University of Southern Queensland

Faculty of Health, Engineering and Sciences

Design and Feasibility Study of Hydro Generators at Various Stages of Mains Water Supply

A dissertation submitted by

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in fulfilment of the requirements of

ENG4111 and ENG4112 Research Project
ERP2021

towards the degree of

Bachelor of Engineering (Honours)

Power Engineering

Submitted: October 2021

ABSTRACT

Climate change and a rapidly increasing population are two major factors of a growing global energy demand. Los Angeles County in California has a population of almost 10.5 million people and is expecting an increase of almost 1 million by 2040.

Even with the rapid growth rate of renewable energy sources such as solar and wind, fossil fuels still contribute 80% of the energy for consumption in the United States of America.

Water has been utilized as a source of energy for thousands of years, from waterwheels used by the ancient Greeks to the Three Gorges Dam in modern China. Hydroelectric power generation is the largest contributor of renewable energy, supplying 17% of the global electricity demand. However, unlike solar and wind, hydropower usage has merely kept constant over the last two decades, not grown. This is due to several factors such limited water resources, environmental concerns, and a large initial outlay of cost.

The aim of this project is to research and conduct a feasibility and efficiency study on hydroelectric power generation from an unutilized existing renewable energy resource, the water supply network in Los Angeles, California, where the Los Angeles Department of Water and Power has over 7 thousand miles of pipe providing 146 billion gallons of water a year. Using hydro generation from an untapped existing resource will help minimise the impacts on social, ethical, and environmental factors. Computational fluid dynamic simulations and small-scale models will be used for various turbine designs within the water supply network, and results analysed to conclude if this is a viable energy resource.

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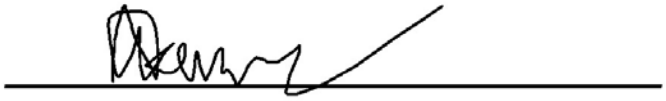

Signature

ACKNOWLEDGEMENT

I would like to express my sincerest gratitude to the following list of people for helping me to achieve my goals for this project:

Justine Gillmer – to my wife and best friend, who has supported me in every way with cups of coffee, priceless advice, and endless encouragement. Only with her proof reading, patience, and love was I able to complete this final piece of my degree.

Matthew Fairhall – a friend and fellow student, who convinced me that starting to study electrical engineering would be a great idea. Thank you for your endless zoom sessions where we could discuss assignments, exams and which filter background was the funniest. Matt's aptitude and dedication to his work set an example and continues to motivate my studies.

John Kitney – my dad, who is always an example of professionalism and integrity that I try to apply to everything I do.

Associate Professor Tony Ahfock – a lecturer at the University of Southern Queensland, who generously gave me hours of helpful advice over zoom and emails. Through our discussions my project was enhanced and gained direction to become something that I am proud of.

Doctor Wijitha Senadeera – a lecturer at the University of Southern Queensland and my supervisor for this dissertation, whose many years of experience and expertise were paramount in me gaining the confidence to study the areas I was interested in and learn and achieve skills in Computational Fluid Dynamics.

To all the lecturers and staff at the University of Southern Queensland who made this possible.

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NOMENCLATURE

The following abbreviations have been used throughout the text:

AC	Alternating Current
B_d	Bucket Depth
B_n	Number of Buckets
B_w	Bucket Width
D	Runner Diameter
DC	Direct Current
d_{jet}	Jet Diameter
EESS	Electrical Energy Storage Systems
ELV	Extra Low Voltage (not exceeding 50 V AC or 120 V ripple free DC)
f	frequency
HAC	Hazard Assessment Checklist
HV	High Voltage (exceeds 1000 V AC or 1500 V DC)
LADWP	Los Angeles Department of Water and Power
LS	Lifespan of Generator
LV	Low Voltage (exceeds 50 V, but not exceeding 1000V AC or 1500V DC)
N	Turbine Shaft Speed
Pa	Pascals
P_N	Number of Poles
PPE	Personal Protective Equipment
P_r	Pressure Rating
USQ	University of Southern Queensland

CHAPTER 1

INTRODUCTION

"Sometimes we just simply have to find a way. The moment we decide to fulfill something, we can do anything. And I'm sure the moment we start behaving as if we were in an emergency, we can avoid climate and ecological catastrophe. Humans are very adaptable: we can still fix this. But the opportunity to do so will not last for long. We must start today. We have no more excuses." ('You did not act in time': Greta Thunberg's full speech to MPs, 2021)

1.1 Project Outline

As the above quote by climate activist Greta Thunberg indicates, the reality of climate change is a fact that our world has no choice but to address in a myriad of ways to avoid a catastrophic outcome. However, the quote also suggests there is hope by highlighting that humans are adaptable, and that there is still time, however brief, to reverse the damage we have done to our planet. With this in mind, we must ask ourselves – how do we best adapt to the challenge of reversing climate change? The answer is simple in concept, if complex in practice; we must use what energy resources we have already created and adjust them to make the designs more efficient and reduce any additional environmental impacts.

A growing population, rapidly advancing technology and a proportional link between electrical energy consumption and the Human Development Index (HDI) (Electricity Consumption and Development Indicators, 2021), means that electricity demand will continue to climb. As a result, a greater electricity supply will be needed to be produced; and with social and environmental concerns needing to be addressed, renewable energy production and solutions need to increase much quicker to allow for the phase-out of fossil fuels.

This study will investigate hydroelectric power, a renewable energy source that has not increased in production in the USA for half a century (Monthly Energy Review - March 2021, 2021). Specifically, this project will focus on the water supply network in CA, USA, as a possible additional source for hydroelectric generation. It will explore the requirements of a viable locations within the water supply network, as well as different turbine generator designs to determine if they are suitable for the new application. It will also detail the expected output and cost to determine efficiency and feasibility of the proposal. A simulation and a small scale model will then be used to explore the capability of the scheme and determine if the design can be improved.

1.2 Background

1.2.1 Renewable Energy

The choices of energy production are many, however it is normally broken down into two main sub-categories:

- Renewable energy –

"Renewable energy is energy obtained from naturally repetitive and persistent flows of energy occurring in the local environment." (Twidell and Weir, 2015)

- Non-renewable energy –

"*Non-renewable energy is energy obtained from static stores of energy that remain underground unless released by human interaction*" (Twidell and Weir, 2015)

We often consider renewable energy to be new and innovative in its use, however historically, this is far from the truth. Non-renewable energy has only been utilised in the USA as a mains supply source from the early 1800s (Francis, 2021).

Unsurprisingly, given the limits of technology, for most of human history, renewable energy has been the main source of energy production. Early forms of renewable energy include:

- Biomass, such as wood burning in the Palaeolithic age, used for cooking and heating.

- Solar, harnessed as early as 672 BC by the Chinese Empire, using curved mirrors for cooking and warmth.
- Hydropower, first utilised as mechanical energy in 1 BCE in Greece, using a water wheel to grind wheat into flour. Later in 1827, Benoit Fourneyron built the first water turbine, which created six-horsepower of energy.
- Geothermal energy, created by natural hot springs. The best-known example is the use of this source and location by the Romans to heat their bath houses in 60 AD.

1.2.2 Hydropower

The term hydroelectric power refers to electricity generated from the energy of moving water. The energy of moving water can be easily observed when looking at a flowing river or stream, where the energy generated is proportional to the water's volume (V), density (ρ), gravity (g) and head height (h).

$$Energy\ Released = V\rho gh$$

Converting this energy into electricity is done via a turbine, of which there are two main types:

- Impulse turbine: uses the impulse (kinetic energy) to rotate the turbine, the moving water will strike each blade individually, and
- Reaction turbine: the turbine's blades react to the pressure of the water, the moving water flows over the blades to rotate them.

An ideal hydroelectric generator would have 100% efficiency. This is, of course, impossible. However, putting aside the loss of power for the time being, the gross power produced can be calculated when considering that the water will have a volumetric flow rate, Q, measured in m^3/second. Thus, the gross power of a hydroelectric generator can be calculated as follows:

$$P_{GROSS} = Q\rho gh$$

1.2.3 The Problem

Fossil fuels are still the main source of energy in the world and specifically in the USA, where in 2019 renewable energies only supplied 11% of the total energy consumed.

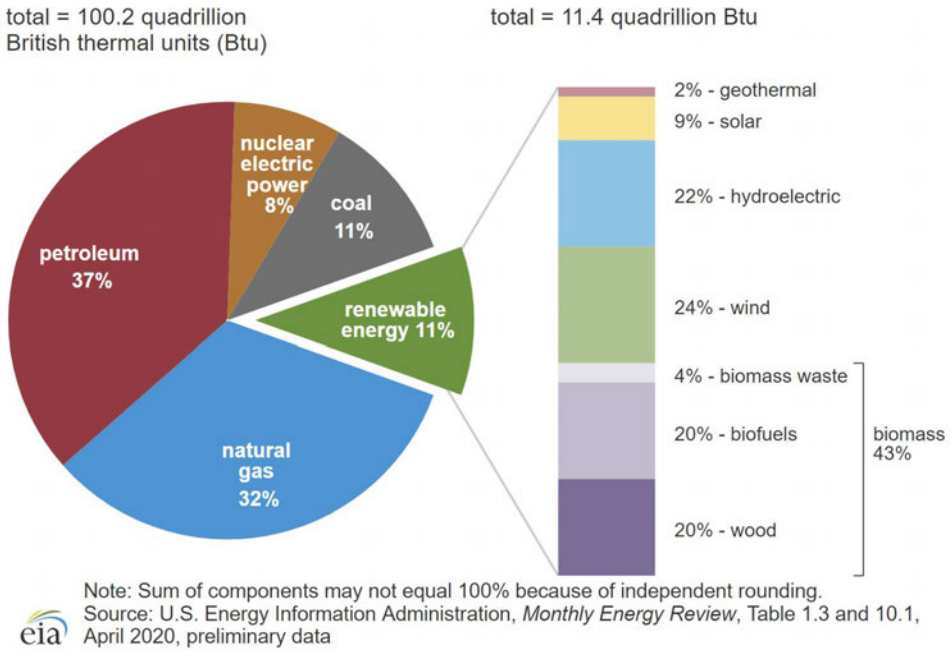


Fig 1.1 – USA Primary Energy Consumption By Energy Source

(U.S. Energy Information Administration, 2021)

In the USA, 29% of global warming emissions are generated from electricity generation (Benefits of Renewable Energy Use, 2021). With climate change occurring as a result of carbon emissions, an emphasis needs to be placed on reducing and replacing fossil fuels renewable energies.

Over the last two decades there has been substantial growth in solar, wind and biomass production due to increases in technological advancements, cheaper production costs, government tax incentives and public desire for an alternative, clean source. However hydroelectric generation in the United States of America has been at a relatively stable and low rate for almost a century.

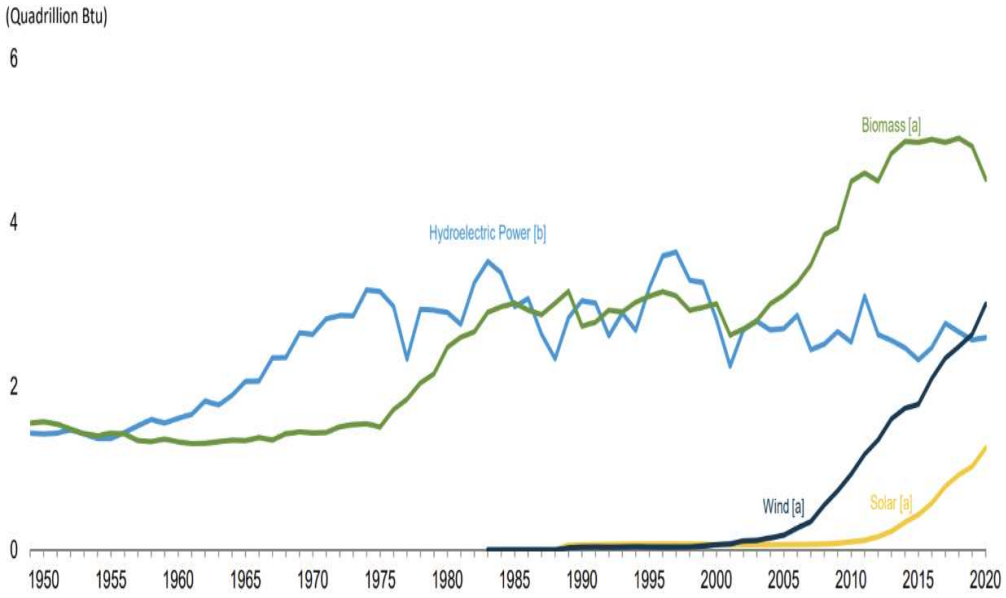


Fig 1.2 – Renewable Energy Consumption
(Total Energy Data, 2021)

Hydroelectric generation on most scales, particularly mega hydroelectric power generation schemes, can prove difficult for a variety of reasons such as:

- Substantial investment costs – estimated to be approximately US$1000 per installed kW
- Environmental impacts on the land of the site as well as down/up stream
- Potential to change water quality in body of water, due in part to the de-oxygenation of water
- Environmental impacts on wildlife and habitats

With a growing population and increases in technology, the demand for electricity will continue to increase. This needs to be met with even greater increases in environmentally sustainable energy sources to combat the effects of climate change.

1.3 Knowledge Gap Identification

After completing some initial research with regards to California's clean energy target by 2045, details of which are outlined in section 3.1.1, it became clear that all efforts were being focused on increasing the supply of renewable energy. However, there was no information or studies conducted that discussed ways to improve California's existing infrastructure to reduce the need for extra energy sources.

The purpose of this dissertation is to address the lack of research into the area of recoverable energy sources within Los Angeles, California, the United States of America. The project looks at utilising the water supply network as a potential wasted energy source and use the excess energy to produce electricity.

1.4 Project Aim

This project aims to investigate the viability of hydroelectric generation in locations not currently being used, where minimal or zero environmental impact occurs. These locations will be within the existing water supply infrastructure in CA, USA, focussing primarily on the customer water mains at various dwelling locations (neighbourhoods), as a potentially untapped energy resource.

Project viability will be determined by research into existing technology's feasibility, as well as examining and testing the pressure lost during the generation process. This data will be collected and reviewed to give a comprehensive and informed opinion with each case scenario of generator design and location to determine if worthwhile.

Once the feasibility and efficiency of each scenario is determined, in the cases where it is not viable, the target design parameters will be analysed to form the bases of a new design brief. With simulation software, such as Onshape and SimScale, attempts will be made to improve the hydroelectric schemes setup and meet the determined criteria.

1.5 Project Objectives

The specific objectives of this project are: -

1. Conduct initial background research on various types of existing hydro generation, giving an overview of both small and large systems.
2. Detail governmental factors of Los Angeles (where this study is taking place), such as carbon taxes, carbon emission targets, etc.
3. Specify three to five (3 -5) locations with potential to incorporate a hydro generator in-line with the water supply mains, such as catchment, treatment plant, reservoir, and customer mains.
4. Detail information about the incoming water supply network, and a statistical analysis of the water usage per capita and expected water flow rate at each specified location.
5. Determine the potential output of each location when applying the various types of existing hydro generation, as well as listing costs of both install and ongoing, thereby determining if the location and equipment chosen is feasible.
6. If not feasible, list parameters of the hydro generator at each location that would need to be met to achieve the desired output.
7. Design and model a new type of hydro generator that meets above parameters and model system using Onshape and SimScale.
8. Build a small-scale model of design to test and record data.

1.6 Thesis Overview

Chapter 2, through an in-depth literature review, explores hydro schemes and the various hydroelectric power generation designs with a specific focus on the turbine, the water supply system and usage in California, and possible options for EESS within proposed hydro schemes. The main aim of this chapter is to provide a foundation for innovative designs.

Chapter 3 defines the various proposed locations for the new hydroelectric power generation schemes and details a feasibility study of each location, with a detailed analysis of viable sites.

Chapter 4 explores the scenarios where target parameters were not met and simulates, with Onshape and SimScale, new hydroelectric generation designs recording modelled results.

Chapter 5 produces an in-depth discussion surrounding the simulation and small-scale model results, outlining the associated implications, impacts and obligations.

Chapter 6 summarises and provides conclusions for the project, as well as recommendations for future research into the development of the proposed schemes.

1.7 Summary

As is shown above, this project will test both the feasibility and efficacy of existing hydroelectric schemes when used in various locations of the water supply network.

As dictated by target parameters and with environmental impacts being a clear motivator to engineer alternative solutions, simulations will be run to determine if an improved design is possible to increase viability.

There is a clear and immediate need for this study as we replace more fossil fuels with cleaner energy sources, whilst also adapting technologies to become more energy efficient. It is hoped this research will offer an alternative source of clean energy for everyone with minimal social or environmental impacts.

CHAPTER 2

LITERATURE REVIEW

2.1 Overview

For the project, an in-depth understanding of existing designs of hydroelectric turbines/schemes will be required. For this reason, a literature review needs to be undertaken to gather data and further develop the innovative ideas towards this research project. A continual revision of the literature review throughout this project will also occur to ensure an up to date and informed approach is taken. The focus areas for the literature review will be:

- LA water supply network
- Hydro Turbines
- EESS
- CFD Simulation
- Existing Schemes

2.2 Los Angeles Water Supply Network

The LADWP in the largest municipal utility in the USA and reports three (3) main sources of water to supply LA county. (Sources of Supply, 2021)
These sources include:

- Metropolitan Water District of Southern California (MWD)
    - Providing water through both the Colorado River and California Aqueducts.
- Local groundwater
    - Underground reserves of water from aquifers.
- The Los Angeles Aqueducts.
    - Comprising of two separate aqueducts, the Los Angeles Aqueduct and the Second Los Angeles Aqueduct.

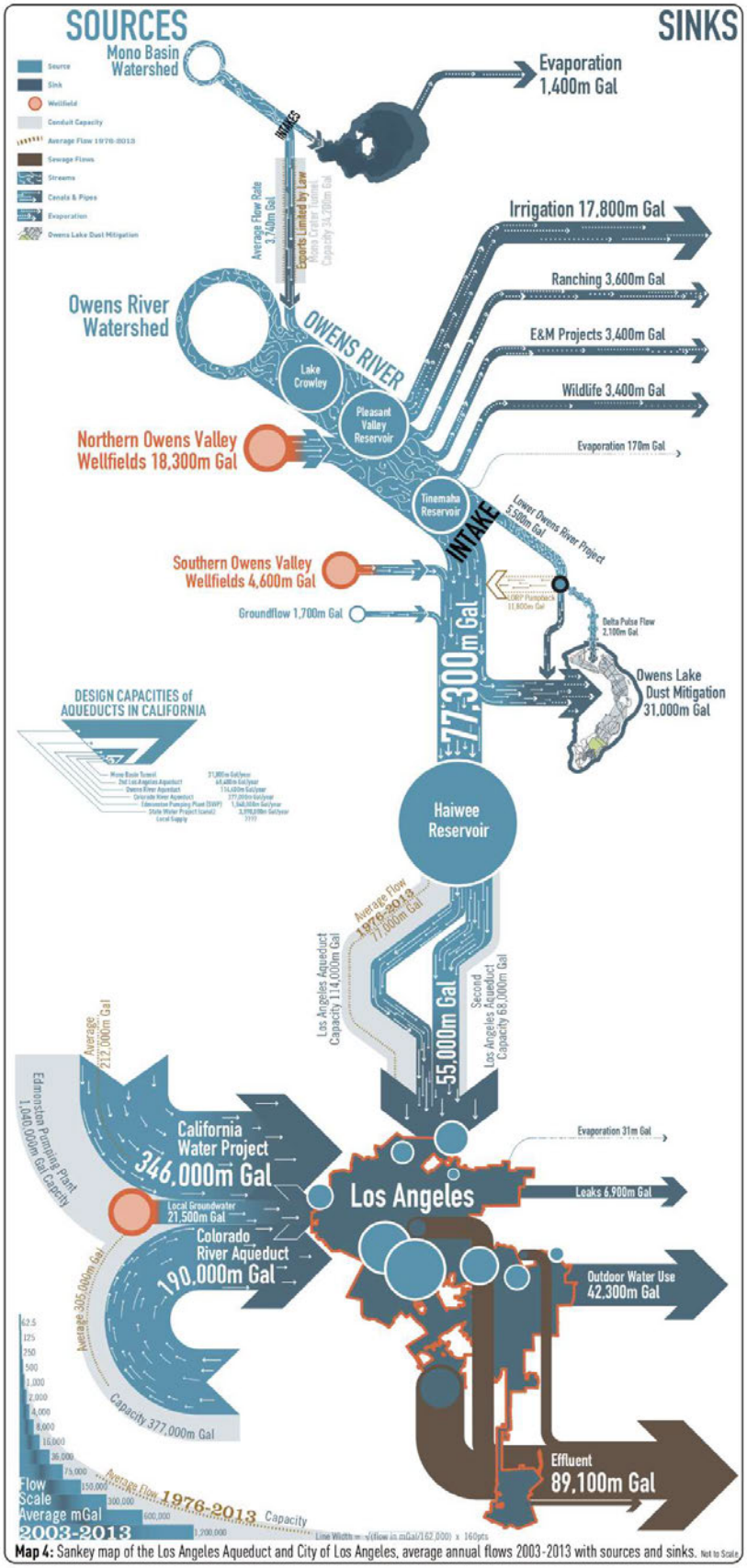


Fig 2.1 – LA City Water Infrastructure
(Lehrman, 2021)

To distribute the water supply from the sources shown, LADWP uses a variety of infrastructure to ensure that an adequate and reliable water source is provided to the end user. The water infrastructure is shown in the following table 2.2.1, from a report published this year from LADWP. Further information can be found in appendix E.

Table 2.1 LADWP Water Infrastructure
(Facts & Figures, 2021)

Water Infrastructure	
Tanks and Reservoirs	115
Pump Stations	84
Ammoniation Stations	9
Chlorination Stations	22
Regulator Stations	329
System Pressure Zones	111
Distribution Mains	7,336 miles of pipe
Fire Hydrants	60,988
Total Storage Capacity	323,820 acre-feet

LADWP reports that it uses the above infrastructure to ensure an average water supply pressure of 53 PSI, not exceeding 80 PSI. Water pressure is dependent on many factors such as demand, property elevation, distance from supply, etc. Exceeding 80 PSI particularly in a residential home is problematic as most plumbing supplies (e.g. faucets, toilets, water heaters) are not engineered past this PSI. This can lead to failure causing hazards to property and/or persons.
To reduce places where excess pressure exists, a pressure regulator valve, as shown in Appendix D Table D, is used.

LADWP supplies an average of 1.658 gigalitres a day to just over 4 million people in LA city. In 2018 the average daily use of water per capita was given at 112 gallons (424 litres) (Annual Report 2017-18, 2021). However, it is important to note that residential water supply demand fluctuates throughout the day on an hourly basis as shown in Figure 2.2.2 below.

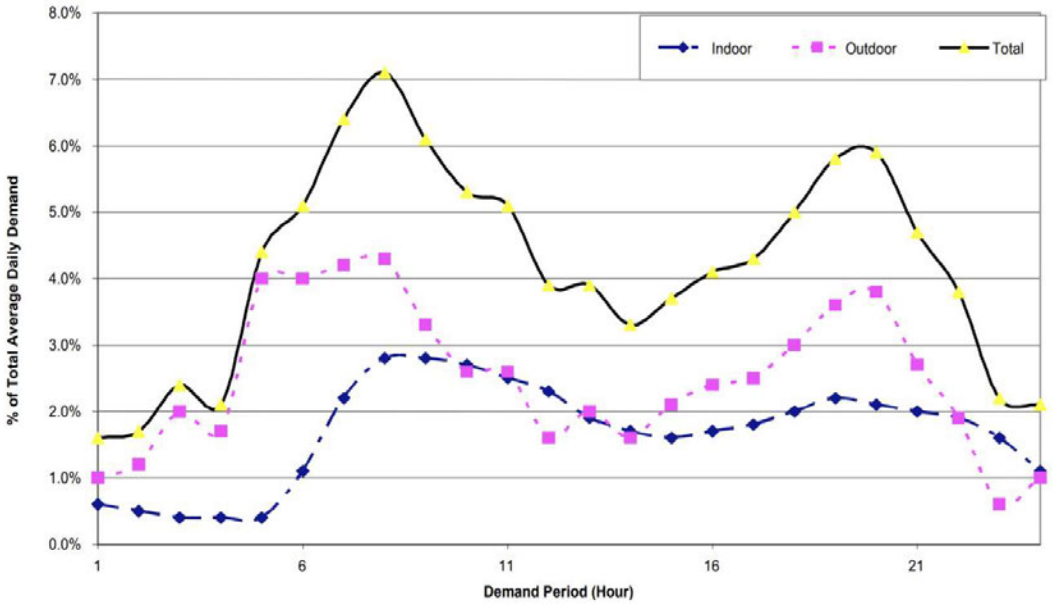


Fig 2.2 – LA Residential Hourly Water Usage
(House, 2021)

When using water in Los Angeles, the maximum allowable instantaneous flow rate from a kitchen faucet is 0.138798 l/s (2.2 g/m). (Ehlers, 2021)

2.3 Energy Demand

The water demand, as shown in Fig 2.2.2, is not constant but rather fluctuates with two defined peaks, as does the electrical energy demand in California.

Seen below in Fig 2.3.1, the non-renewable energy demand almost replicates that of the hourly water usage, however not for the reasons one might think. Whereupon first inspection it would be easy to attribute the fluctuation of demand in energy to people getting ready to start/end the day (as is the case for water), it does not account for the reduction during the middle of the day when demand would peak due to air conditioning, machinery, office/shop lighting etc. The reduction is, in fact, due to solar and wind generating more during the middle of the day, therefore less demand is needed from other sources of electricity.

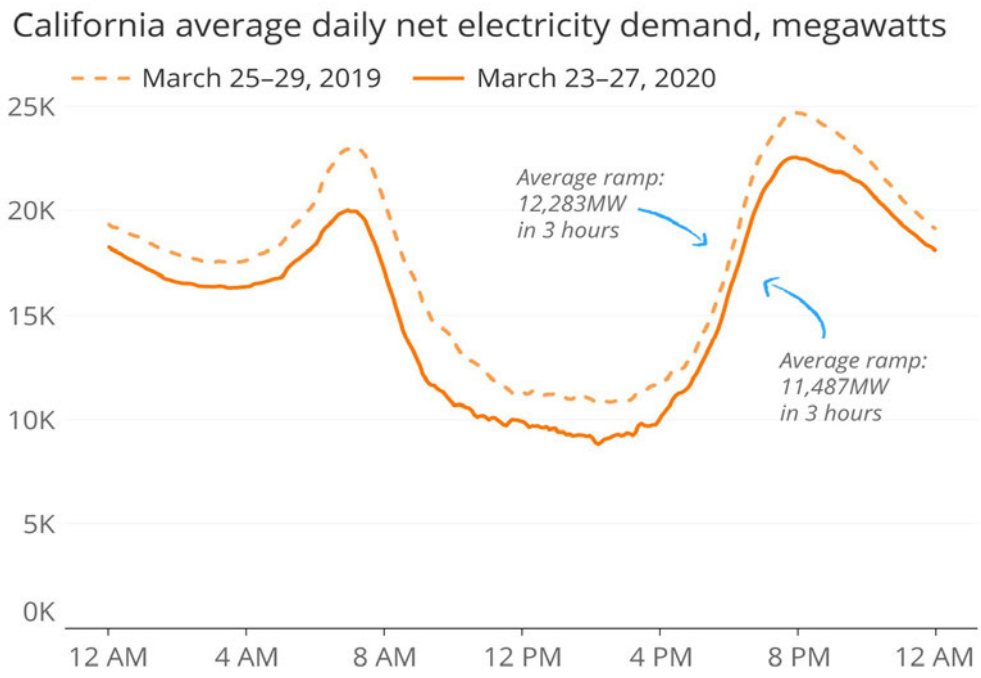


Fig 2.3 – California Non-Renewable Daily Demand
(Electricity is changing, 2021)

According to a study conducted by the University of California Irvine, the average household in California consumes 6000 kWh per year. (Comparisons of Household Power Usage, 2021). Of this total electrical energy demand, California can produce a peak of 94.5% using renewable energy sources as confirmed by the Californian Independent System Operator (California just hit 95% renewable energy. Will other states come along for the ride?, 2021).

2.4 Hydro Turbines

Shown in section 1.2.2, Hydropower turbine design is usually categorised as having two main categories for hydroelectric generation, being impulse and reactive. To determine the most efficient and effective design, a qualitative and quantitative criterion should be applied. An example of these requirements is displayed below in Table 2.2.1.

Table 2.2 Turbine Selection Criteria
(Williamson, Stark and Booker, 2014)

Quantitative criteria	Qualitative criteria
Rated flow/head efficiency	Environmental – regulatory, weather, location
Part flow/head efficiency	Required civil works
Cost	Portability
Turbine rotational speed	Maintainability and serviceability
Power for given site or required site conditions	Reliability
Size of system	Ease of manufacture
	Design modularity

Turbine designs vary to better suit these requirements in a range of different conditions; hence it is important to have an overview of each design.

The four design categories are: Impulse, Reaction, Archimedes Screw and Waterwheel. With slight modifications to each of the four categories, eleven different types are displayed in Figure 2.2.1 below.

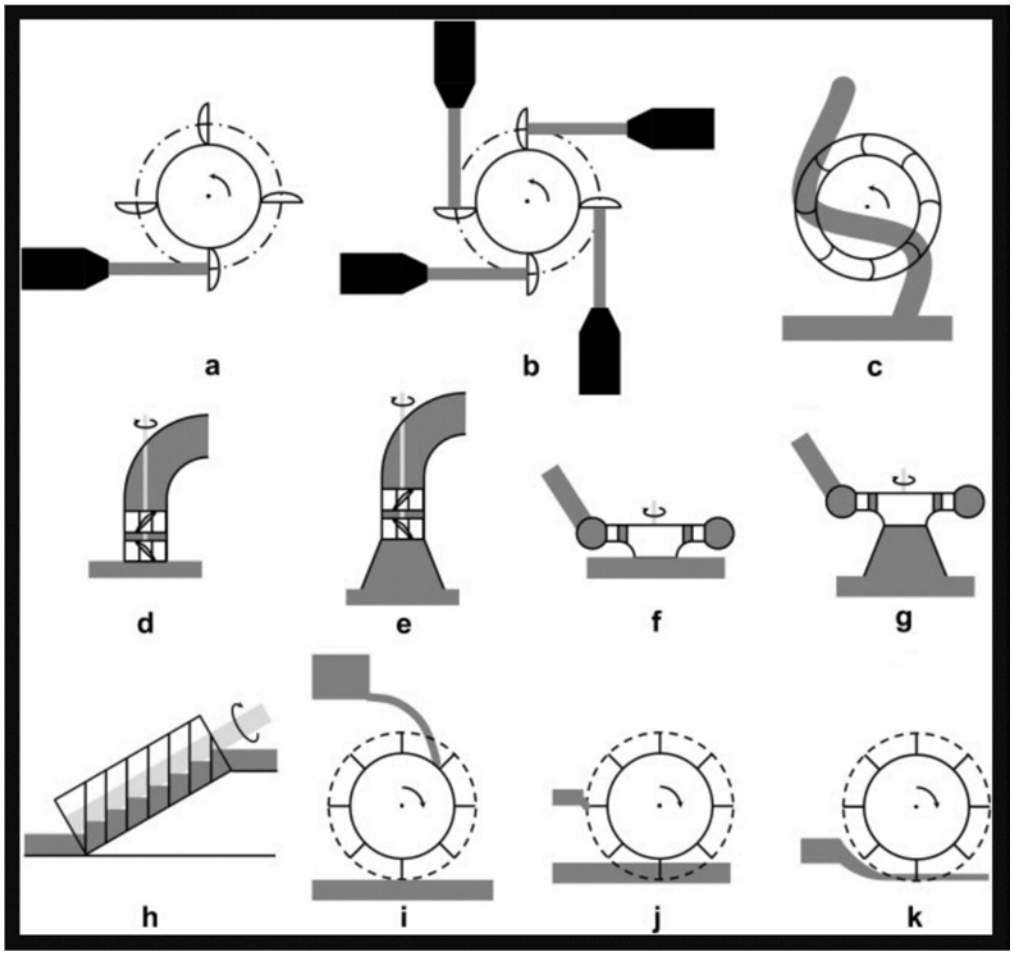


Fig 2.4 – Turbine designs a. Pelton/Turgo single-jet b. Pelton/Turgo multiple-jet c. Crossflow d. Propeller turbine – no draft tube e. Propeller turbine – draft tube. f. Radial flow turbine – no draft tube g. Radial flow turbine – draft tube h. Archimedes screw. i. Overshot waterwheel j. Breastshot waterwheel k. Undershot waterwheel.
(Williamson, Stark and Booker, 2014)

As can be seen in fig 2.3.1, there are many different design options. Taking the head pressure as a defining factor, it is possible to select one turbine for each scenario:

2.4.1 Kaplan Turbine

A reaction type turbine that has two main variations with the design type. One design is fitted inside a continuation of the penstock where the other, like the Francis turbine, uses a spiral casing. Both design types direct the water flow past guide vanes which are adjusted to maximise flow efficiency and create a tangential velocity. The whirling force created in the water then is funnelled down to the axial flow turbine. The blades on the turbine can also be adjusted to maximise performance.

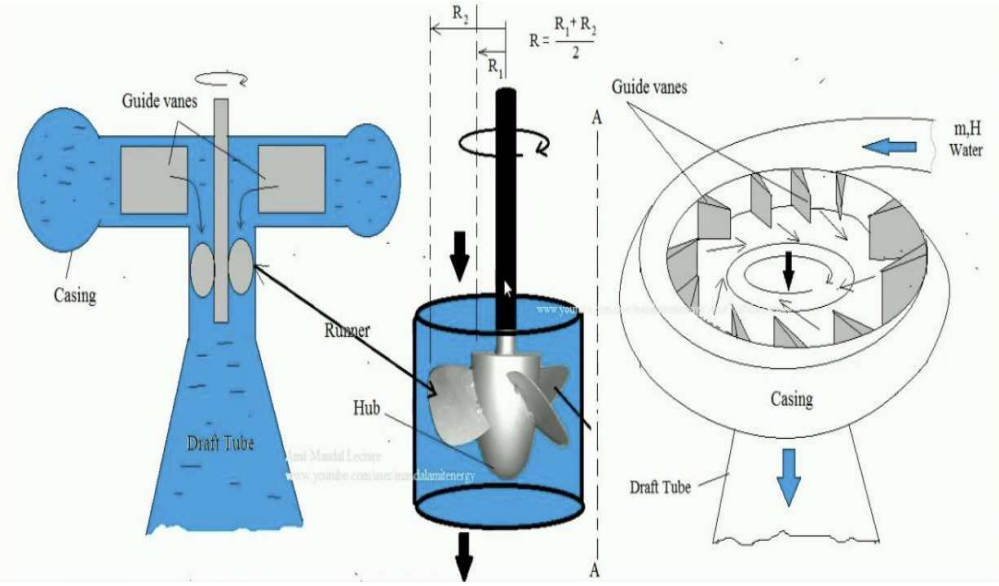


Fig 2.5 – Kaplan Turbine
(Mandal, 2021)

When considering micro-hydro schemes, the Kaplan turbine is best suited for a low head pressure.

2.4.1 Francis Turbine

A reaction type turbine that works on the pressure difference across the runner blades. Water enters a scrolled casing, increasing in velocity as it travels around before entering through guide and stay vanes. These vanes direct the water to achieve an optimal flow before moving through runner vanes creating a rotation. The water then exits the turbine through a centrally located draft tube.

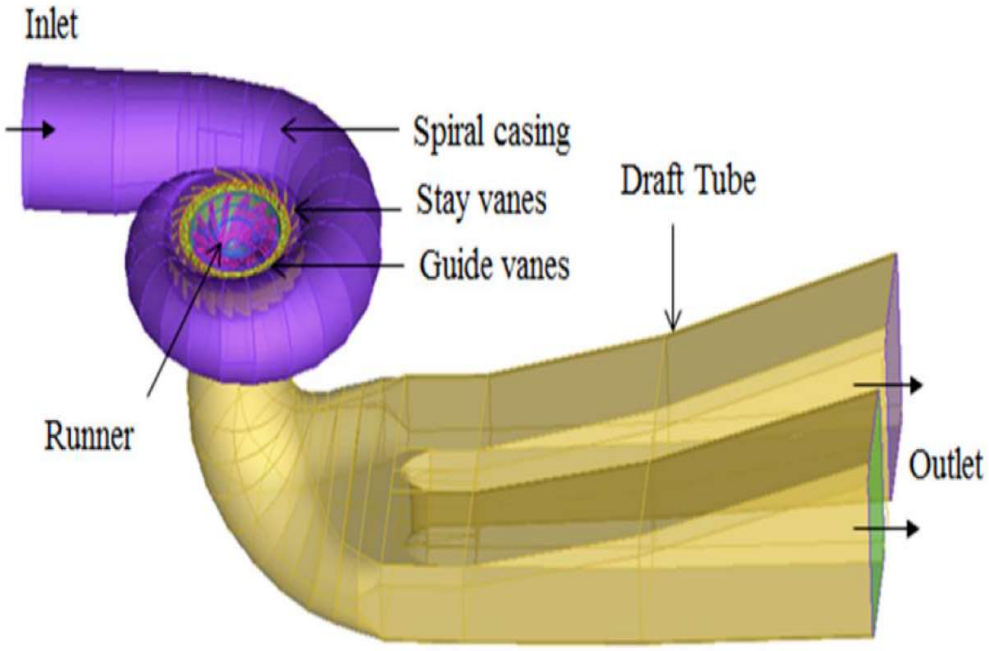


Fig 2.6 – Francis Turbine
(Rakibuzzaman et al., 2019)

When considering micro-hydro schemes, the Francis turbine is best suited for a medium head pressure.

2.4.1 Pelton Turbine

An impulse turbine which uses the kinetic energy produced from one or more nozzles positioned around a rotating runner disc. Increasing the number of nozzles allows for a smaller runner disc for a given flow rate. The disc is fitted with buckets to maximise the kinetic force of the water jet/s. The bucket design is split into two to haves with a raised central ridge to reduce the risk of a kinetic energy dead spot in the central area.

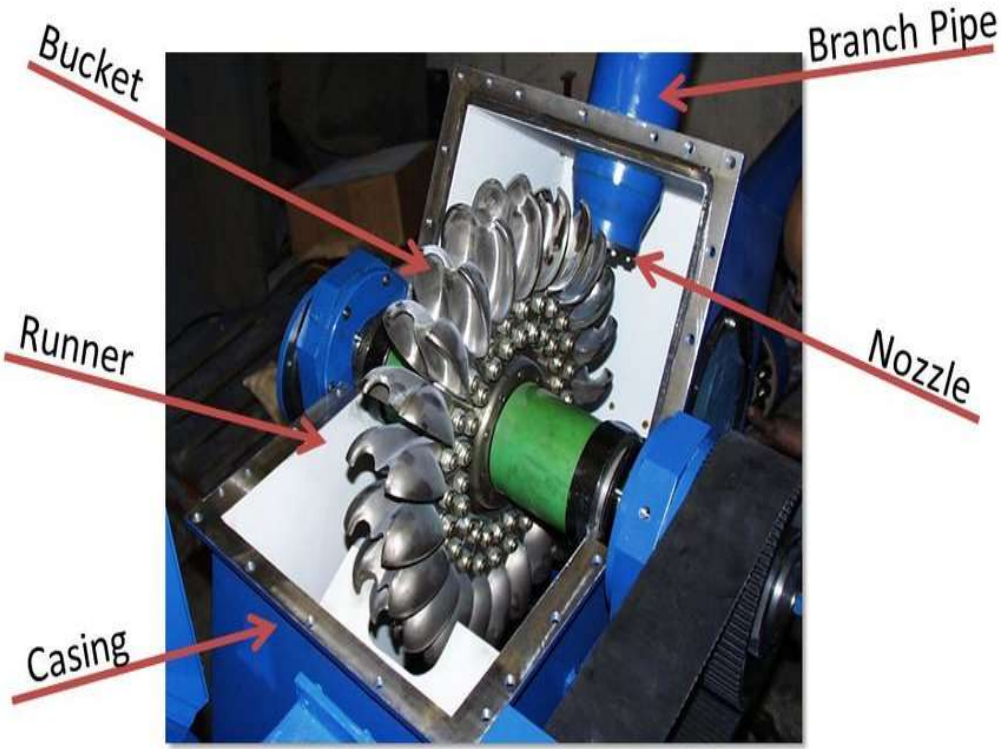


Fig 2.7 – Pelton Turbine
(Zidonis and Aggidis, 2021)

When considering micro-hydro schemes, the Pelton turbine is best suited for a high head pressure.

2.5 Electrical Energy Storage System

Renewable energies such as wind, solar and tidal often have a fluctuating power output due to external environmental factors. This intermittency can be addressed by EESS (Electrical Energy Storage Systems).

EESS is a way to store the electricity generated to bridge intermittent sources as well as meet peak energy demands. This can be created through a variety of methods such as compressed air, pumped hydro storage, flywheel and batteries.

An article from HIS Markit showed that Battery EESS, specifically lithium-ion, have reduced in costs by 60% over the last five years and are forecast to lower by a further 60% by 2030. (IHS Markit, 2021)

EESS usage has increased steadily since 2015, with only a slight reduction in new installations in 2019 due to the Covid-19 pandemic, and this growth is forecast to continue until 2030 as can be seen in Figure 2.4.1.

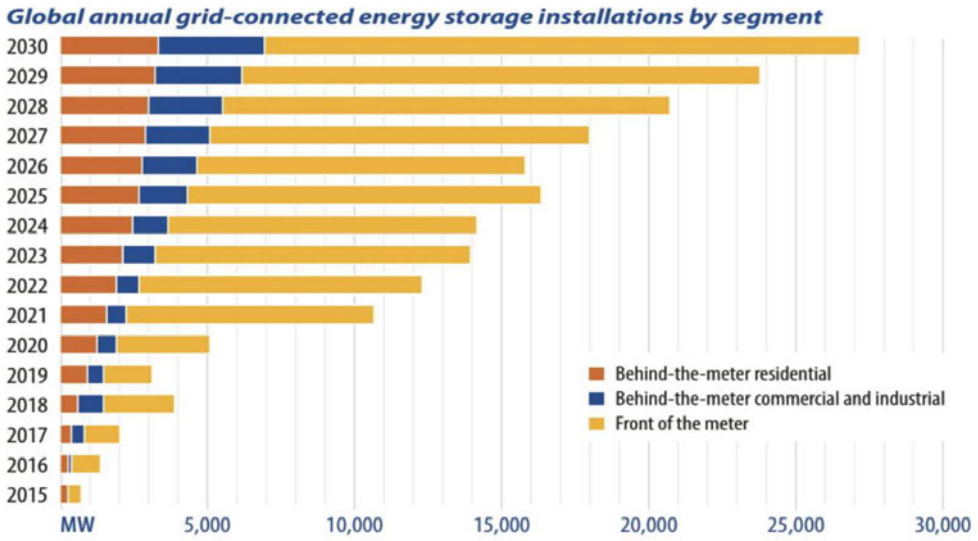


Fig 2.8 – Grid-connected Energy Storage Installations
(Longson, 2021)

Unless demand closely mimics supply, there is a need for efficient energy storage to ensure power is a reliable commodity. Unlike feeding directly back into the electrical grid, distributed generation through EESS offer a solution for the need of flexibility with renewable energy.

2.6 Computational Fluid Dynamics Simulation

In the book Computational Fluid Dynamics (CFD) by G. Powell, CFD is described as combining both discrete and continuum theories for fluid modelling with computational algorithms for fluid simulation.

To expand on the definition, a computer is used to model fluid theory by allowing the user to set parameters, such as boundary conditions, material of fluid, analysis type. These parameters will be explored in depth in Chapter 4.

2.7 Existing Schemes

In other American states such as Oregon, where the city of Portland's water supply network allows, designs are being used to maximise excess pressure within gravity fed water mains by a renewable energy provider called Lucid Energy, as shown in fig 2.9 and 2.10.
This requires specific criteria to be met for the scheme to be viable. The circumstances of assessing the possibility of a scheme are covered in chapter 3. However, it is important to be aware of existing technologies.

Fig 2.9 – Water Mains Generator
(Engineering et al., 2021)

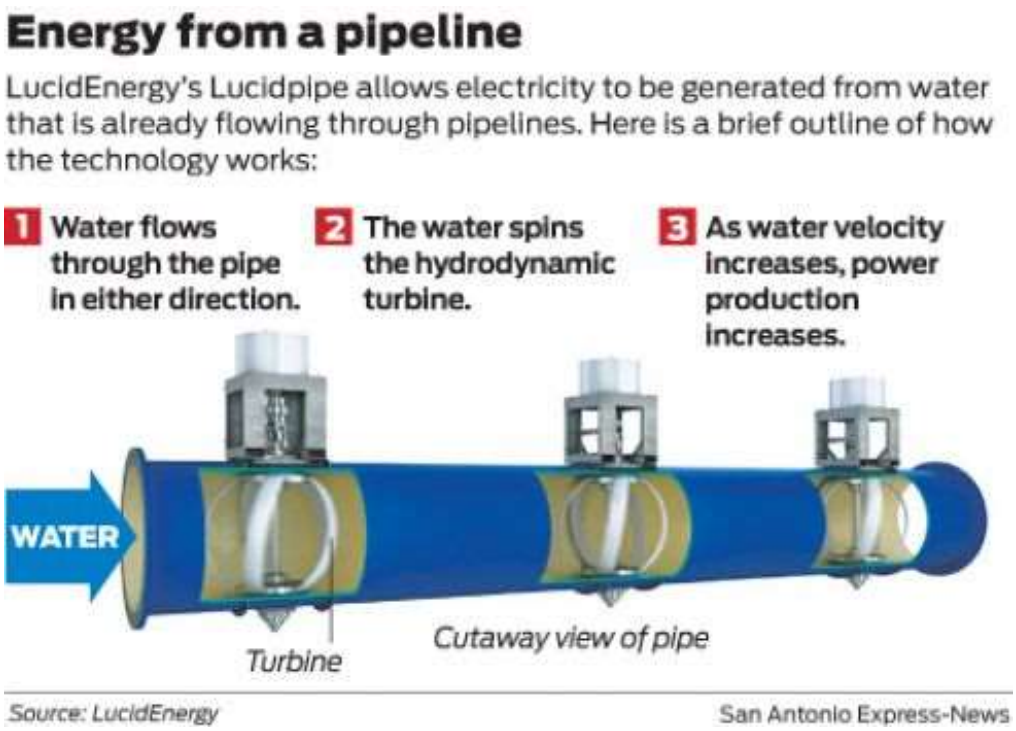


Fig 2.10 – Energy from a Pipeline
(Engineering et al., 2021)

CHAPTER 3

RESEARCH AND TEST METHODOLOGY

3.1 Locations for focus of study

Per the project specification outline, research included choosing various locations within the water supply network for potential hydroelectric power generation. As is discussed in this chapter, there were many varied contributing factors that led to a location to be chosen and for others to be dismissed from a viability standpoint. A further outline about why only one site/location was selected is detailed in section 3.1.3.

3.1.1 Los Angeles

Los Angeles, California was selected for this project as the location of study due to four (4) reasons:

1) I have been living within LA County since 2015, so am familiar with the unique geography and topography as well as the existing energy and water network provided.

2) Los Angeles County is primarily supplied by one utility provider for both water and power, the LADWP. For hydroelectric power generation, this combination of two professional disciplines within one integrated water and electrical supply system is ideal.

3) The various elevations of Los Angeles County, coupled with the provision of imported water, creates a complex water supply network. This leads to fluctuating water supply pressures (50 – 300 psi) to ensure that minimum pressure is possible at all locations for consumers.

4) California passed a bill (SB 100 Joint Agency Report, 2021) into law in 2018 to replace all fossil fuels with renewable and zero-carbon sources for electricity generation by 2045.

3.1.2 Potential Sites

As outlined in the Project Specification Appendix A, various locations were proposed within the water supply network such as catchments, treatment plants, reservoirs and customer mains. The following potential locations were identified:

1) Los Angeles Aqueduct – runs south from Ownes Valley near the Nevada California border to Los Angeles and conveys water for 544 km.

Fig 3.1 – Los Angeles Aqueduct (Penstock)
(Water Education, 2021)

2) California Aqueduct – running for 715 km parallel to the Californian coastline and transporting water from the Sierra Nevada Mountains down to Los Angeles.

Fig 3.2 – California Aqueduct
(California Aqueduct, 2021)

3) Colorado River Aqueduct – almost 400 km in length, it carries water from east to west from the Colorado River to Los Angeles.

Fig 3.3 – Colorado River Aqueduct
(Troy, 2012)

4) Santa Monica Water Treatment Plant – used for purifying water from the Charnock groundwater sub-basin.

Fig 3.4 – Santa Monica Water Treatment Plant
(Water Education, 2021)

5) LADWP water mains – the water utilities responsibility, located underground acting as the major artery for water distribution within Los Angeles.

Fig 3.5 – LADWP Water Utilities Network
(Bridging Engineering and GIS, 2021)

6) Private Service Line – one of two parts connected to the underground water mains to deliver potable. The service line is divided into two sections, with one section deemed as public (utility owned) and the other private (consumer owned). The private service line will normally incorporate the water meter, a pressure regulator and a shut off valve.

Fig 3.6 – Private Service Line Components
(Service Line Assembly, 2021)

3.2 Capability and Demand Study

Hydroelectric power generation schemes can be complex and are expensive in initial setup costs, therefore it is essential to have adequate research into capability and demand of each of the proposed sites listed in section 3.1.2.

1) Los Angeles Aqueduct

   Whilst being built (completed in 1913), hydroelectric power was generated at two separate plants to provide electricity to aid in the construction. The Los Angeles Aqueduct has accommodated fourteen (14) different hydroelectric plants since it began operating.

   Today, eight (8) plants are still in operation and can generate 122 MW of power. (LADWP Eastern Sierra, 2021)

2) California Aqueduct

   Part of the California State Water Project (SWP), the California Aqueduct has nine (9) hydro plants along its route. Of these plants, four (4) are hydro pumping plants, to ensure the water has enough head height to reach the final destination. The five (5) remaining hydroelectric power generating plants operating at maximum capacity total a supply of over 18 GW. (SWP Facilities, 2021)

3) Colorado River Aqueduct

   Uses pumping stations to gain adequate head height (a total of approx. 5 km) to ensure that the water can travel west across the vast deserts to reach Los Angeles. Although it does not generate power through its own hydroelectric system, the Aqueduct uses some supply from hydroelectric power plants such as the Hoover and Parker Dams. (CRA - Water Ed Foundation, 2021)

4) Santa Monica Water Treatment Plant

   Pumps water over 5.5 km from groundwater supplies to be filtered and treated to ensure a clean water supply. Once ready for distribution, water is then pumped to Santa Monica consumers, supplying 32 million litres a day. (SMWTP Process, 2021)

5) LADWP Water Main

   From an interview I conducted with an LADWP engineer specialising in the supply line water pressure, it was reported that Los Angeles has one of the most complex water supply systems in the United States of America. This was qualified by a few key contributing factors:

   - The various supply sources, such as imported water, pumped groundwater, and treated water all being integrated.
   - Los Angeles county has both hilly and flat topography.
   - The urban sprawl of Los Angeles, being the most populated county in the United States of America and covering an area of over 12000 km^2.

   These factors account for the extensive infrastructure which includes 111 different pressure zones and 84 separate pumping stations. (LADWP, n.d.)

From the capability and demand survey of the five (5) potential locations listed it can be seen that:

1) Los Angeles Aqueduct – hydroelectric potential is already being used. Further capability is not a viable option.

2) California Aqueduct – hydroelectric potential is already being used. Further capability is not a viable option.

3) Colorado River Aqueduct – does not have the capability to support hydroelectric generation as it relies on pumping stations to have adequate head height.

4) Santa Monica Water Treatment Plant - does not have the capability to support hydroelectric generation as it relies on pumping stations for distribution.

5) LADWP Water Mains – hydroelectric generation is not viable due to the complexity of the network. Introducing a scheme would require further pumping stations which would demand further electrical power than what could be generated.

The location listed as Private Service Line in section 3.1.2 is explored in the following sections as the chosen location for study.

3.3 Private Service Line

To determine the feasibility and viability of the private service line, several studies need to be conducted to ensure all facets are considered. These studies include:

- A site survey adequately showing the intended area for the proposed scheme.
- A hydrology study, to determine the electrical power potential of the site.
- Pre-feasibility study, using the characteristics of the hydro source to determine the best design possible.
- Full feasibility study once an initial design is decided upon, to optimise the performance of the scheme by detailed engineering calculations and costings.
- Financial evaluation of costs of installation and maintenance.

3.4 Site Survey

Water is supplied to the city of Los Angeles through the water mains which are then tapped off by service lines for each consumer. To provide a safe and reliable service, a pressure reduction valve is installed. Pressure reduction/regulator valves reduce the supply pressure to an acceptable and safe level for the fixings and consumers.

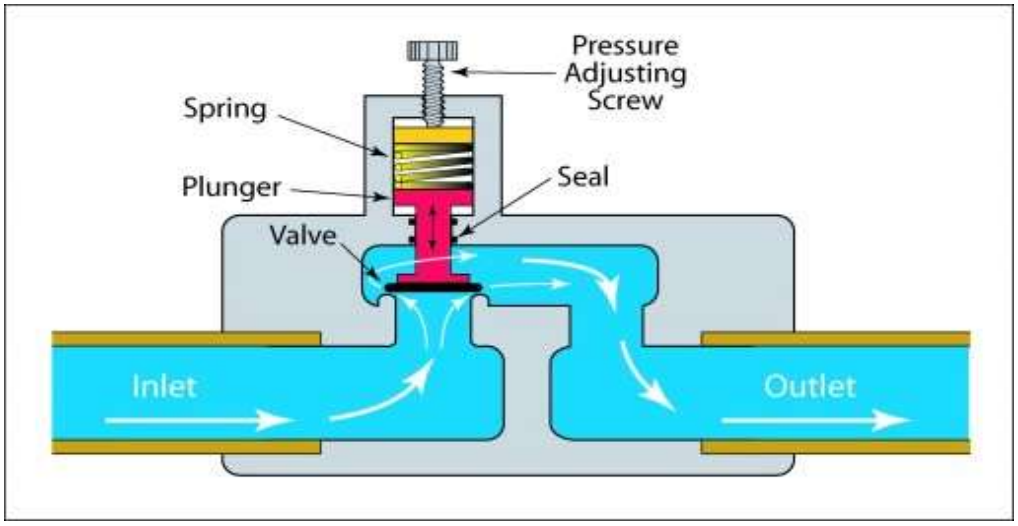


Fig 3.7 – Pressure Reduction Valve
(Regulators, 2021)

From an interview I conducted with an LADWP engineer specialising in the supply line water pressure, the variations in the supply water pressure can range from 50 – 300 psi (LADWP, n.d.). The variation for this is due to proximity to supply, demand, elevation of site and supply network adjustments (further discussion is included in section 3.13 – 5) LADWP Water Main).

For this report, 200 psi (13798952 Pa) will be used to study if the scheme is viable, where optimal pressure using a regulator for a domestic dwelling is between 50 and 70 psi. For this project the desired minimum pressure in a house will be 50 psi (344738 Pa).

California is prone to severe drought, and therefore imposes water efficiency standards and water restrictions to a higher degree than that of other states within the USA. As a result, the water flow within a house is restricted to a maximum of 2.2 GPM (0.138798 l/s or 0.000138798 m^3/s) (Ehlers, 2021)

It is possible to calculate the energy lost through a pressure reduction valve (PRV) using the nominated values by firstly noting that hydraulic power is calculated by:

$$Hydraulic\ Power\ (W) = Pressure\ (Pa) \times Flow\ (m^3/s)$$

Using the above power formula and substituting the values nominated to find the power lost:

$$Inlet\ Power\ = Outlet\ Power - Power\ Loss\ at\ PRV$$
$$1378952 \times 0.000138798\ = 344738 \times 0.000138798 - Power\ Loss\ at\ PRV$$
$$191.3958\ = 47.8489 - Power\ Loss\ at\ PRV$$
$$Power\ Loss\ at\ PRV\ = 143.5468348\ W$$

As is shown in the above calculations, there is 143.5 W of power being wasted every time a tap is turned on or a shower is used. We are literally flushing power down the toilet. To further illustrate this a CFD model is displayed below showing the pressure reduction and power loss around the inlet valve, fig3.2.1.2.

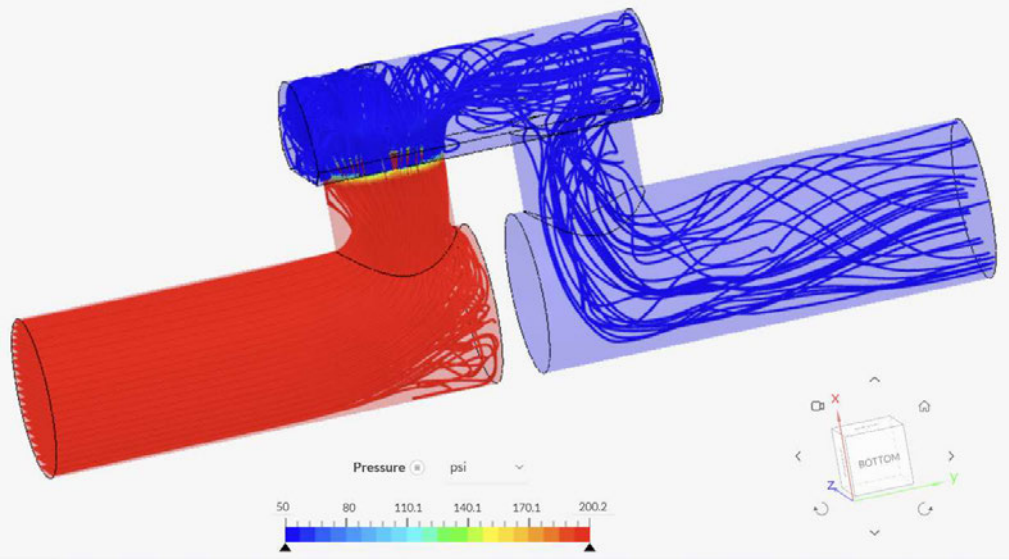


Fig 3.8 – CFD Pressure Reduction Valve
(SimScale, 2021)

It is also possible to use the CFD model to display convergence plots of the area average of both the inlet and outlet to confirm that the velocity is constant. These convergence plots are shown below:

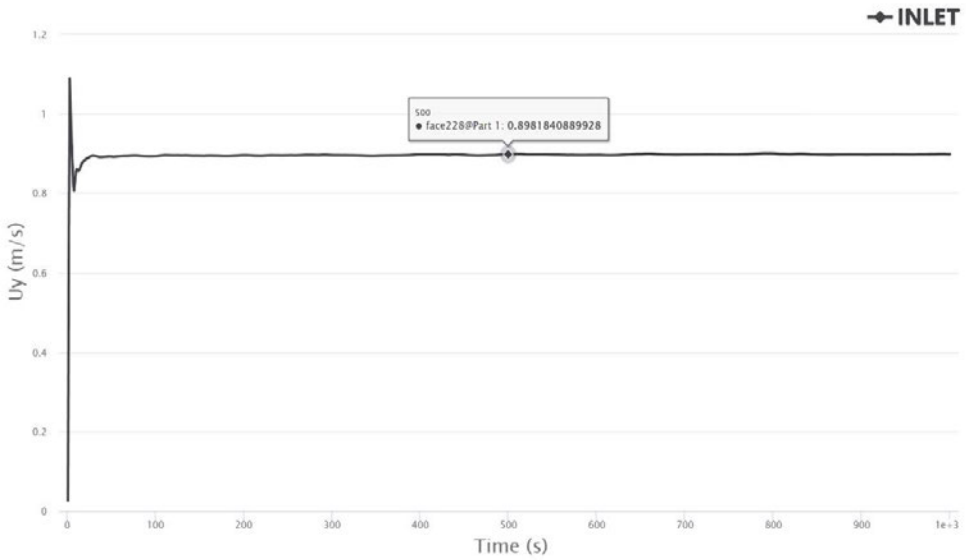


Fig 3.9 – PRV Inlet Velocity
(SimScale, 2021)

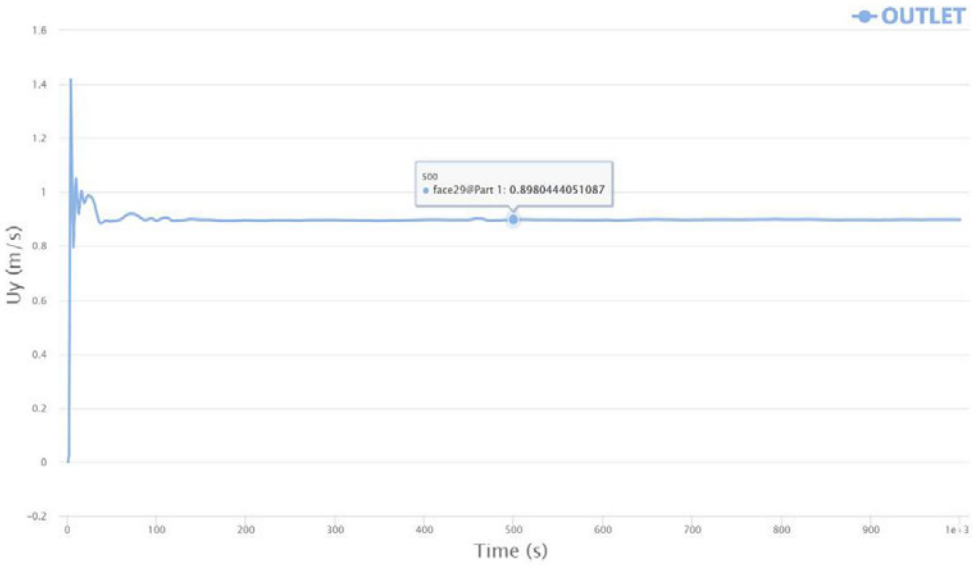


Fig 3.10 – PRV Outlet Velocity
(SimScale, 2021)

As is shown in the above two figures 3.09 and 3.10, after the system reaches steady state, the velocity of the inlet is equal to the velocity at the outlet and remains constant.

This selected scheme for this project aims at replacing the PRV with a hydroelectric turbine in areas where there is already excess pressure. This would provide the ability to harness the otherwise wasted power to provide power generation.

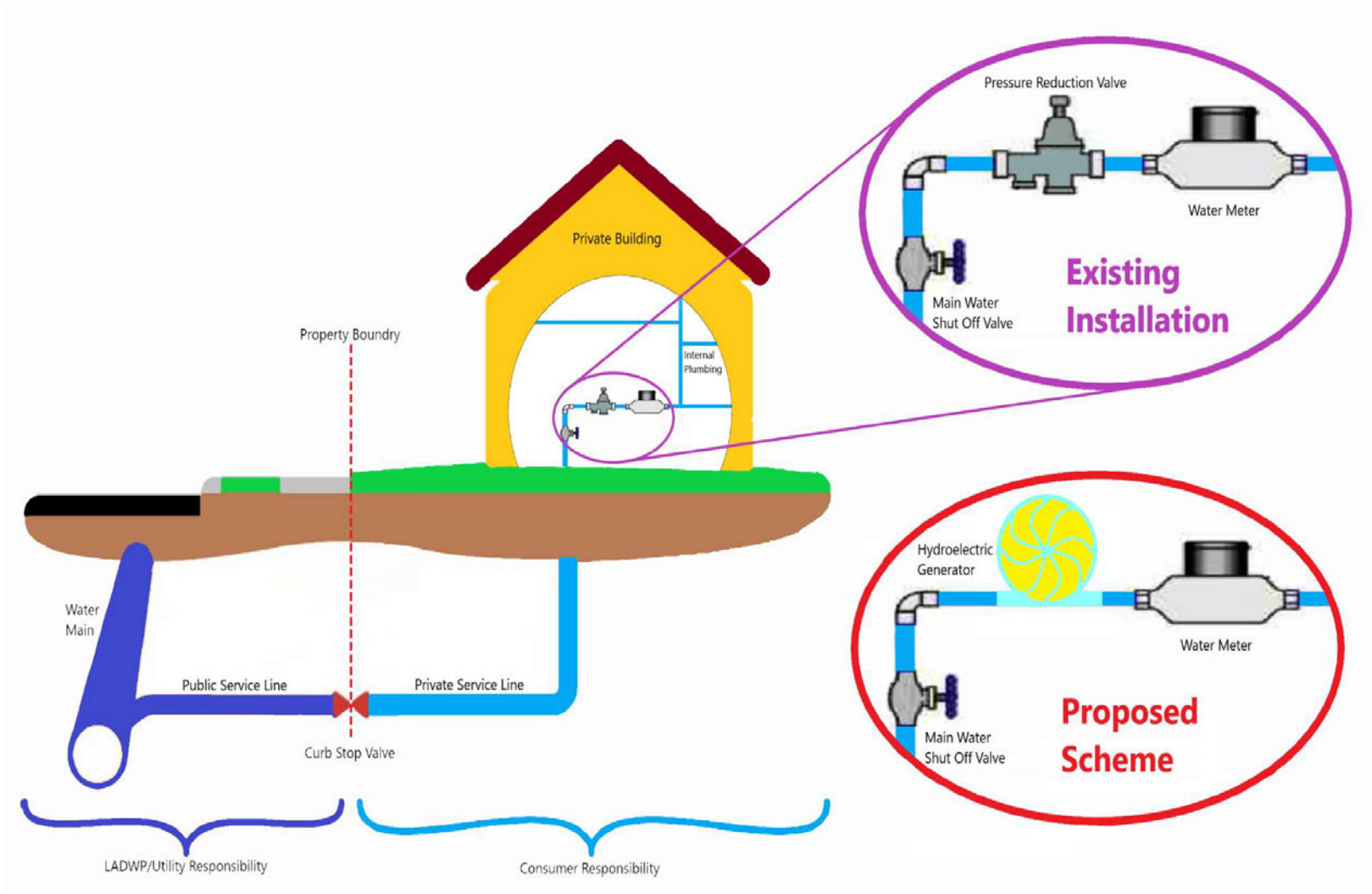


Fig 3.11 – Site Survey of Private Service Line

3.5 Hydrology Study

As per section 3.2.1, it is shown that the potential instantaneous power from the private service line is 143.5W. However, this is not a reflection of what the yearly output is expected to be, rather it will be used later for the turbine choice in section 3.2.3. To calculate the potential energy generation over a year for the proposed private service line scheme, the turbine power output formula is used along with the water usage per capita for Los Angeles:

$$P = \eta \rho Q g h$$

As discussed previously in section 2.2, the average daily amount of water used per capita is 424 litres. Converting this to standard SI units is:

$$424\ l/day/capita \Rightarrow 0.004907\ l/s/capita$$

The United States Census Bureau reports that Los Angeles has an average number of 2.99 people per household (Quick Facts, 2021). Therefore, per household the average water use can calculated below:

$$0.004907\ \times 2.99 = 0.01467314815 = 14.673\ ml/s$$

Needing the volumetric flow rate, converting the units as follows:

$$0.014673\ l/s = 0.001 \times 0.014673\ m^3/s$$
$$Q = 14.67314\ \times 10^{-6} = 14.673\ \mu m^3/s$$

Using the nominated values for water pressure in section 3.2:

$$Main\ to\ Service\ Line = p_1 = 200\ psi$$
$$Service\ Line\ to\ Internal\ Plumbing = p_2 = 50\ psi$$
$$Available\ Excess\ Pressure = \ p_T = p_1 - p_2$$
$$Available\ Excess\ Pressure = \ 200 - 50 = 150\ psi$$

Converting psi to SI units:

$$1\ psi = 0.70325\ m\ of\ head$$
$$150\ psi = 105.4875\ m\ of\ head$$

Rounding down for ease of calculations for the remainder of the study gives:

$$h = 105.4875\ m\ \Rightarrow 100\ m$$

Now using the turbine power output equation and neglecting the efficiency to determine the maximum power available average over a year:

$$P = \eta\rho Q g h$$
$$P = 1 \times 997 \times 14.673 \times 10^{-6} \times 9.81 \times 100$$
$$P = 14.35103036 = 14.351\ W$$

Determining the total potential kWh output for the year per household:

$$P_{day} = 14.35103036 \times 24 = 344.425\ Wh/day$$
$$P_{year} = 344.425 \times 365 = 125.716\ kWh/year/household$$

Determining the total potential kWh output for the year per capita:

$$P_{year} = \frac{125.716}{2.99} = 42.045\ kWh/year/capita$$

3.6 Pre-Feasibility Study

To determine the type of feasible design the characteristics of the proposed site as per section 3.2.1 are listed below in SI units:

$$Potential\ Instantaneous\ Power = P_I = 143.5\ W$$
$$Head\ Pressure\ Available = h = 100\ m$$
$$Maximum\ Flow\ Rate = Q_M = 0.138798\ \text{l/s or } 0.000138798\ \text{m3/s}$$

The proposed site has a maximum flow rate, however unlike a dam reservoir, this will not be constant. Fluctuations in speed will occur when a tap is opened partially, or if the pipe outlet is fitted with a water-saving fixture. Flow control devices within a hydroelectric power generation scheme must be accounted for by considering the effects of the part-flow efficiency as a priority.

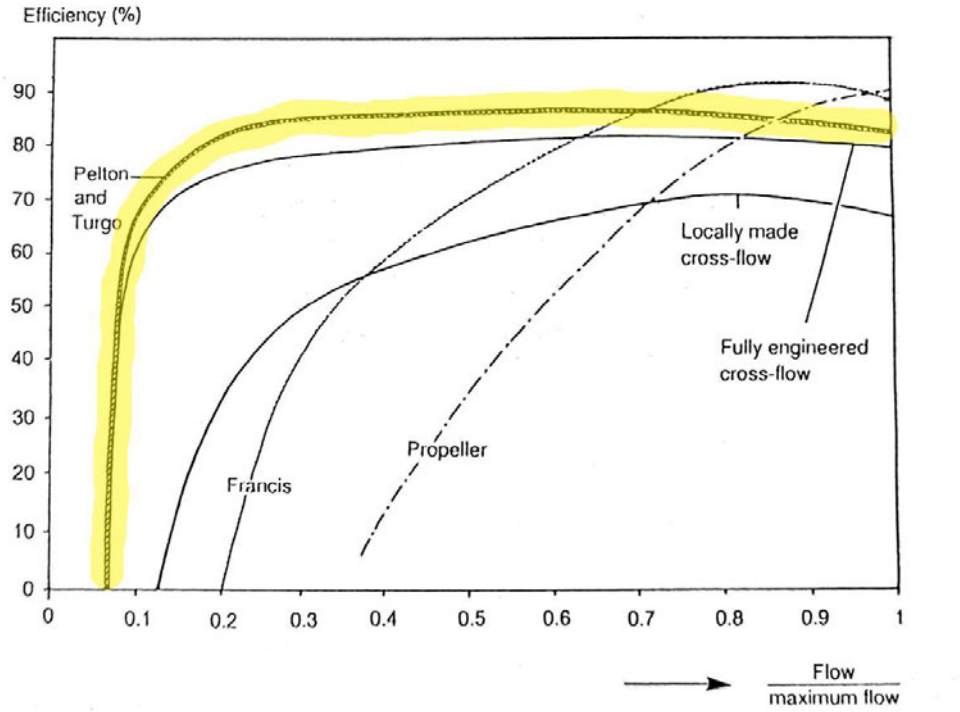


Fig 3.12 – Part-flow Efficiency of Turbine Designs
(Harvey, Brown, Hettiarachi and Inversin, n.d.)

As is shown above fig 3.2.3.1 the Pelton Turbine has an efficiency that is the least impacted from a part-flow rate and largely remains at a constant output.

3.7 Feasibility Study – Turbine Design

Using a Pelton Turbine and the characteristics of the site, as described in section 3.2.3, it is possible to calculate an engineered specific design for optimal performance. Minimising components within the installation is important to reduce initial costs and maintenance. To do so the turbine shaft speed will have a 1:1 ratio with the alternator to avoid the need for speed changing gears. Producing power at 60 Hz, as is typical in the United States of America, is therefore ideal. Nominating the use of a 2-pole alternator to maximise efficiency it is now possible to calculate the shaft speed of the turbine:

$$N = \frac{120f}{P_N}$$

$$N = \frac{120 \times 60}{2}$$

$$N = 3600\ RPM$$

To achieve the desired speed, the Pelton turbine utilises engineered buckets and a jet injector to focus and maximise the kinetic potential of the water, as illustrated in fig 3.2.4.1.

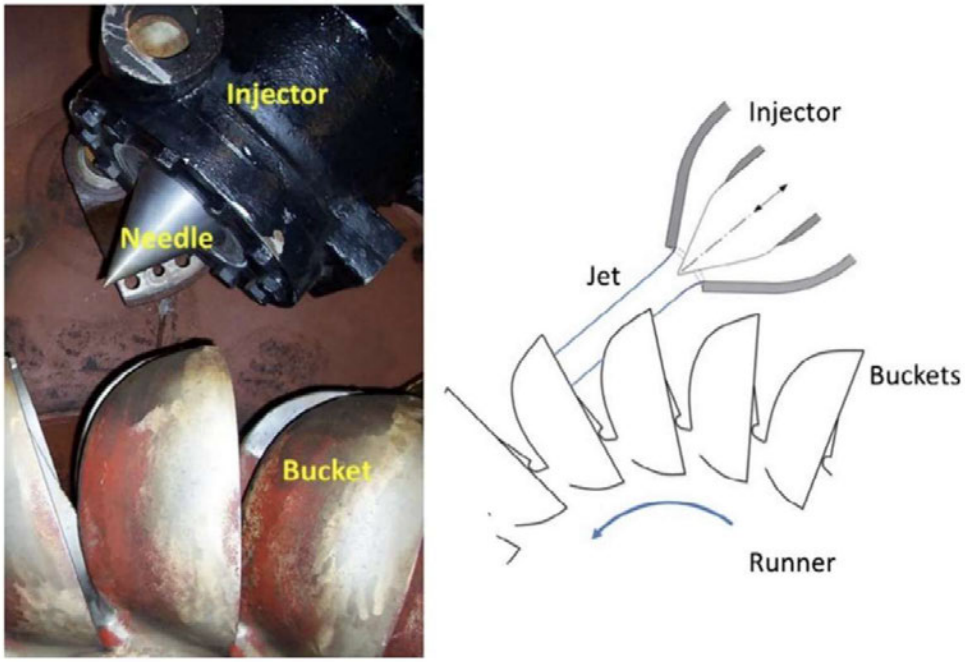


Fig 3.13 – Pelton Turbine Components
(Egusquiza et al., 2018)

To confirm the choice of a Pelton turbine, it is possible to calculate and compare the specific speed with other turbine design choices:

$$Specific\ Speed = N_s = \frac{1.2 \times N \times \sqrt{kP_I}}{h^{1.25}}$$

$$N_s = \frac{1.2 \times 3600 \times \sqrt{0.1435}}{100^{1.25}}$$

$$N_s = 5.175$$

This is represented graphically in fig 3.2.4.1 below:

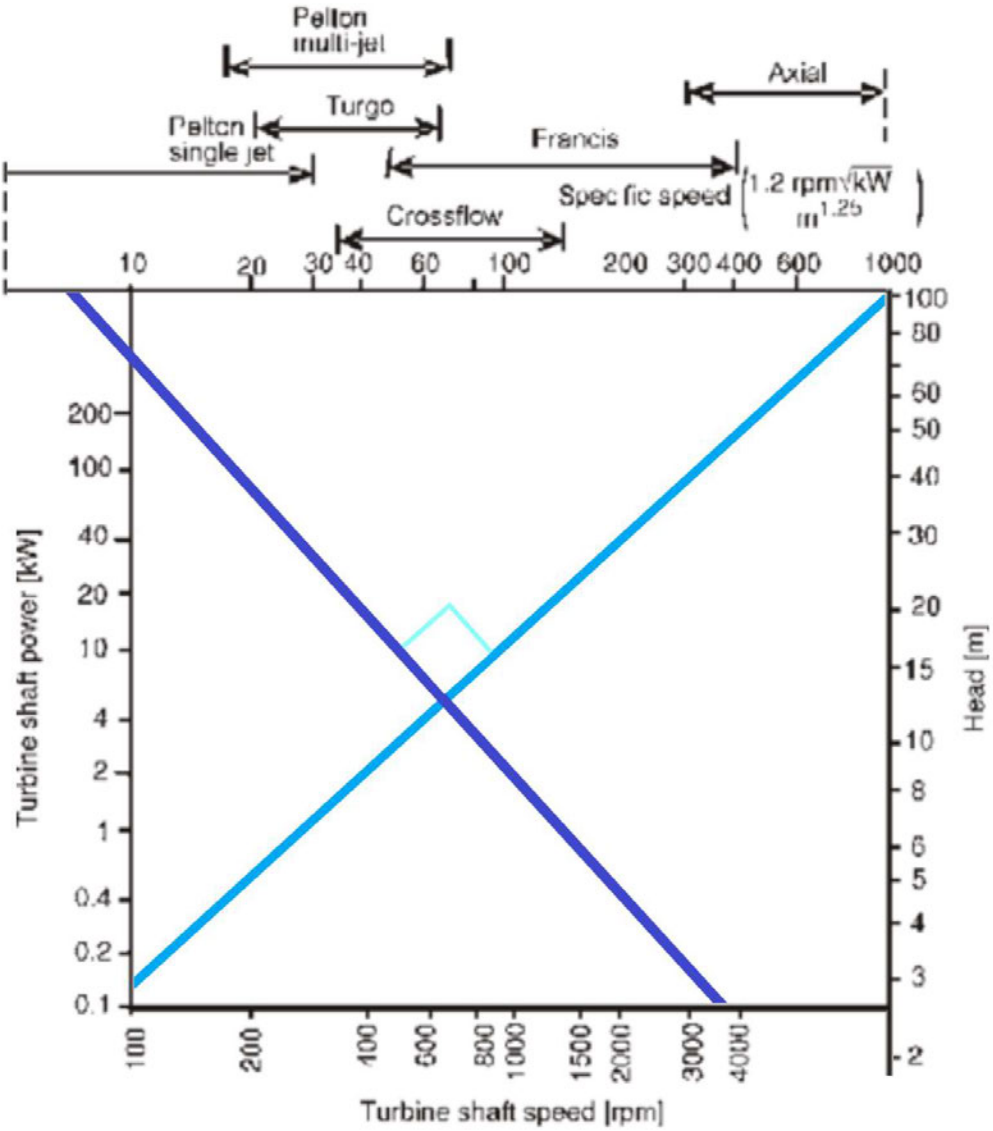


Fig 3.14 – Selection of Turbine using Specific Speed
(Harvey, Brown, Hettiarachi and Inversin, n.d.)

In designing the ideal Pelton turbine, it is beneficial to size the diameter of the runner according to the available head height. This will ensure that the excess pressure is being converted into electrical energy, and that the output has an adequate pressure of 50 psi.

To calculate the optimal diameter the rpm equation is used:

$$D_{ideal} = \frac{38 \times \sqrt{h}}{N}$$

$$D_{ideal} = \frac{38 \times \sqrt{100}}{3600}$$

$$D_{ideal} = 0.1056\ m$$

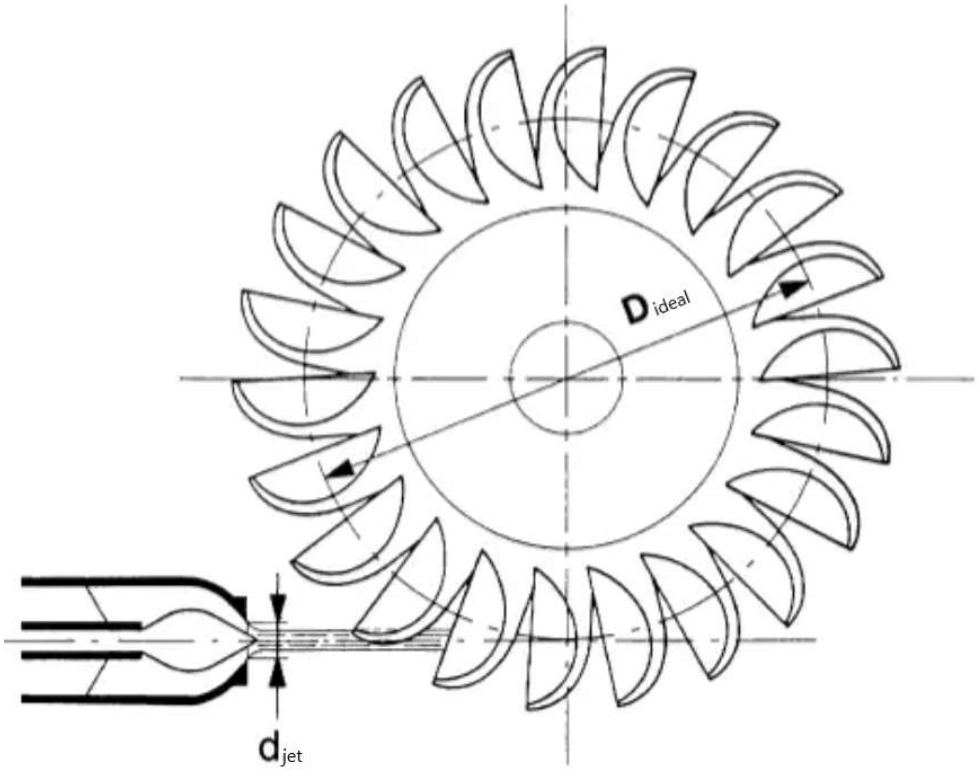


Fig 3.15 – Pelton Runner Dimensions
(Ukasha and Khan, 2021)

The calculation of the ideal diameter is displayed graphically using the nomogram in fig 3.2.4.3 below:

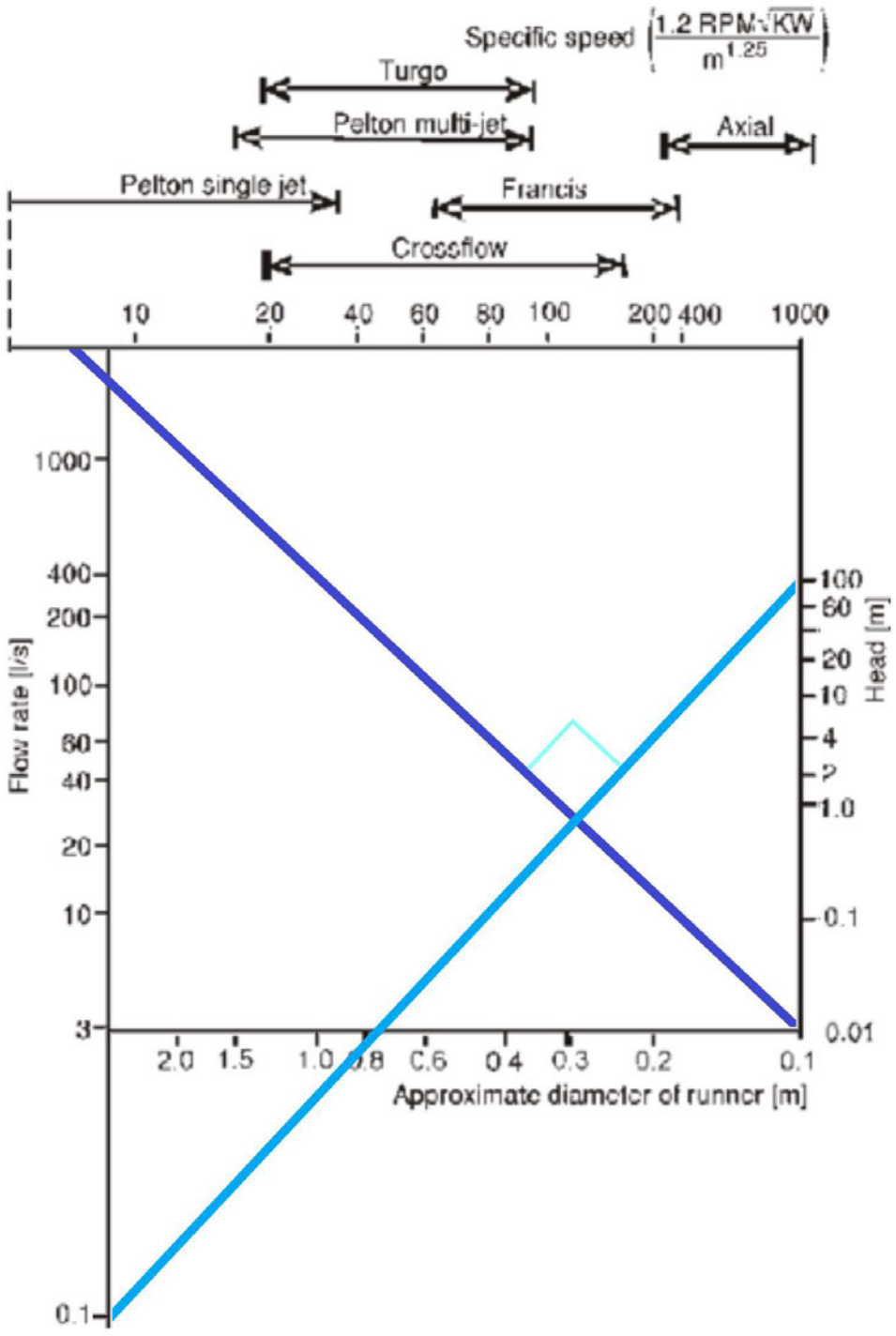


Fig 3.16 – Ideal Diameter of Turbine
(Harvey, Brown, Hettiarachi and Inversin, n.d.)

Working within the United States of America's measurements to install a hydroelectric generator onto a 1-inch pipe, design units are converted to the imperial system:

$$D_{ideal} = 0.1056\ m \Rightarrow 4.1557\ "$$

As per fig 3.2.4.3, an important component to ensure optimal output of the Pelton turbine is the nozzle jet. From the nomogram in fig 3.2.4.2, the single jet Pelton turbine is the most efficient choice. Therefore, using the nozzle equation, it is possible to calculate the ideal jet diameter:

$$d_{jet} = 0.54 \times \frac{\sqrt{Q_M}}{h^{0.25}} \times \frac{1}{\sqrt{n_{jet}}}$$

$$d_{jet} = 0.54 \times \frac{\sqrt{0.000138798}}{100^{0.25}} \times \frac{1}{\sqrt{1}}$$

$$d_{jet} = 0.0020117\ m\ \Rightarrow 0.0792\ "$$

As can be seen from fig 3.12, with an engineered design, a Pelton turbine, producing 143.5 W, can achieve an efficiency of up to 90% (Pelton and Turgo turbines - Renewables First, 2021). This will be the target efficiency for the CFD simulations carried out in chapter 4.

3.8 Feasibility Study – Financial Evaluation

The cost of hydroelectric generating schemes varies depending on many factors including site location, water capacity, environmental and social mitigation. Generally, the conventional mega hydro installations are less expensive per kWh than that of smaller schemes but have a substantial capital cost.

To determine the feasibility and viability of the proposed private service line hydroelectric scheme, a monetary value and comparison is assessed in the following sections of this chapter.

3.8.1 Plant Factor

For the proposed scheme of a private service line Pelton turbine hydroelectric generator, assuming no losses as discussed in section 3.5, the total power per year is:

$$P_{year} = 125.716\ kWh/year$$

The power ratio of a hydroelectric installation indicates the overall capacity of generation for the scheme compared to the power demand. This can be useful in cases of a conventional large scale hydroelectric project where the scheme considers future planning and therefore has a supply that exceeds the demand.

For the discussed proposed scheme however, as per section 2.3, the average consumption per household per year in California is 6000 kWh/year. This is well above the power the proposed scheme will produce and therefore:

$$Plant\ Factor = \frac{Power\ Used \times Time}{Power\ Installed \times Time} \Rightarrow \frac{Energy\ Used}{Energy\ Available}$$

$$Plant\ Factor = \frac{6000}{125.716} = 47.727 < 1$$

A plant factor greater than 1 shows that the proposed scheme is under rated and will not be able to meet demand if it was the only source of supply. However, due to this scheme being complimentary to other sources, as displayed in fig 2.3, the electrical energy produced will all be used to offset the demand of fossil fuels.

3.8.2 Unit Energy Cost

From section 3.8.1 it is evident that all the hydroelectric power generated will be consumed. Hence with a 100% efficiency, the proposed private service line hydroelectric scheme could provide a maximum of 125.716 kWh per year.

Unit energy costs are normally given in kWh and are calculated by the complete cost of the scheme to install and run, divided by the total power output for a given time:

$$Unit\ Power\ Cost = \frac{Total\ annual\ cost\ + Operating\ Cost + Maintenance\ Costs}{P_{year} \times Plant\ Factor}$$

Where Plant Factor is calculated as greater than 1, as per section 3.8.1, the number 1 is used as all electrical energy is consumed.

Further studies need to be conducted to gather an accurate estimation on costings, however the factors to be considered are:

- Pressure casing – pressure casing of turbine will increase costs
- Number of installations – more installations will result in cheaper costs for parts and labour. This may be possible with a government initiative to meet a clean energy target as discussed in section 3.1.1
- Zero carbon tax – the proposed private service line hydroelectric power generation scheme is a possible renewable energy source. Being within the United States of America means this will have the benefit of a carbon tax exemption or other incentives such as the Federal Investment Tax Credit (Explorer et al., 2021).
- Overall installation parts – alternator, cables, housing, certification, Pelton turbine, potential for EESS (battery storage).
- Calculations have neglected losses and are at 100% efficiency. Generally, a hydroelectric generation scheme is given an overall efficiency of 50%.

Further studies will be needed to accurately assess the private service line scheme.

- Life of parts – what is the designed/expected lifespan of plant/equipment used? Does it require regular maintenance or replacement?

Grid supplied electricity in Los Angeles is reported as 22.0 cents per kWh. (Bureau of Labor Statistics, 2021). The monetary equivalent of the private service line compared to the grid supply is therefore:

$$P_{year} \times Grid\ Unit\ Energy\ Cost = 125.716 \times 0.22 = \$27.66\ USD$$

Recorded in September 2021, the average solar panel cost in Los Angeles California is listed as $2.71 USD per W. As per section 3.5, it was shown the private service line scheme could produce a maximum of:

$$P = 14.35103036 = 14.351\ W$$

The monetary equivalent of the private service line compared to the cost of a solar panel is therefore:

$$P \times Solar\ Panel\ Cost/W = 14.351 \times 2.71 = \$38.39\ USD$$

CHAPTER 4

DATA AND RESULTS ANALYSIS

4.1 Simulations Setup

To test and optimise the private service line hydroelectric Pelton turbine scheme, as discussed in chapter 3, losses were neglected during the simulations to replicate the full generation potential. This is taken into consideration within the conclusions of section 6.

The Pelton turbine was designed using an online Computer Aided Design (CAD) software called Onshape.

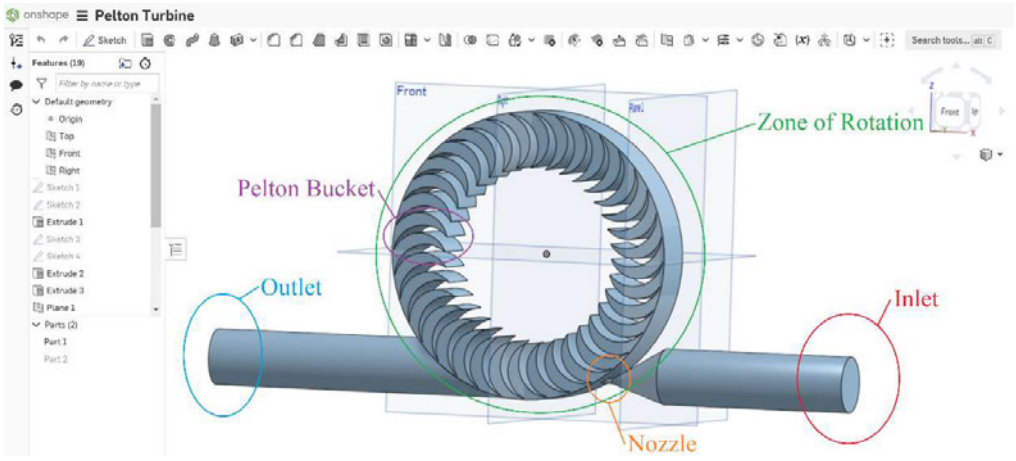


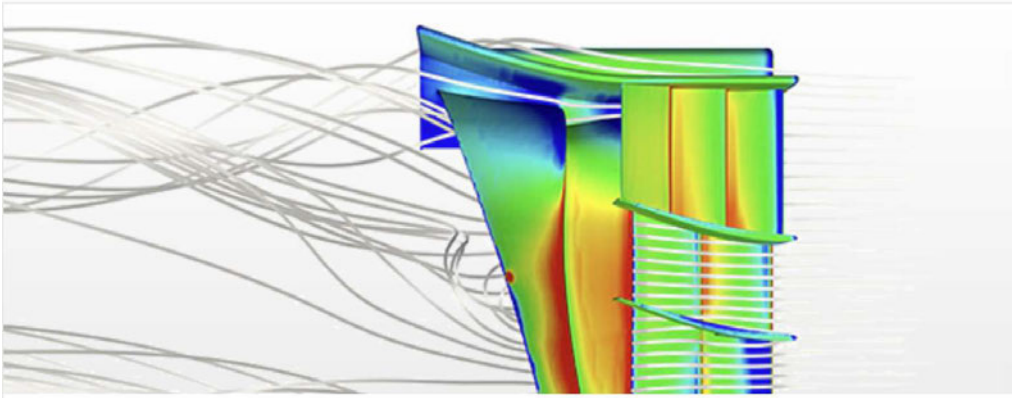
Fig 4.1 – CAD Pelton Turbine
(Onshape, 2021)

The CAD is made of the water/fluid. The Pelton buckets, pipes, nozzle and casing were modelled using negative space. Fig 4.1 shows an inline Pelton turbine attached to a 1-inch private service line.

Using the CAD, the design was then imported into a Computational Fluid Dynamic (CFD) simulation software package. For this project, SimScale, an online CFD simulator was used.

Once the CAD model was uploaded into the CFD software, the simulation needed

certain parameters to be addressed to operate. The designed and imported geometry of fig 4.1 was assigned as an incompressible fluid, fig 4.2, as this replicates the properties of water and results in the density staying constant with pressure fluctuations.



Incompressible Fluid Flow

Simulate flow of a single fluid for which the maximum Mach number is lower than 0.3 (e.g. ~100m/s air speed at standard pressure). In this regime fluid density variations usually are negligible and the behavior of the fluid can be approximated as incompressible.

Fig 4.2 – Incompressible Fluid
(SimScale, 2021)

Once the parameter of the fluid flow was determined, the geometry was then assigned particular material characteristics as per fig 4.2.

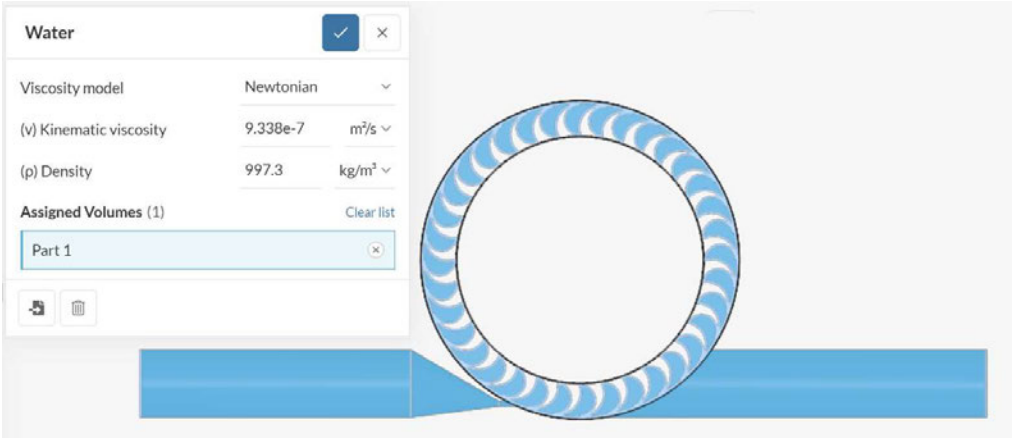


Fig 4.3 – Material Properties
(SimScale, 2021)

The material selected was water, as this will be present in the private service line and has values that are displayed in fig 4.2 for density and viscosity.

As discussed in section 3.4, the value of the incoming pressure from the water main was nominated as 200 psi with a desired output of 50 psi to be supplied to the house. Within the CFD simulation, these values were then assigned to the inlet and outlet faces of the designed geometry, shown in figs 4.4 and 4.5.

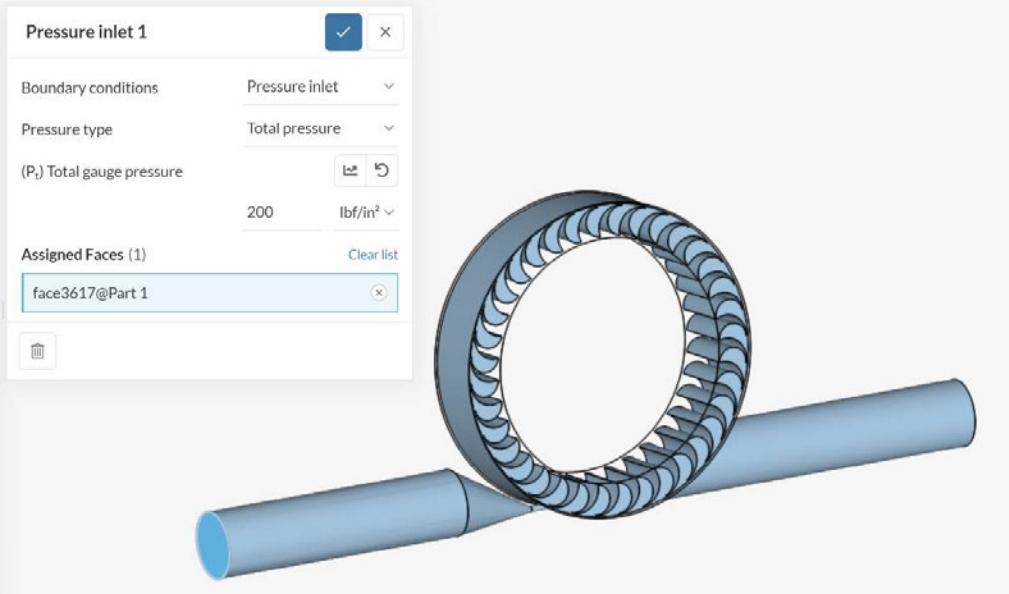


Fig 4.4 – Pressure Inlet – 200 psi
(SimScale, 2021)

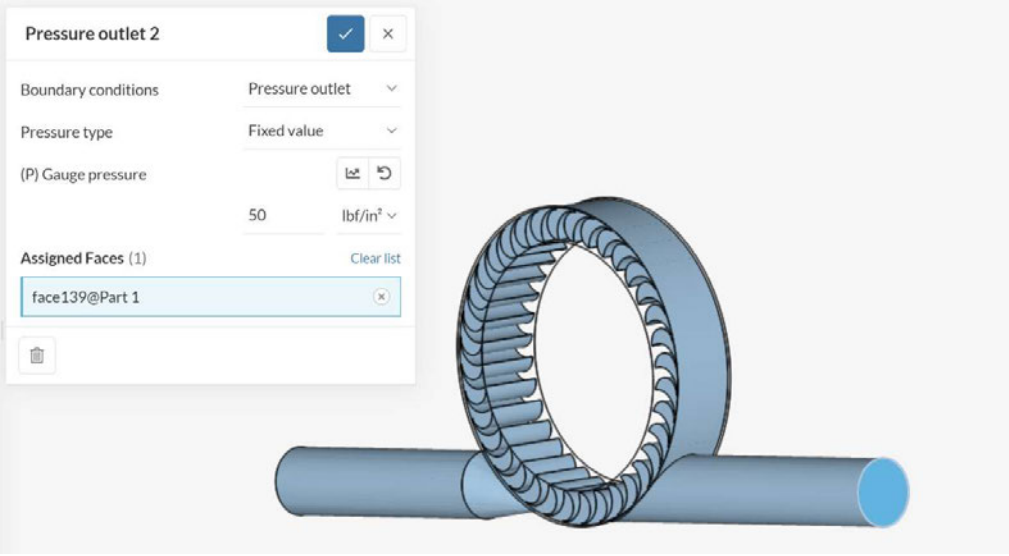


Fig 4.5 – Pressure Outlet – 50 psi
(SimScale, 2021)

As can be seen in the above figs 4.4 and 4.5, the selected face of the geometry is

highlighted in light blue.

For a Pelton turbine, the rotation speed should remain constant with a given runner diameter and constant pressure or head height. This was shown previously in section 3.7 with the use of the RPM equation:

$$D_{ideal} = \frac{38 \times \sqrt{h}}{N}$$

However, there are many factors, such as geometrical arrangement and shape of the buckets or the misalignment of the jet that could influence the Pelton turbine's efficiency, by causing the speed to be below the optimal level.

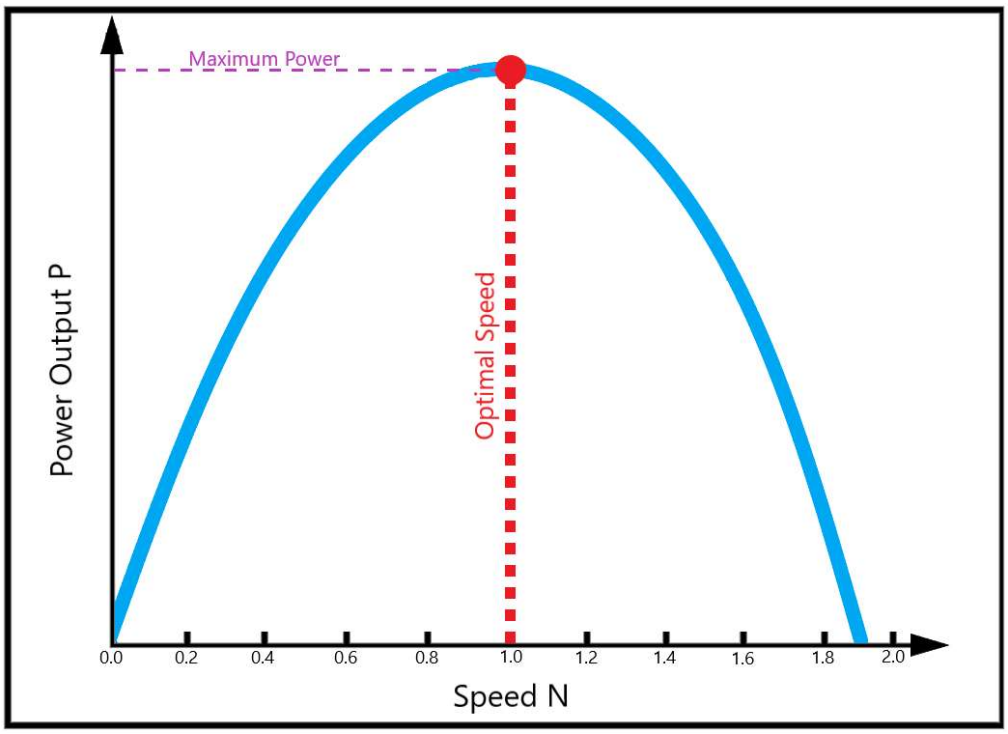


Fig 4.6 – Power Versus Speed Curve of a Pelton Turbine
(Eisenring, 1991)

Fig 4.7 displays when the shaft speed of a Pelton turbine is below the intended design speed, but also when the shaft speed is increased past the design speed. An increase of speed is to be expected when there is no load applied, resulting in no back electromagnetic force preventing runaway speed. The Pelton turbine has a runaway limit at 1.9 times the nominal speed.

As discussed at the beginning of this section, the simulations were used to optimise the design of the Pelton turbine, and therefore the nominal shaft speed was maintained to simulate the full hydroelectric power generation potential.

With moving parts in a CFD simulation there are several ways to calculate how the fluid will respond. For the simulation conducted, a Multiple Reference Frame (MRF) zone was selected, see fig 4.6.

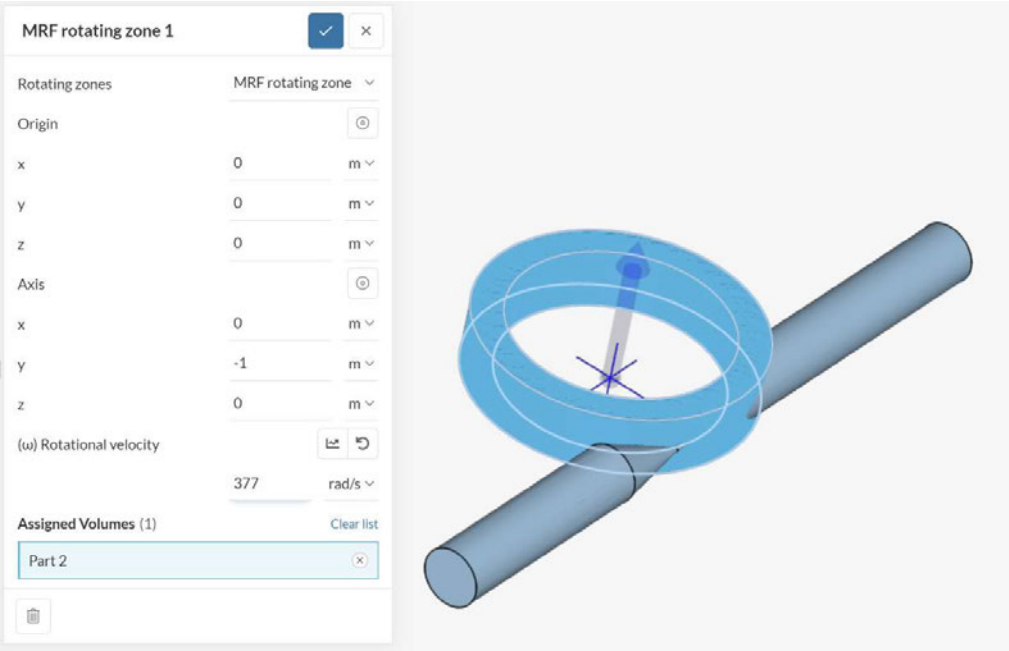


Fig 4.7 – MRF Zone
(SimScale, 2021)

The MRF zone wass used to simulate the operation of the Pelton turbine at full load. The Pelton turbine shaft speed as per fig 3.14, at full load is operating at 3600 rpm.

Converting this to radians per second:

$$3600\ rpm = \frac{Shaft\ Speed}{60} \times 2\pi = 376.99 \Rightarrow 377\ rad/s$$

Counterintuitively, the rotating zone does not move the negative space representing the buckets of the Pelton turbine. Rather the physics of the fluid within the selected zone changes to rotate around in a steady-state approximation.

The direction and placement of rotation was set using the origin and axis coordinates seen in fig 3.14. The right-hand rule was used to confirm the direction (finger direction) with respect to the axis of rotation (thumb direction).

Additional data can be collected and processed through the CFD simulation, such as the force exerting on the buckets of the turbine (fig 4.7) or the velocity of the inlet and/or outlet of the design (fig 4.8).

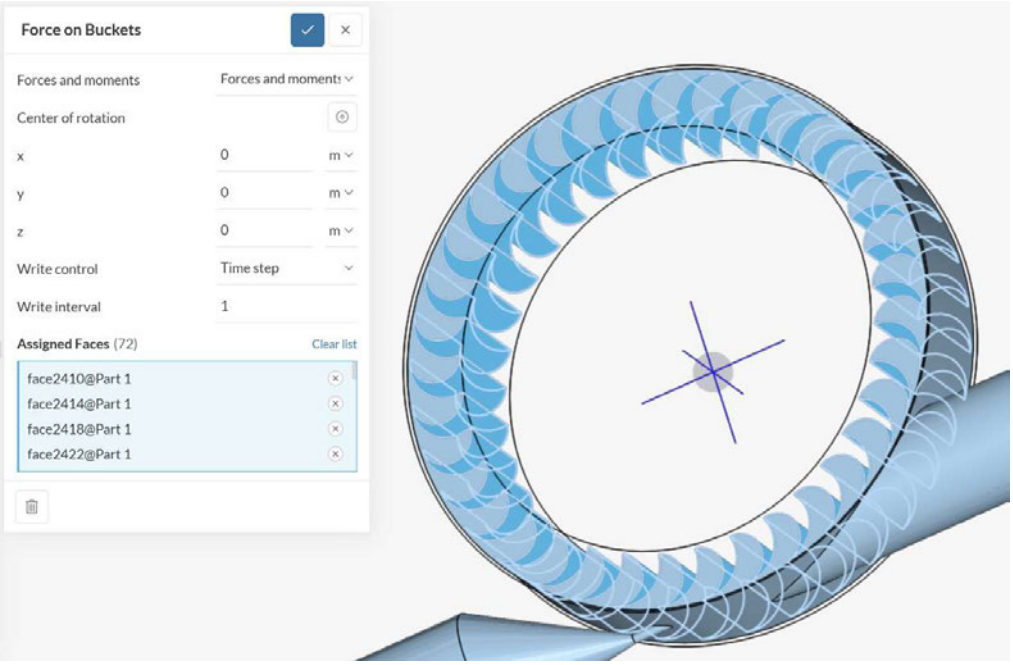


Fig 4.8 – Force Exerted on Buckets
(SimScale, 2021)

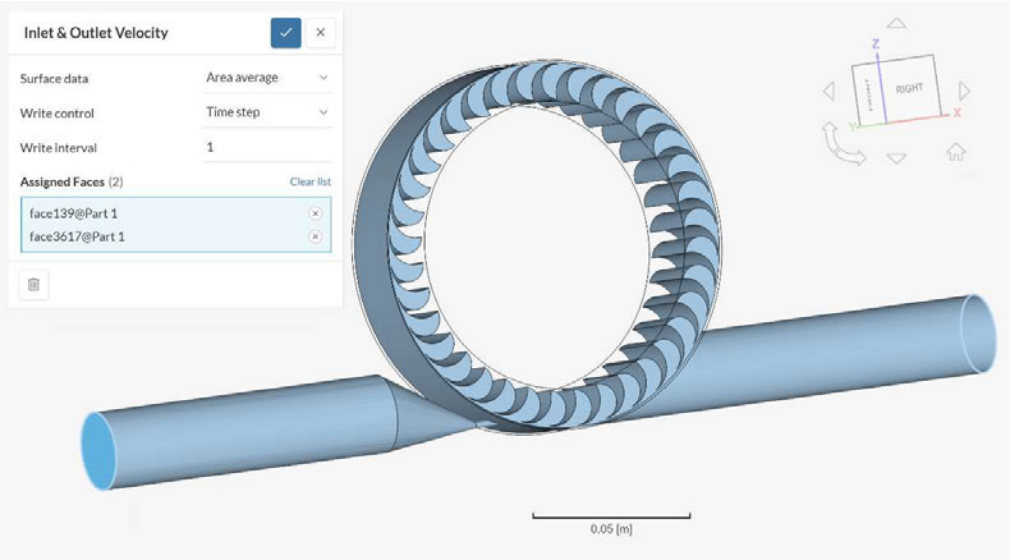


Fig 4.9 – Velocity of Inlet and Outlet
(SimScale, 2021)

Once all parameters for the simulation were specified, the final stage before running the simulation was to create a mesh. This is essentially where the geometric body is broken up into smaller pieces, which reduces the computing power needed and addresses each area as a separate mathematical problem. An example of how the Pelton turbine geometry was divided through meshing is shown below in fig 4.10.

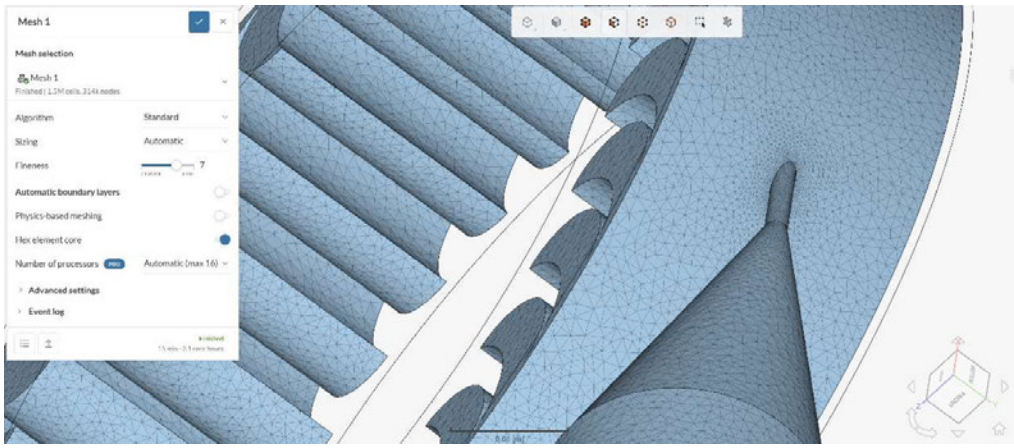


Fig 4.10 – Meshing of Geometry
(SimScale, 2021)

4.2 Simulation Data

The first simulation began by using the design features as discussed in section 3.7 and 4.1, to then varying the design slightly to determine if a more efficient model could be achieved with a target efficiency of 90%.

4.2.1 Simulation V01

Table 4.1 - Design Specification V01

Symbol	Description	Value	Units
D	Runner Diameter	4.1157	Inch
djet	Jet Diameter	0.0792	Inch
Bd	Bucket Depth	0.5	Inch
Bw	Bucket Width	1	Inch
Bn	Number of Buckets	36	Unit
dp	Pipe Diameter	1	Inch
N	Shaft Speed	3600	RPM

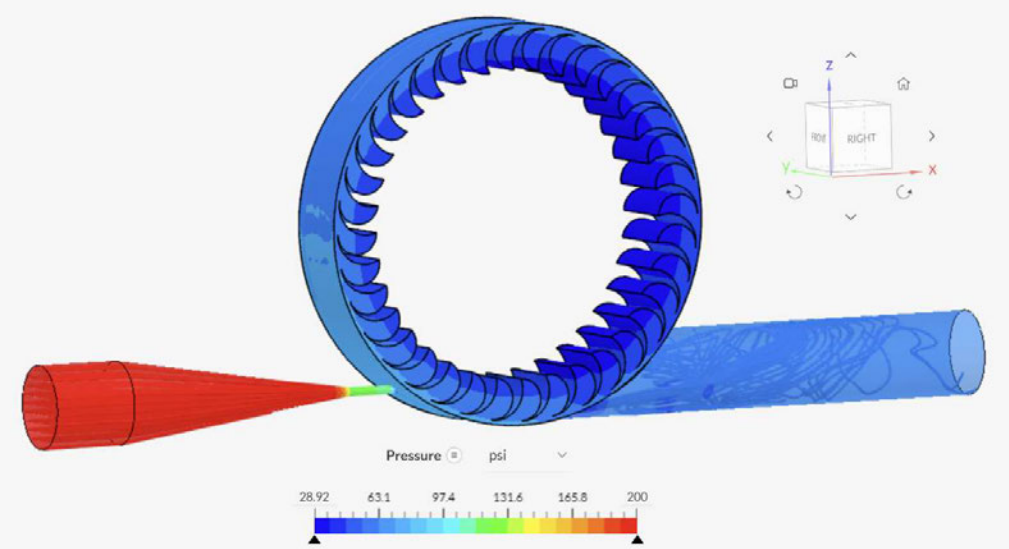


Fig 4.11 – Pelton Turbine V01 – Pressure
(SimScale, 2021)

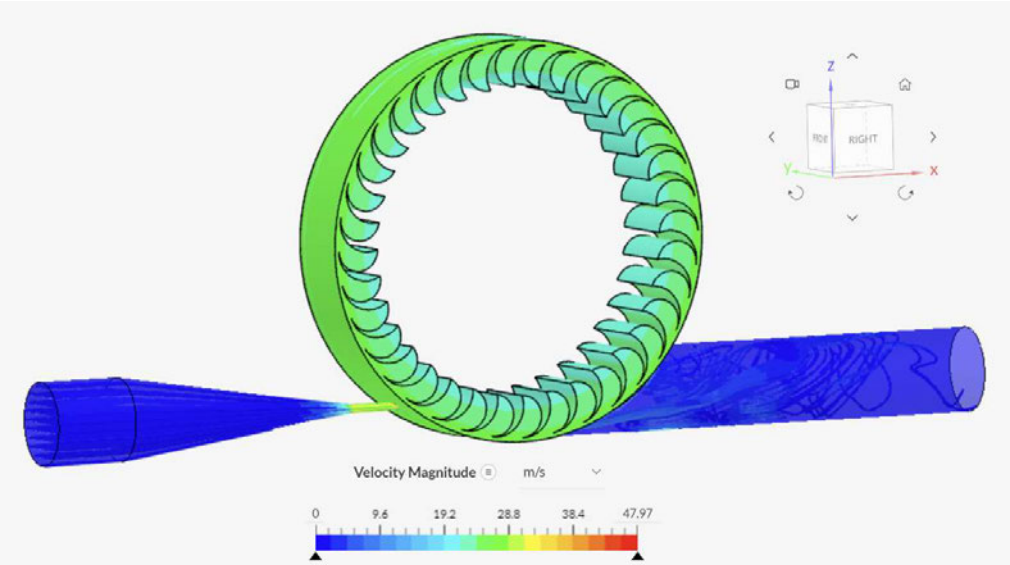


Fig 4.12 – Pelton Turbine V01 – Velocity
(SimScale, 2021)

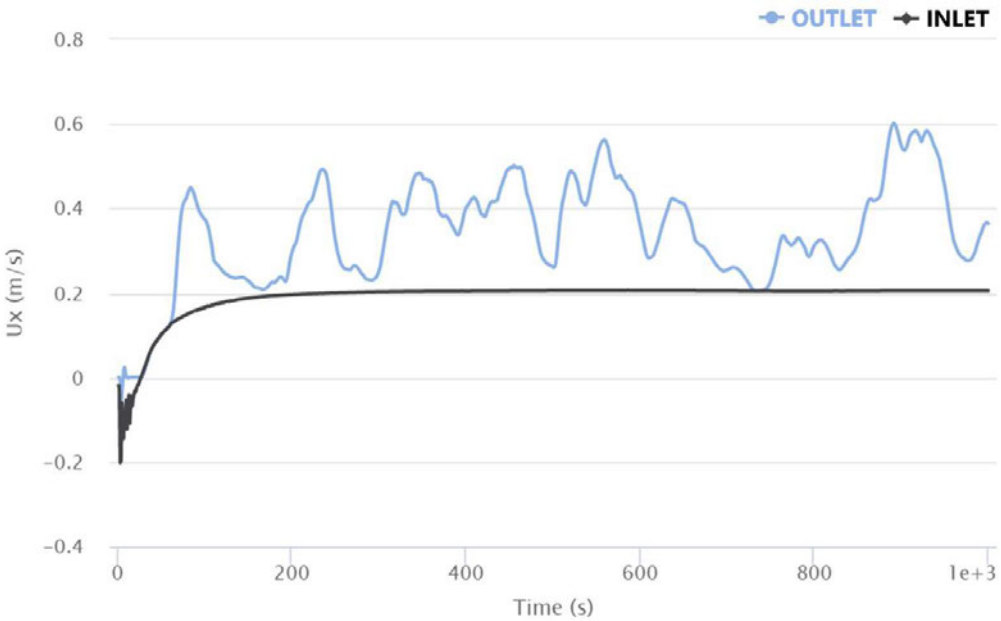


Fig 4.13 – Pelton Turbine V01 – Inlet and Outlet Velocity
(SimScale, 2021)

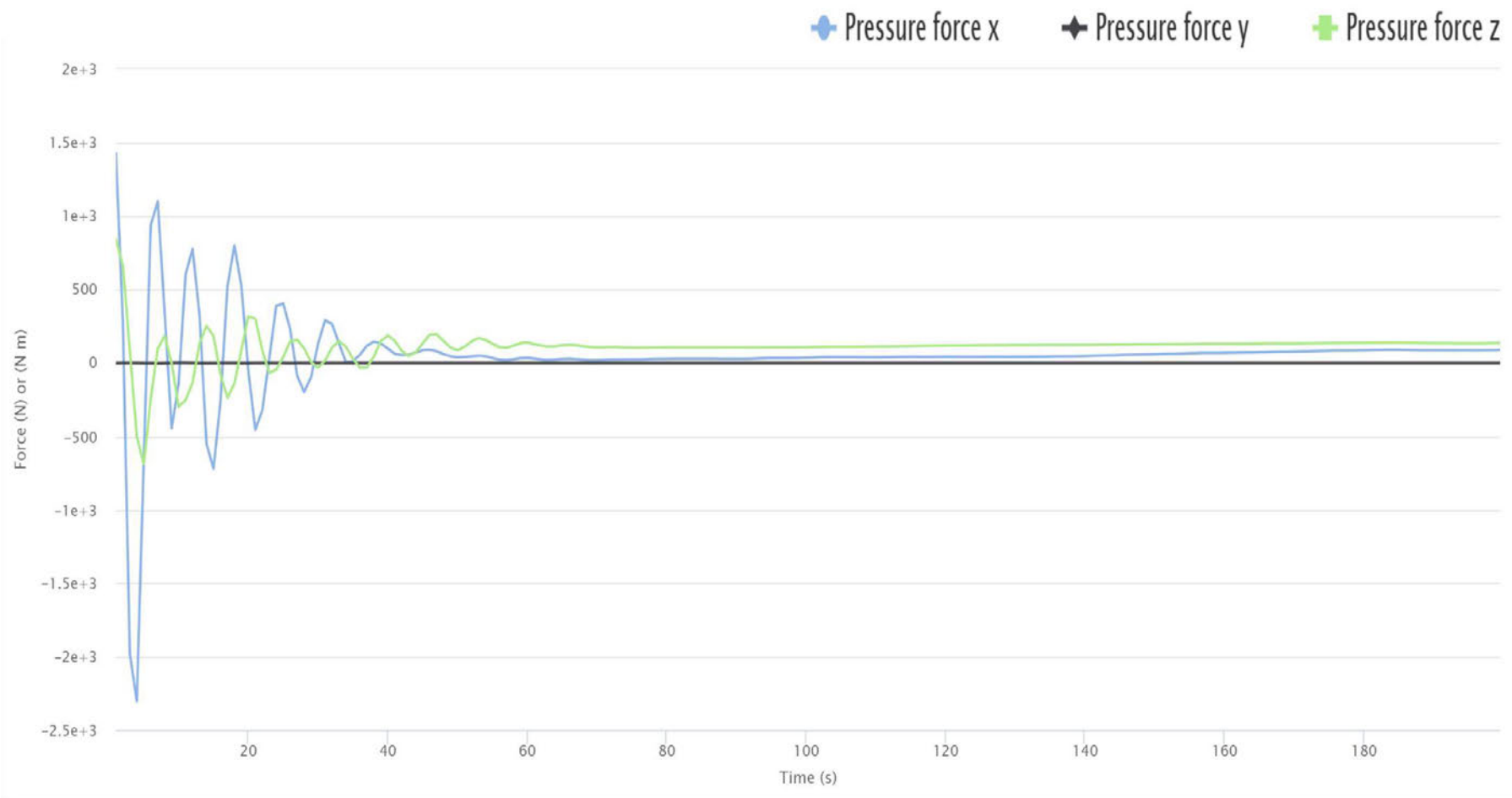


Fig 4.14 – Pelton Turbine V01 – Forces on Buckets
(SimScale, 2021)

The aim of the simulation was to assess the efficiency at full load of the Pelton turbine design by observing the pressure and the velocity.

As discussed in section 2.4.1, the Pelton turbine is an impulse turbine, harnessing the kinetic energy of the water to rotate the buckets and runner. Fig 4.1 displays a difference in the pressure around the buckets, which was not the desired effect as it is better suited for a reaction turbine. The fluctuating pressure may also lead to cavitation of the buckets surface which would in turn require increased maintenance and costs.

In attempts to improve this, a change of bucket depth was used in the Pelton turbine versions 2 (section 4.2.2) and 3 (section 4.2.3).

As can be seen from fig 4.10, the velocity was increased through the nozzle, maximising the impact and effect on the turbine itself. The velocity was then dispersed over the runner diameter, before exiting the turbine into the outlet 1 inch pipe.

The pressure forces on the buckets, displayed in figure 4.12, shows that the dominant forces were occurring in the "z" domain, while the main impulse force is the "x" domain. This suggests a loss of efficiency in the design.

Although lacking a definitive formula for determining the optimum number of buckets, there are suggestions that a correct range can be found using a ratio given from the nozzle jet diameter to the runner diameter. One example is shown below in table 4.3:

Table 4.2 – Bucket Number Selection
(Židonis and Aggidis, 2021)

Selecting the number of Buckets	
d_{jet} : D	Bn
01:16	17 to 21
01:18	18 to 22
01:10	19 to 24
01:15	22 to 27
01:20	24 to 30
01:25	26 to 33

As there is no mathematically proven method for selecting the optimum number of buckets, CFD simulation was used. After determining an optimal bucket depth (sections 4.2.1, 4.2.2 and 4.2.3), the next stage was to determine what effect changing the number of buckets would have on the design. Using the optimum design established in section 4.2.3, an increase was made in the number of buckets for version 4 (section 4.2.4) and then a decrease in version 5 (section 4.2.5).

The velocity increased and fluctuated on the outlet, indicating that the hydropower was not being harnessed at full capacity. This can be explained through Bernoulli's equation:

$$P_1 + \frac{1}{2}\rho v_1^2 + \rho g h_1 = P_1 + \frac{1}{2}\rho v_2^2 + \rho g h_2$$

Where pressure, velocity, and height at the start of the inlet are represented as P_1, v_1 and h_1 and the same values at the outlet are likewise represented as P_2, v_2 and h_2. For the simulation the head height and density (an incompressible fluid, fig 4.2) remain constant. Therefore, only the pressure and velocity are variables. As per section 3.4, the ideal scenario is to disperse the excessive pressure of 150 psi in the generation of hydroelectric power. Given the formula for hydropower:

$$Hydraulic\ Power\ (W) = Pressure\ (Pa) \times Flow\ (m^3/s)$$

With the velocity staying constant in an ideal situation, there should be 75% less hydraulic power at the outlet accounting for the 75% drop in pressure. Appendix G shows numerically the difference of the inlet velocity compared to the outlet velocity which gives Simulation V01 an efficiency of 55%.

To maximise the design by aligning the velocity of the inlet and outlet, a further modification was made in the final version 6 (section 4.2.6).

4.2.2 Simulation V02

Altering the depth of the bucket by increasing 0.5” from the V01 design specifications. These changes are represented below in table 4.3.

Table 4.3 - Design Specification V02

Symbol	Description	Value	Units
D	Runner Diameter	4.1157	Inch
djet	Jet Diameter	0.0792	Inch
Bd	Bucket Depth	1	Inch
Bw	Bucket Width	1	Inch
Bn	Number of Buckets	36	Unit
dp	Pipe Diameter	1	Inch
N	Shaft Speed	3600	RPM

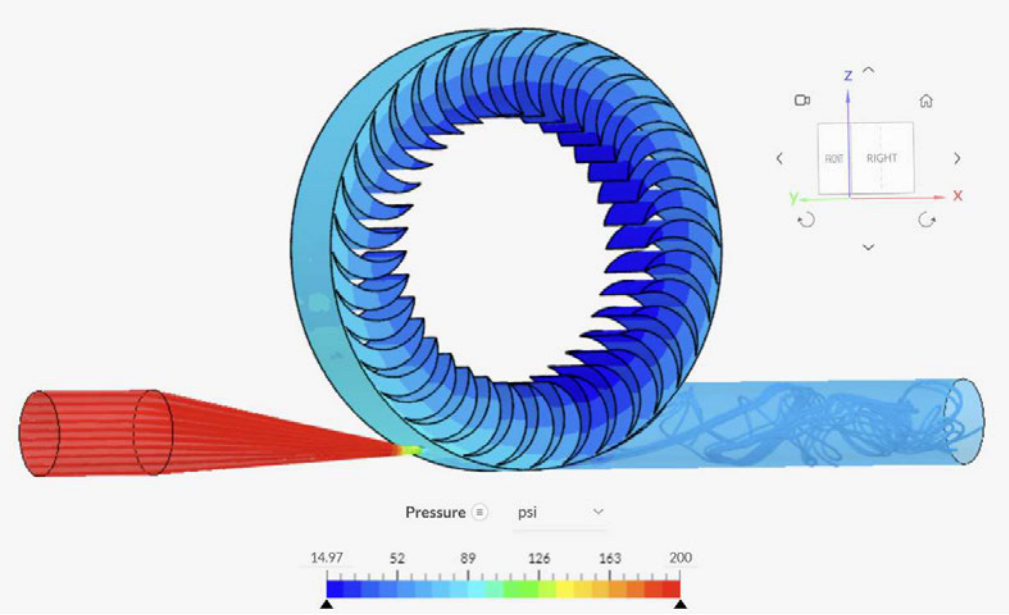


Fig 4.15 – Pelton Turbine V02 – Pressure
(SimScale, 2021)

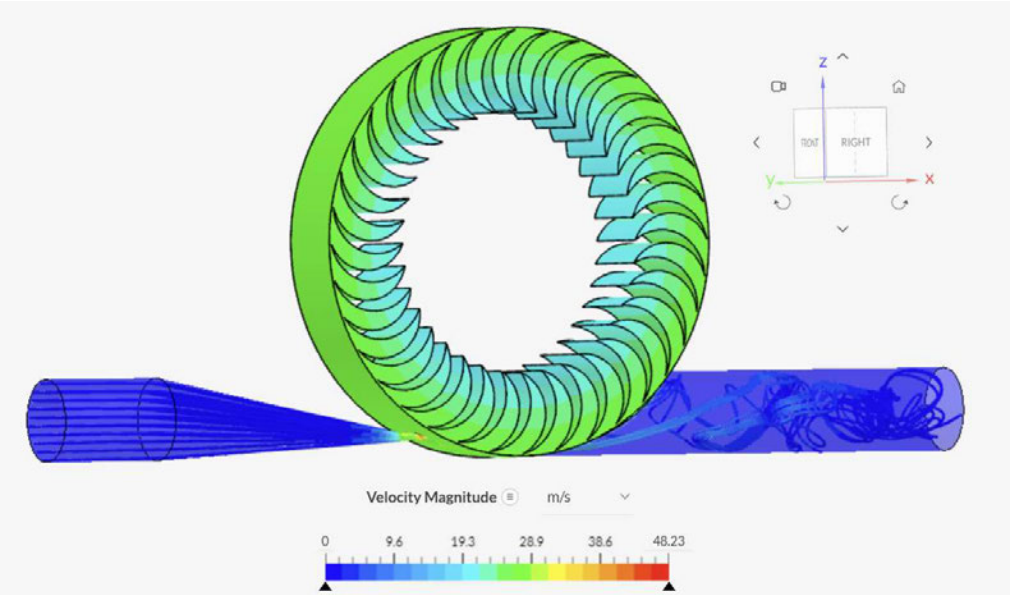


Fig 4.16 – Pelton Turbine V02 – Velocity
(SimScale, 2021)

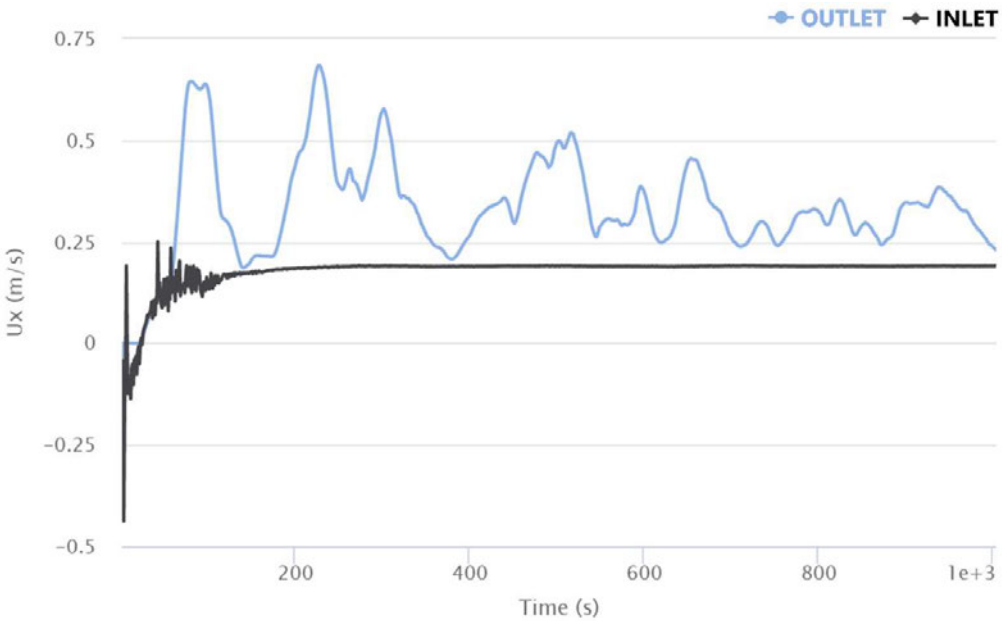


Fig 4.17 – Pelton Turbine V02 – Inlet and Outlet Velocity
(SimScale, 2021)

Fig 4.18 – Pelton Turbine V02 – Forces on Buckets
(SimScale, 2021)

Appendix G shows numerically the difference of the inlet velocity compared to the outlet velocity which gave Simulation V02 an efficiency of 53%.

4.2.3 Simulation V03

Altering the depth of the bucket by decreasing 0.25” from the V01 design specifications. These changes are represented below in table 4.4.

Table 4.4 - Design Specification V03

Symbol	Description	Value	Units
D	Runner Diameter	4.1157	Inch
djet	Jet Diameter	0.0792	Inch
Bd	Bucket Depth	0.25	Inch
Bw	Bucket Width	1	Inch
Bn	Number of Buckets	36	Unit
dp	Pipe Diameter	1	Inch
N	Shaft Speed	3600	RPM

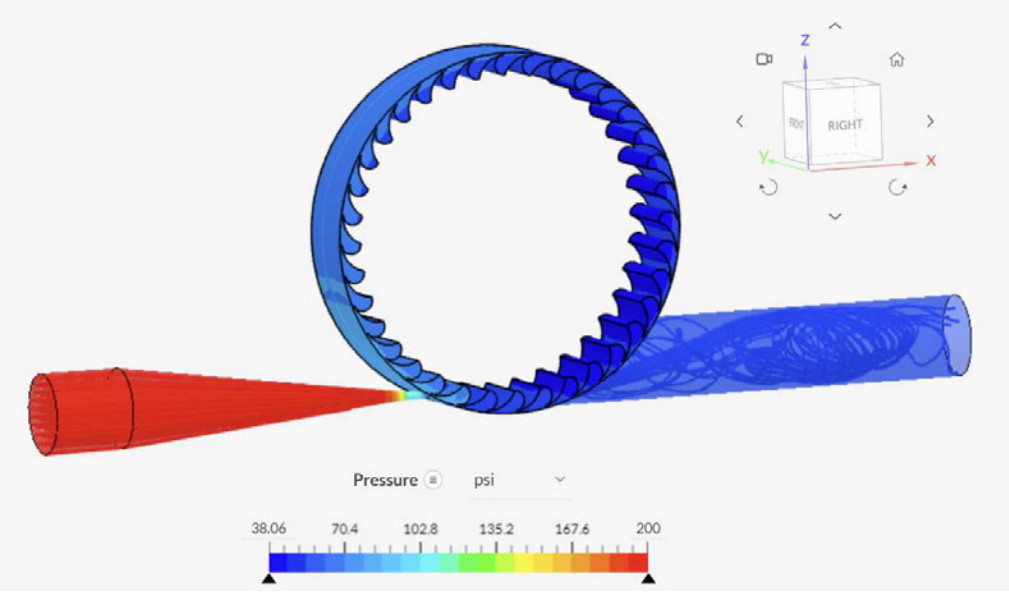


Fig 4.19 – Pelton Turbine V03 – Pressure
(SimScale, 2021)

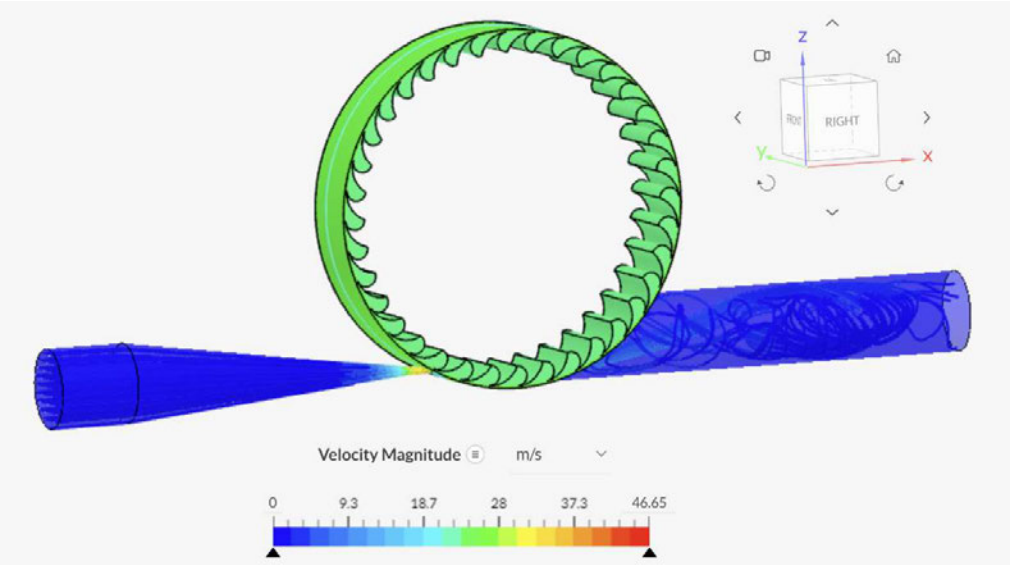


Fig 4.20 – Pelton Turbine V03 – Velocity
(SimScale, 2021)

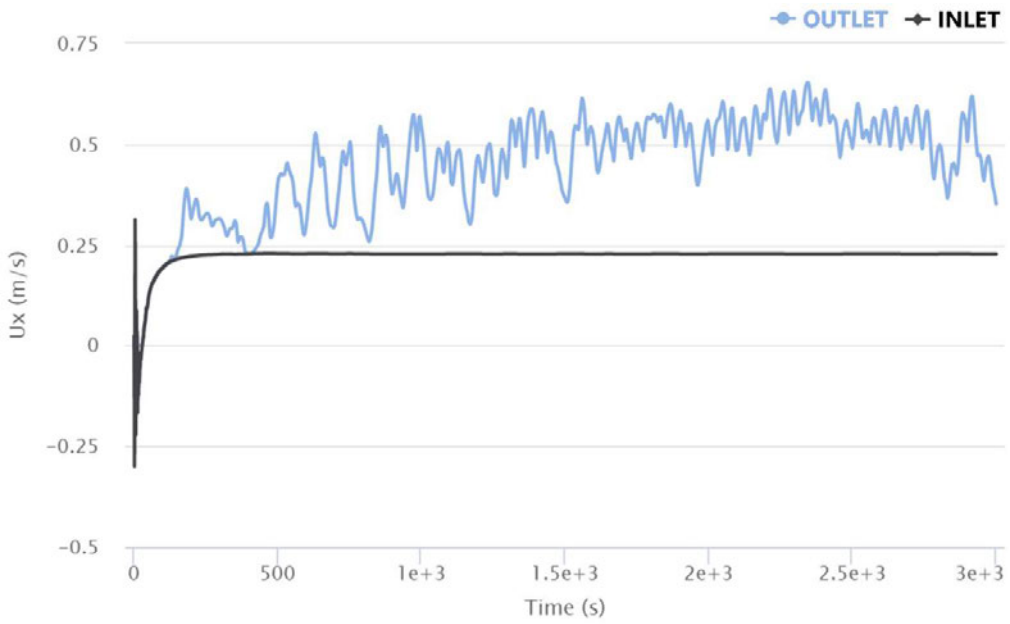


Fig 4.21 – Pelton Turbine V03 – Inlet and Outlet Velocity
(SimScale, 2021)

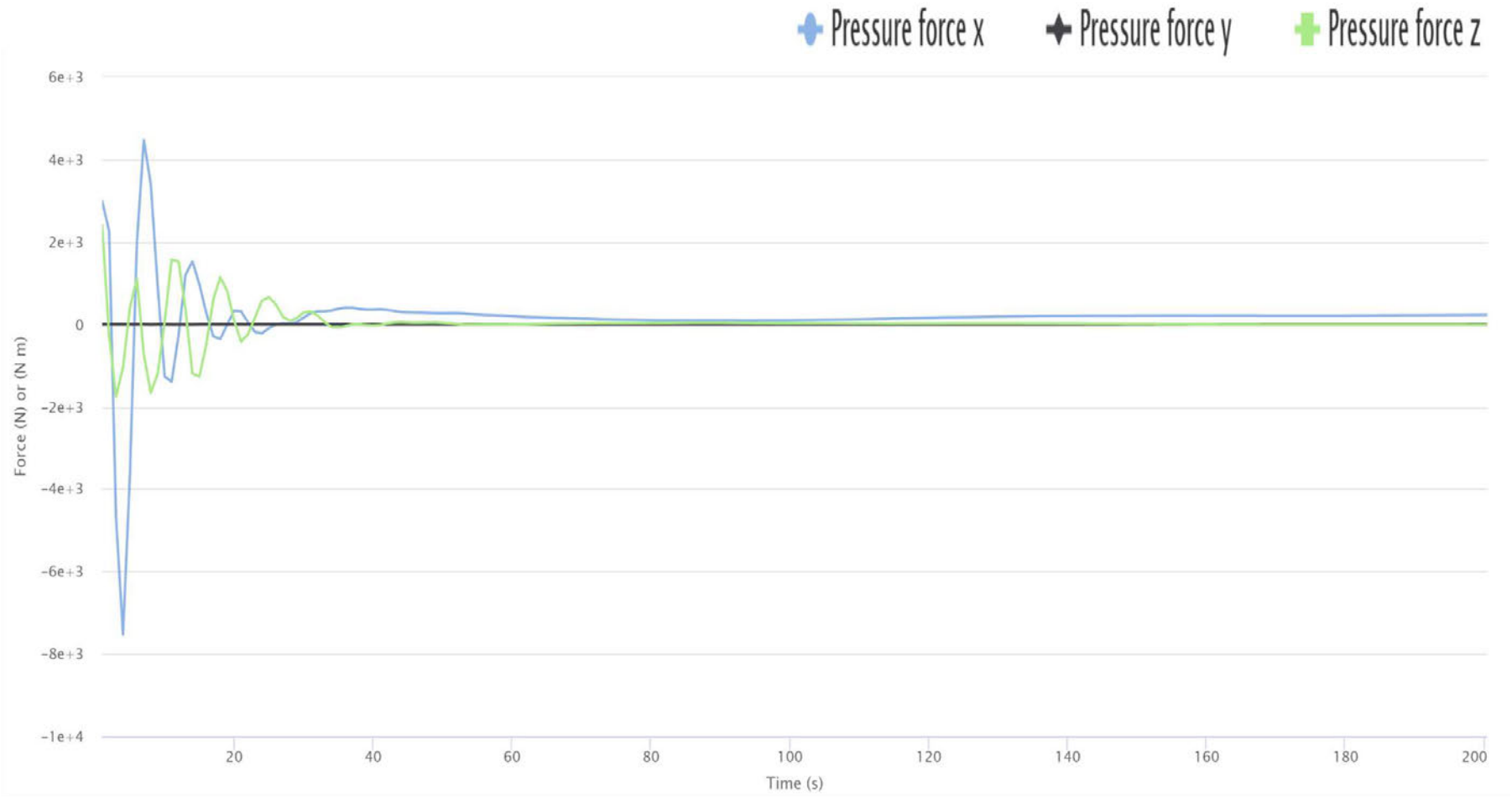


Fig 4.22 – Pelton Turbine V03 – Forces on Buckets
(SimScale, 2021)

As can be seen in fig 4.17, version 3, with a bucket depth of 0.25 inches had the smallest differential pressure surrounding the runner diameter and buckets. As discussed in the analysis of section 4.2.1, this will lead to less cavitation and a higher efficiency for an impulse turbine.

Appendix G shows numerically the difference of the inlet velocity compared to the outlet velocity which gives Simulation V03 an efficiency of 64%. Therefore, Simulation V03 from section 4.2.3 was used as a base design for the following simulations of CFD optimisation (section 4.2.4 and section 4.2.5).

4.2.4 Simulation V04

Altering the number of buckets by increasing from 36 to 72 from the V03 design specifications. These changes are represented below in table 4.5.

Table 4.5 - Design Specification V04

Symbol	Description	Value	Units
D	Runner Diameter	4.1157	Inch
djet	Jet Diameter	0.0792	Inch
Bd	Bucket Depth	0.25	Inch
Bw	Bucket Width	1	Inch
Bn	Number of Buckets	72	Unit
dp	Pipe Diameter	1	Inch
N	Shaft Speed	3600	RPM

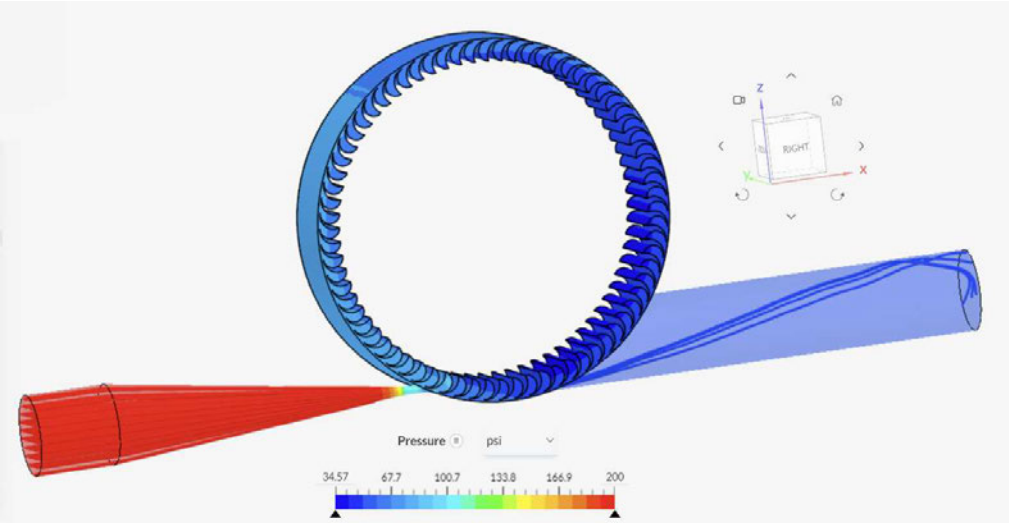


Fig 4.23 – Pelton Turbine V04 – Pressure
(SimScale, 2021)

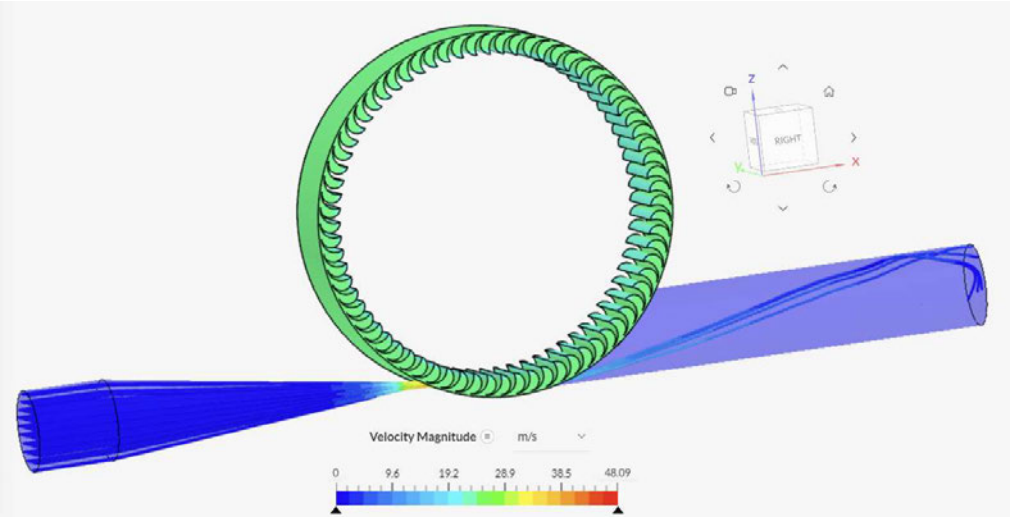


Fig 4.24 – Pelton Turbine V04 – Velocity
(SimScale, 2021)

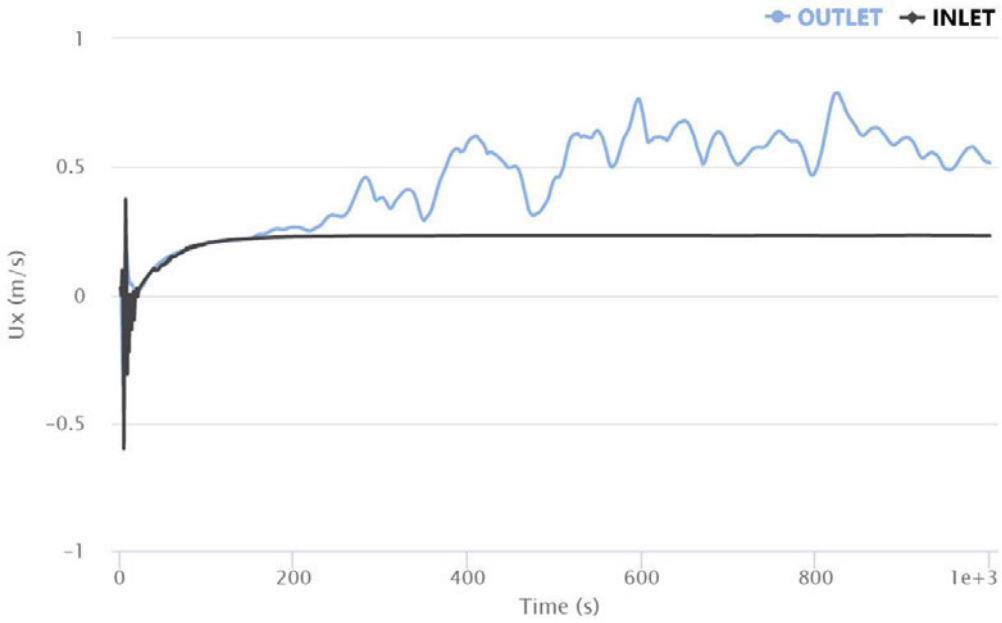


Fig 4.25 – Pelton Turbine V04 – Inlet and Outlet Velocity
(SimScale, 2021)

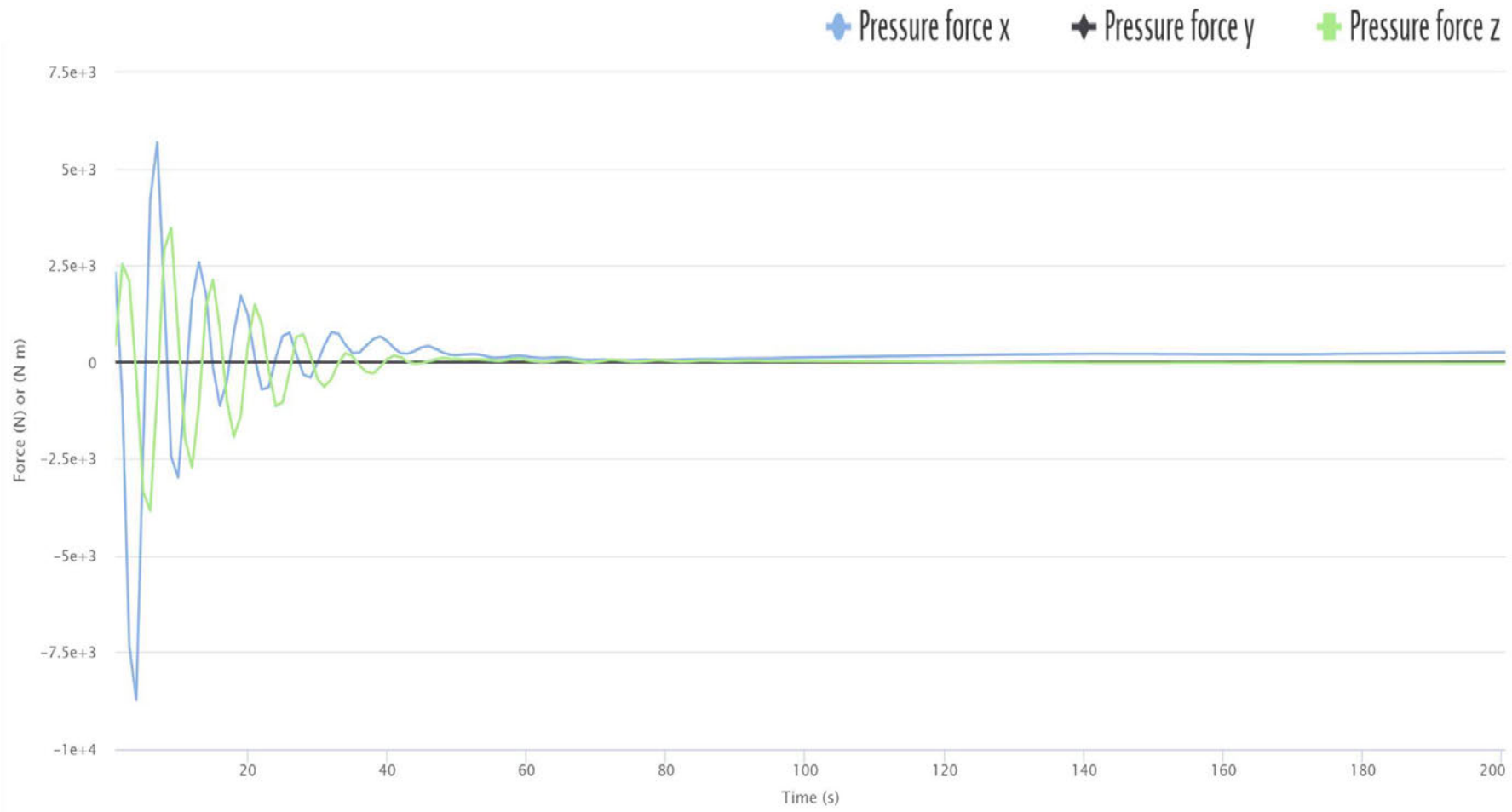


Fig 4.26 – Pelton Turbine V04 – Forces on Buckets
(SimScale, 2021)

Appendix G shows numerically the difference of the inlet velocity compared to the outlet velocity which gave Simulation V04 an efficiency of 48%.

4.2.5 Simulation V05

Altering the number of buckets by decreasing from 36 to 24 from the V03 design specifications. These changes are represented below in table 4.6.

Table 4.6 - Design Specification V05

Symbol	Description	Value	Units
D	Runner Diameter	4.1157	Inch
djet	Jet Diameter	0.0792	Inch
Bd	Bucket Depth	0.25	Inch
Bw	Bucket Width	1	Inch
Bn	Number of Buckets	24	Unit
dp	Pipe Diameter	1	Inch
N	Shaft Speed	3600	RPM

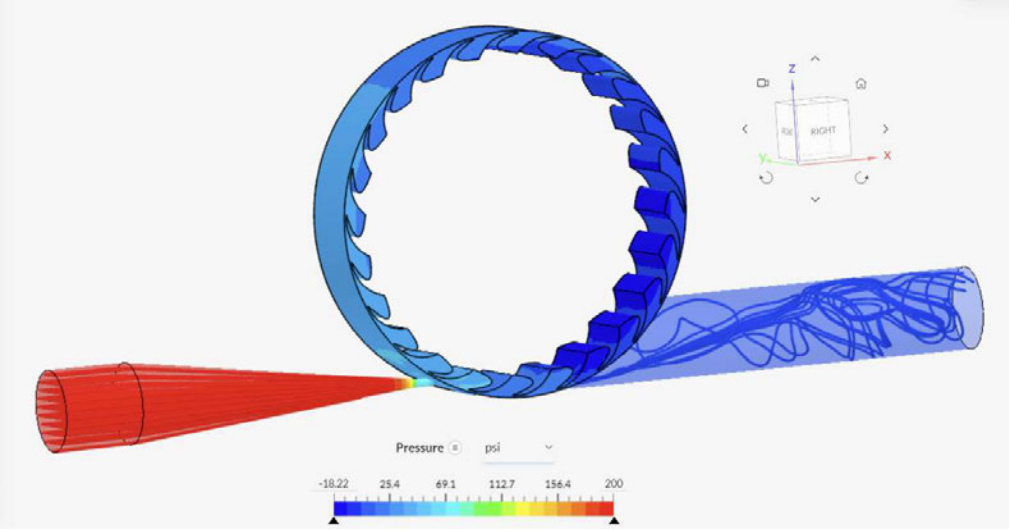


Fig 4.27 – Pelton Turbine V05 – Pressure
(SimScale, 2021)

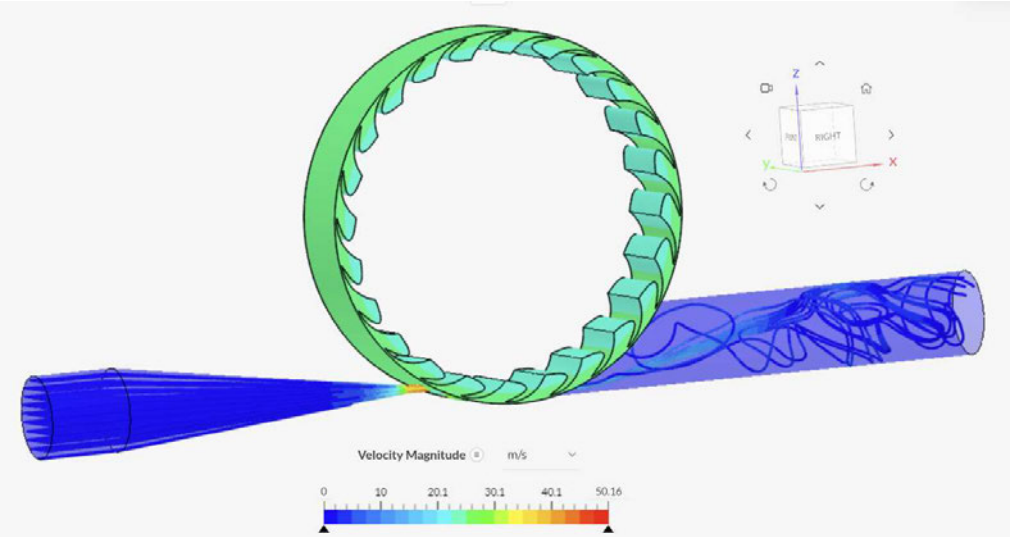


Fig 4.28 – Pelton Turbine V05 – Velocity
(SimScale, 2021)

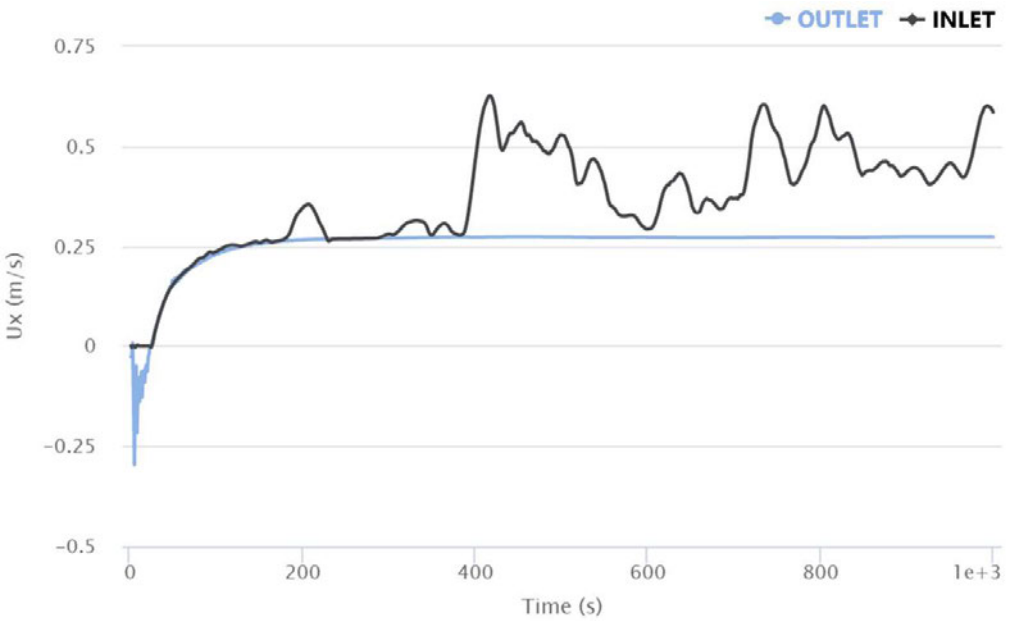


Fig 4.29 – Pelton Turbine V05 – Inlet and Outlet Velocity
(SimScale, 2021)

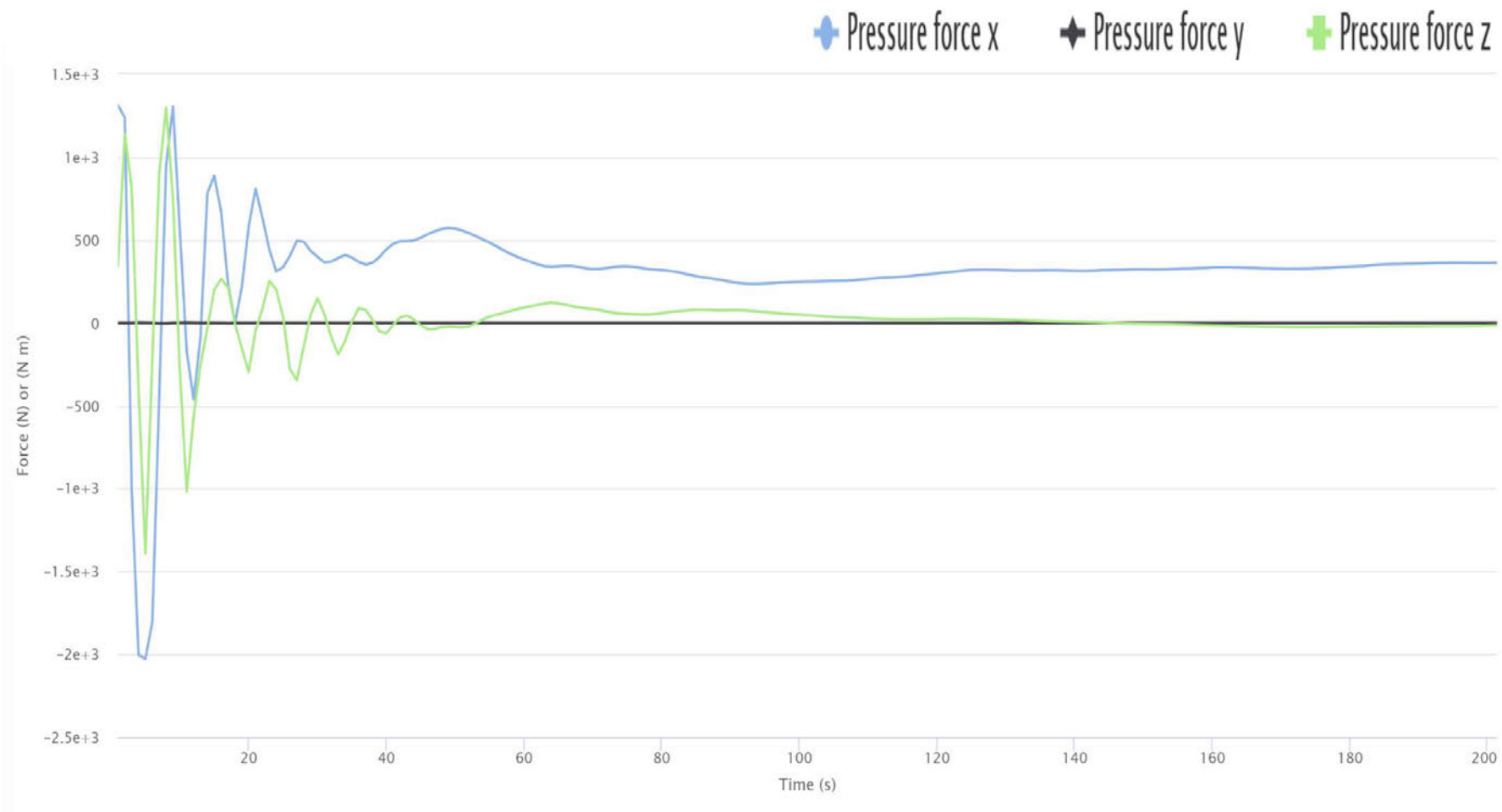


Fig 4.30 – Pelton Turbine V05 – Forces on Buckets
(SimScale, 2021)

From observing the data collected through the CFD simulations, and the tabulated velocity tables in appendix G, the electrical output was maximised through simulation V05, section 4.2.5. This is most evident through the results of the velocity recorded at the inlet and outlet, illustrated in fig 4.19 and tabulated in appendix G.

However, it is obvious, as discussed in section 4.2.1, that an increased velocity at the outlet indicates that there was still excess energy not being used within the Pelton turbine. Appendix G shows numerically the difference of the inlet velocity compared to the outlet velocity which gives Simulation V05 an efficiency of 68%.

4.2.6 Simulation V06

Noting Bernoulli's equation, discussed in 4.2.1, and using simulation V05 as a base, the design was then altered by flaring the 1-inch pipe on the outlet side of the Pelton turbine. The aim was to harness the kinetic energy around the turbine runner before exiting to achieve an efficiency, as discussed in section 3.7, of 90%. These changes are represented below in table 4.7.

Table 4.7 - Design Specification V06

Symbol	Description	Value	Units
D	Runner Diameter	4.1157	Inch
djet	Jet Diameter	0.0792	Inch
Bd	Bucket Depth	0.025	Inch
Bw	Bucket Width	1	Inch
Bn	Number of Buckets	24	Unit
dp	Pipe Diameter	1	Inch
N	Shaft Speed	3600	RPM
***	Pipe flared at Outlet	***	***

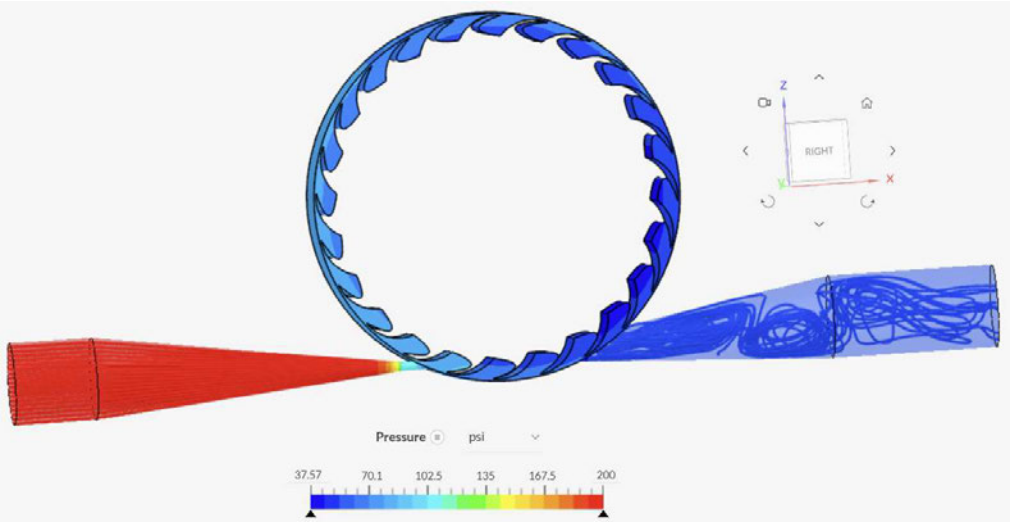


Fig 4.31 – Pelton Turbine V06 – Pressure
(SimScale, 2021)

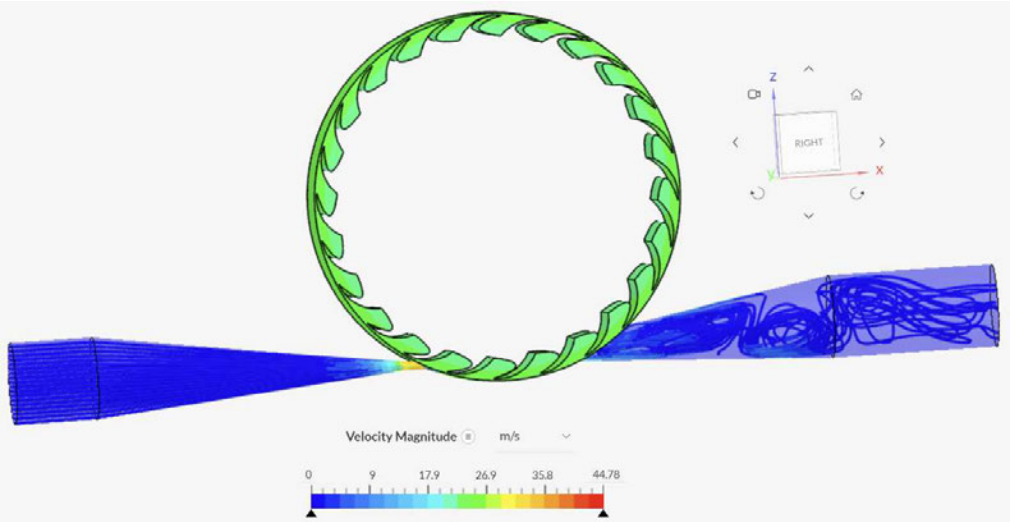


Fig 4.32 – Pelton Turbine V06 – Velocity
(SimScale, 2021)

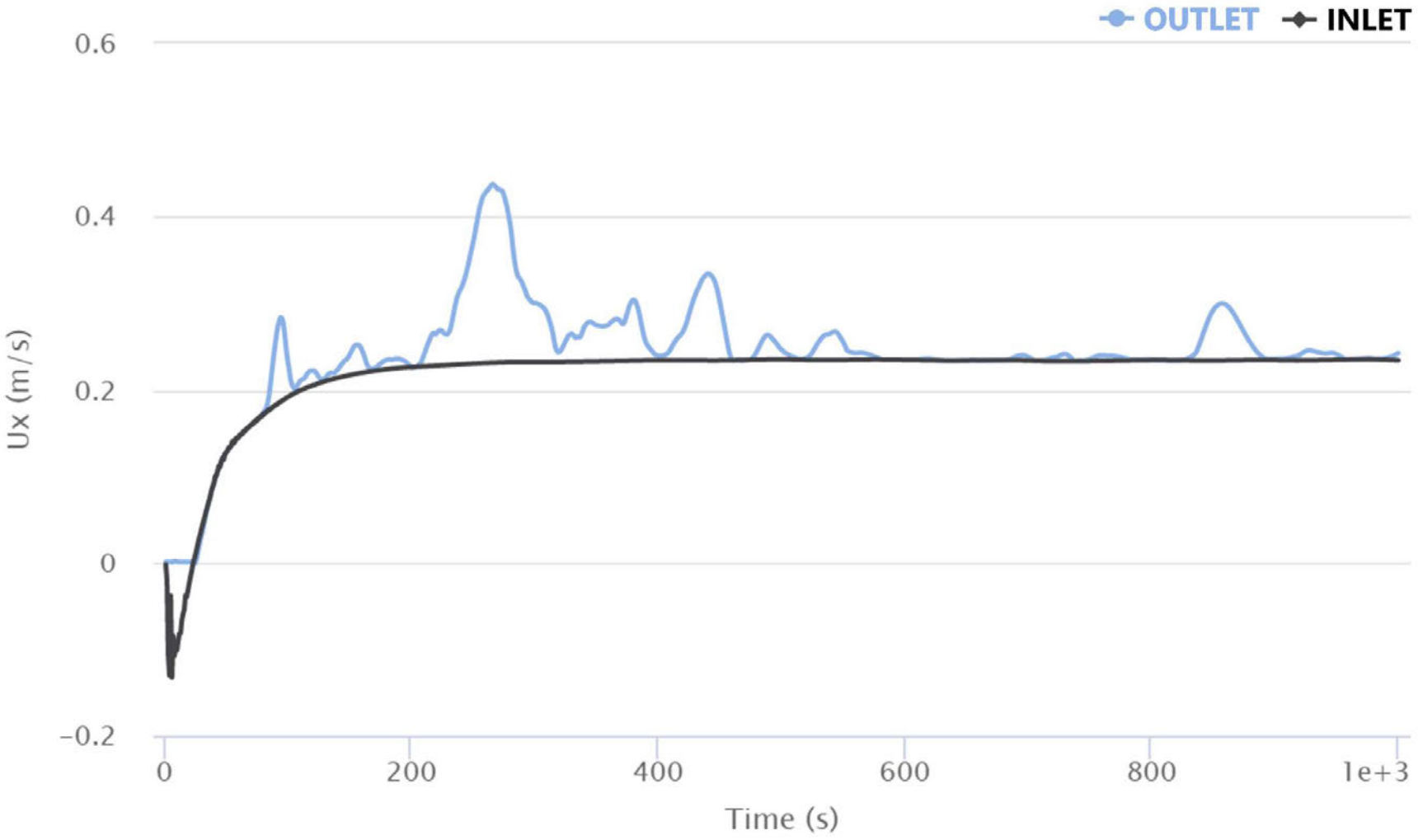


Fig 4.33 – Pelton Turbine V06 – Inlet and Outlet Velocity
(SimScale, 2021)

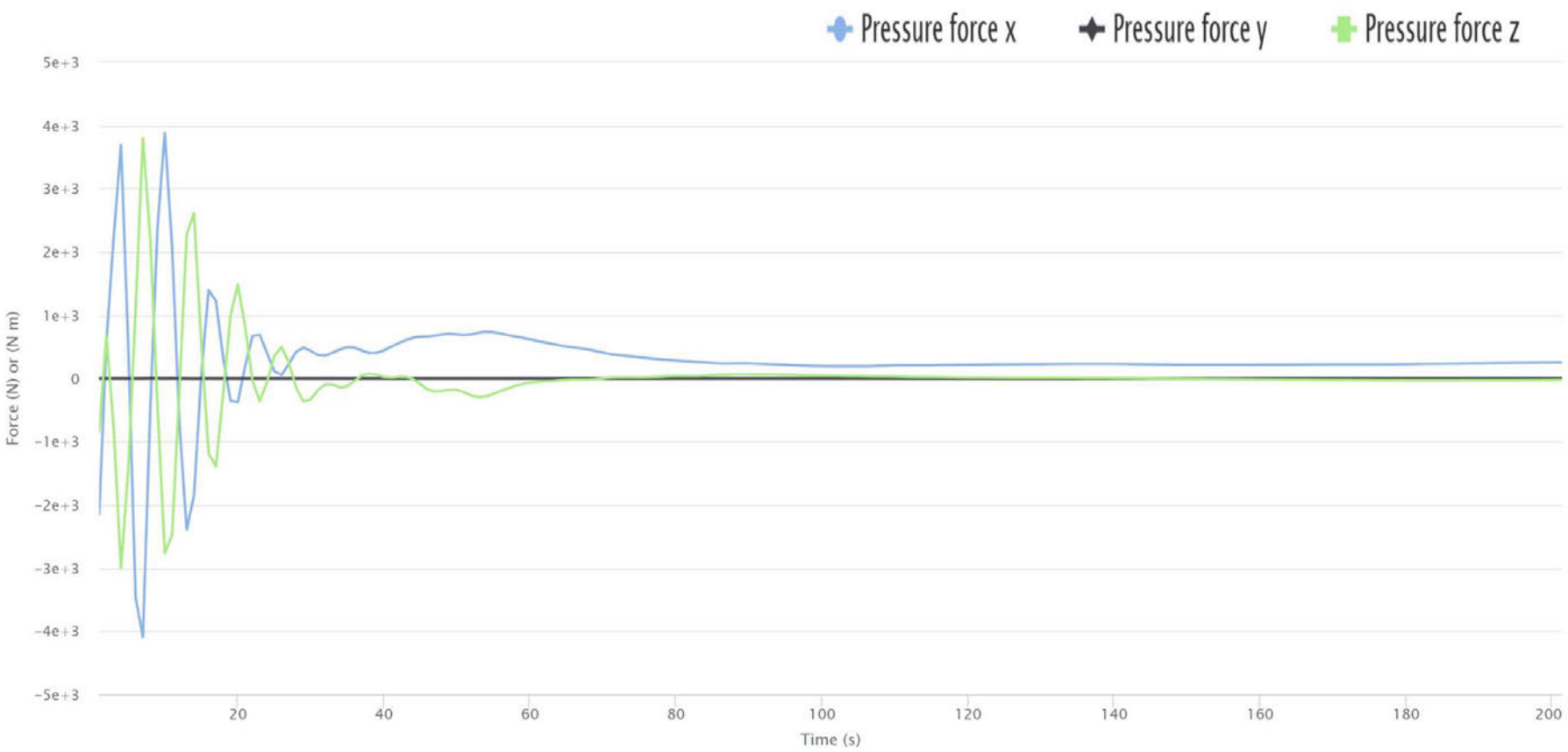


Fig 4.34 – Pelton Turbine V06 – Forces on Buckets
(SimScale, 2021)

The velocity of simulation V06, as depicted in fig 4.31, shows that out of all the design variations, the flared pipe alteration allows for the most efficient operation. With the velocity of the output closer to the input, this would allow for greater hydropower to be generated with the excessive pressure provided by LADWP, the water supply utility. Appendix G shows numerically the difference of the inlet velocity compared to the outlet velocity which gives Simulation V06 an efficiency of 90%.

4.3 Small-Scale Model

A small-scale model of the Pelton turbine was acquired and tested on an outdoor tap outlet to confirm that hydropower could be generated.

Table 4.8 - Design Specification of Small-Scale Model
(Small-Scale Pelton Turbine, 2021)

Symbol	Description	Value	Units
D	Runner Diameter	1.37795	Inch
djet	Jet Diameter	0.137795	Inch
Bd	Bucket Depth	0.11811	Inch
Bw	Bucket Width	0.531496	Inch
Bn	Number of Buckets	24	Unit
dp	Pipe Diameter	0.531496	Inch
Vo	Output Voltage	12	Vdc
Ao	Max Output Current	220	mA
Pr	Pressure Rating	87	psi
LS	Lifespan of Generator	≥3000	h

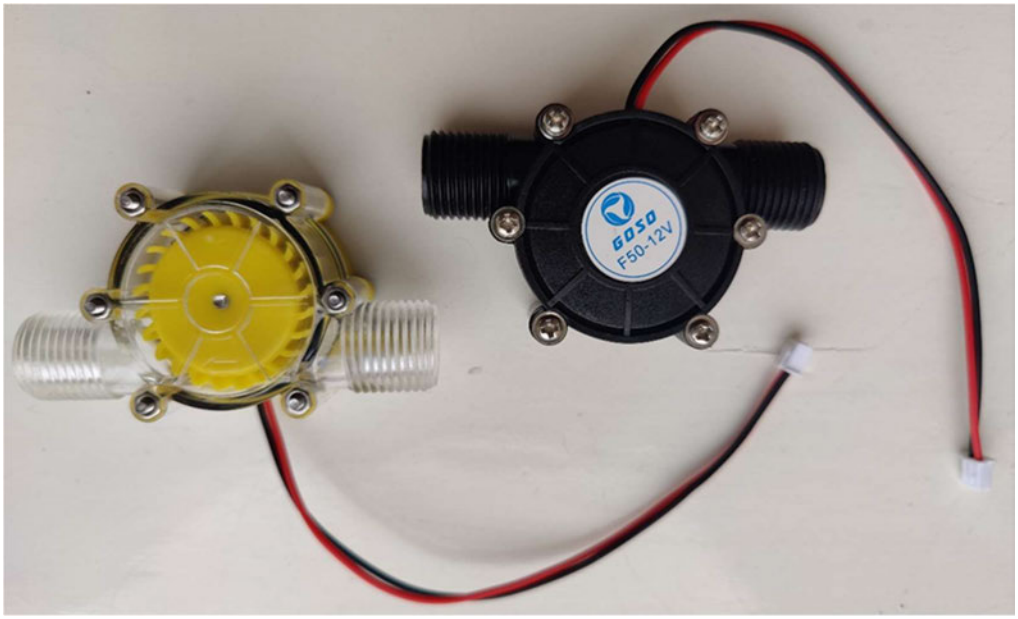


Fig 4.35 – Pelton Turbine Small-Scale Design

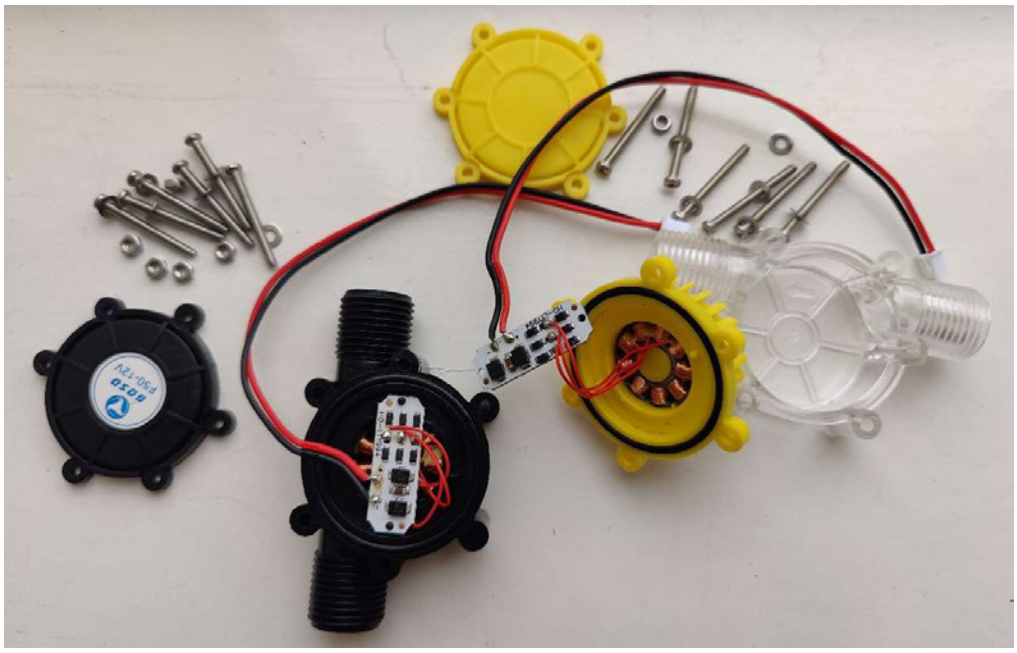


Fig 4.36 – Pelton Turbine Small-Scale Components

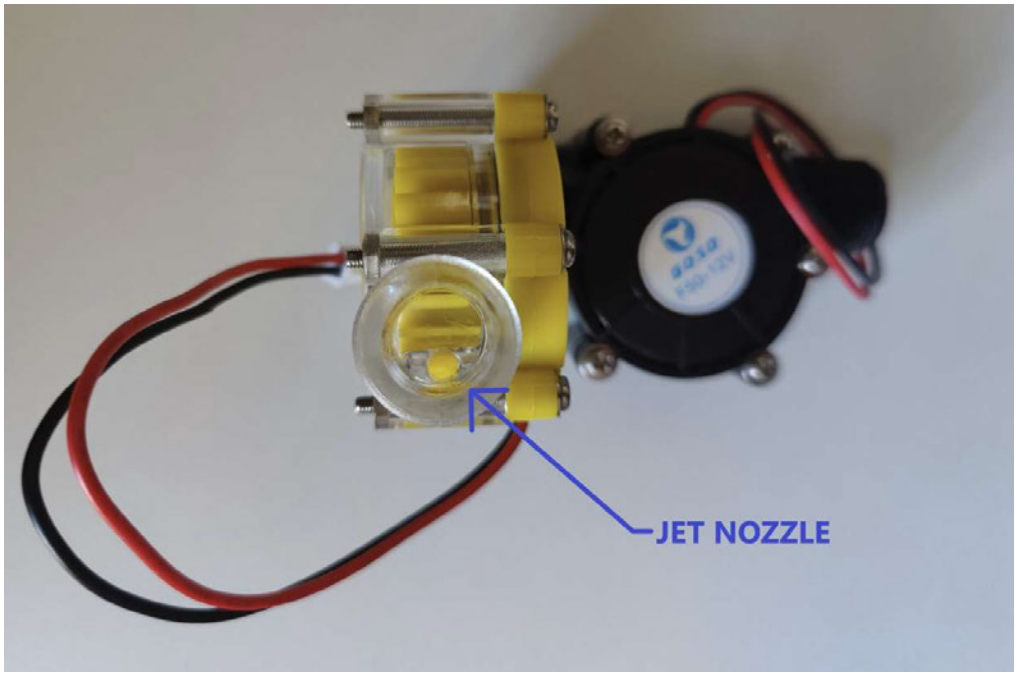


Fig 4.37 – Pelton Turbine Small-Scale Inlet Jet Nozzle

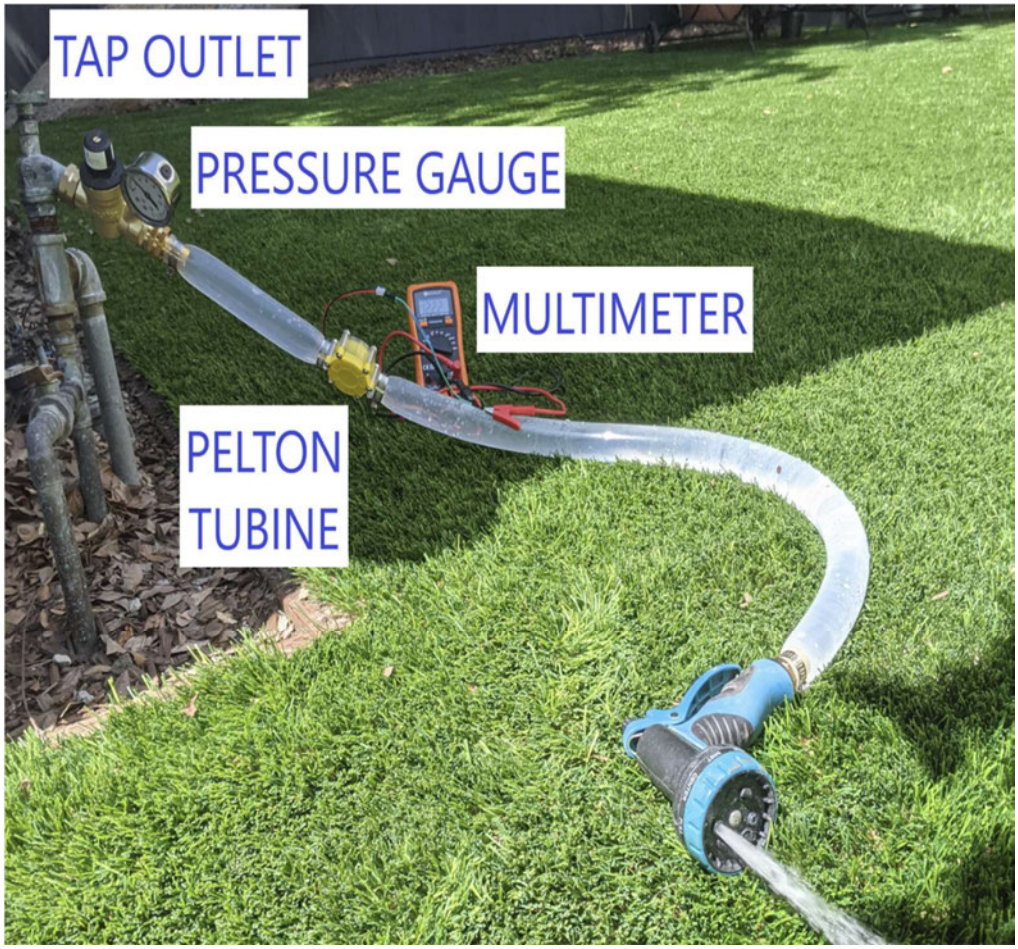


Fig 4.38 – Pelton Turbine Small-Scale Set Up

The Pelton Turbine small-scale models, use a three-phase rectifier, as pictured in fig 4.34, to output a maximum of 12 Vdc 220 mA as indicated from the design specification, table 4.8. Using these figures to calculate the potential maximum hydropower generation:

$$P_{rated} = VA = 12 \times 0.22 = 2.64\ W$$

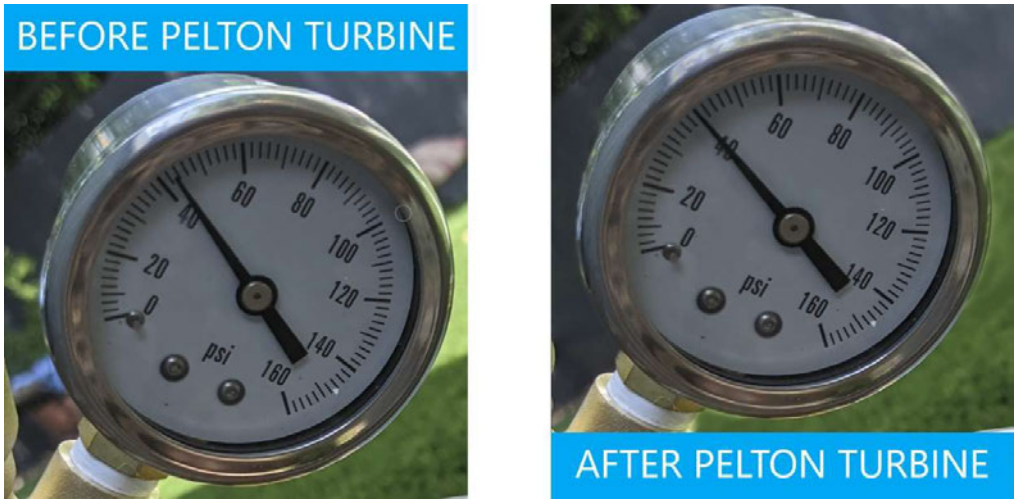


Fig 4.39 – Pressure Gauge Before and After the Pelton Turbine

The small-scale set up was set up initially as shown in fig 4.36 with the pressure gauge before the Pelton turbine. The pressure gauge was then moved along the set-up to record the pressure after the Pelton turbine. The 'before' and 'after' reading are given respectively on the left-hand side and right-hand side of fig 4.37:

$$p_{before} = 43\ psi$$
$$p_{after} = 40\ psi$$

This indicates that the total pressure consumed by the small-scale model Pelton turbine is:

$$p_{before} - p_{after} = p_{used} = 3\ psi \Rightarrow 20684.272\ Pa$$

Even using a small-scale model, this confirmed that the private service line Pelton turbine scheme will reduce the excess pressure, as per the simulations from sections 4.1 and 4.2, by hydroelectric generation.

Using the formula for hydraulic power, as specified in section 3.4, the optimum volumetric flow rate can be calculated:

$$Flow = \frac{Hydraulic\ Power}{Pressure}$$

$$Flow = \frac{2.64}{20684.272} = 0.0001276332\ m^3/s\ \Rightarrow 2.02\ GPM$$

The flow rate was measured using the same setup as in fig 4.36, filling a three (3) gallon bucket shown in fig 4.38 below.

Fig 4.40 – Measurement of Flow Rate

The filling time of the bucket was recoded at 1 minute, giving a flow rate of 3 GPM (0.000189271 m^3/s). Using the pressure used from the small-scale model to calculate the potential power generation:

$$Hydraulic\ Power = Flow \times Pressure$$

$$Hydraulic\ Power = 0.000189271 \times 20684.272 = 3.9149\ W$$

The potential power generation when compared to the rated power gives an efficiency of 67%, which can be expected as it closely lines up with simulation V05 of section 4.2.5 at an efficiency of 68%. Both the small scale-model and simulation V05 have the same number of buckets and are geometrically similar, which suggests that creating a flanged outlet would also help to benefit the small-scale model's design.

CHAPTER 5

DISCUSSION AND IMPLICATIONS

5.1 Implications of Scheme and Benefits

The proposed private service line hydroelectric power generation scheme has the main advantage of not only being a source of renewable energy, but one that works with the conservation of wasted energy. The scheme achieves this by utilising the existing infrastructure and therefore avoids common issues, discussed in section 1.2.3, that often impact and prevent further developments of hydroelectric power.

California is replacing fossil fuels with zero carbon emission renewable energy sources by 2045. When looking at the proposed scheme from a collaborative community approach, it becomes a viable source of generating electricity. With over 4 million people being supplied water through LADWP (section 2.2) and taking a conservative approach of half of the private service mains having excessive pressure (section 3.5), the potential hydroelectric power generation is:

$$Private\ Service\ Line\ Scheme\ Total\ P_{year} = 42.045\ \times 10^3 \times 2 \times 10^6$$

$$Private\ Service\ Line\ Scheme\ Total\ P_{year} = 84.091\ GWh/year$$

In 2019 the California Energy Commission recorded the total usage of electricity in Los Angeles to be 66118 GWh (Electricity Consumption by County, 2021), showing that the private service line hydroelectric generation scheme would only provide 0.1% of the total demand. However, it is a way to improve and re-engineer existing infrastructure by making use of every possible wasted energy source with no negative environmental impacts.

As a new clean energy source, the financial evaluation, section 3.8, details tax incentives and/or exemptions that would be available to a renewable energy scheme.

The CFD simulations conducted, in section 4.1 and 4.2, have the design parameters to provide 110 V at 60 Hz, however it would also be possible, as in section 4.3, to output a DC voltage. This would be used in parallel with existing solar panels to charge an EESS, as in Appendix F.

Within Los Angeles, the main utility LADWP supplies both water and electrical power services. This unique arrangement is particularly beneficial with the private service hydroelectric power generation scheme, as cooperation between both the electrical and water authorities is needed.

5.2 Negative Impacts of Scheme

The design and feasibility study focuses on the full power potential of the selected hydroelectric scheme and highlights the total energy being wasted. This needs to be considered as all hydroelectric power calculations are treated as ideal plant and therefore have no losses included.

Section 3.8 highlights the concerns and risks associated with the private service line hydroelectric power generation scheme, specifically from a monetary standpoint. For the scheme to be financially feasible, the budget would need to be maintained at under $40 USD per annum.

As an individual household or small scale set up, convincing individual customers to invest into the private service line hydroelectric power generation scheme may be difficult. Any hydroelectric installation incurs cost for setup, maintenance, and replacement. The Pelton turbine itself will need to be encased in a pressure rated casing to maintain operation and safety. These expenses would make it difficult to maintain this budget on a macro scale, however as a collaborative community-based scheme, such as a Los Angeles government initiative, these expenses could be decreased.

5.3 Ethical and Moral Obligations

Ensuring the safety of the consumer, the public, and professional persons is the highest priority. New standards may be introduced for the correct installation of the Pelton turbine, such as additional earthing requirements on both sides of the device, as illustrated in fig 5.1 below.

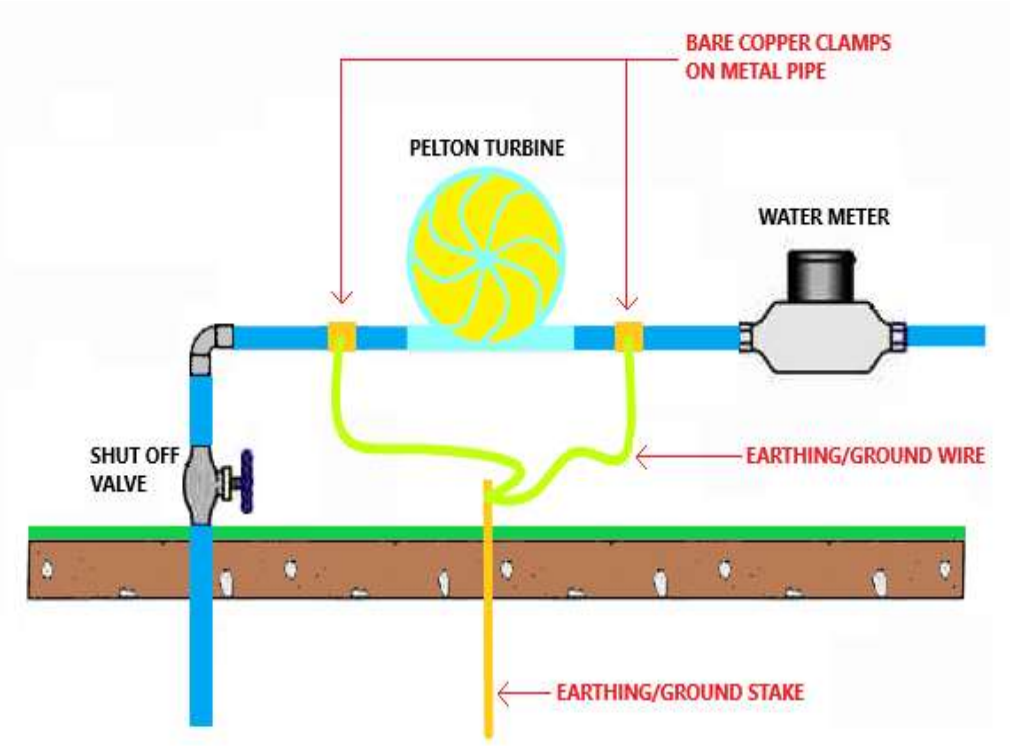


Fig 5.1 – Pelton Turbine Proposed Earthing Protection

The Intergovernmental Panel on Climate Change (IPCC) have released a report in 2021 stating that humans are unequivocally responsible for the rise in global temperatures (Climate Change 2021 The Physical Science Basis, 2021). This confirmation means that humans are also unequivocally morally and ethically responsible to stop and reverse these devastating effects. Renewable energy resources are a fantastic first step, but as highlighted in this project, there needs to also be a focus on innovative designs of existing infrastructure to prevent wasted potential.

The pathway for California to achieve the replacement of fossil fuels with renewable energy sources by 2045 sets a social and economic responsibility for the people, private businesses, and government bodies to utilise all viable steps to achieve this target. Through innovation of new products as well as improvement of those already exiting it is possible to meet and keep up with future growing energy demand.

CHAPTER 6

CONCLUSIONS

6.1 Future Research

Through this project all the outcomes in the project specification, appendix A, have been achieved, however as my understanding and comprehension in this topic has deepened, so too has my scope to develop the dissertation further.

6.1.1 Research Limitations

As with all things since the end of 2019, the Covid-19 pandemic has had an impact on areas of everyday life in the United States of America. In 2021 during this the completion of this project, the effects of the pandemic also impeded some aspects of study and data collection. Within Los Angeles particularly where lockdowns and restrictions were continually occurring, this limited public access to certain areas, within the LADWP network or at key water distribution points to prevent unnecessary risk.

At the beginning of the dissertation, I was living in Los Angeles, however, due to work commitments had to relocate midway to Prague in the Czech Republic. This change in geographic location, has limited or prevented some of the further studies for the present time.

6.1.2 Areas of Future Research

Further studies of the LADWP water supply network, specifically a survey of the supply pressure of each private service line, would help determine the number of viable consumers where the private service line hydroelectric generation scheme could be applied.

Further research into alternative turbine designs such as the spherical turbine, as discussed in section 2.7, should be explored to further ensure that the installation is optimised to the full potential.

Expenses for the components, as discussed in chapter 3, should be priced for multiple quantities. These components include the pressure casing, alternator, cables, and safety devices.

Contacting of the relevant utilities, LADWP, to discuss the integration of the Power and Water services. This is important to ensure that the installation is legal and adheres to safety standards.

Research other geographical areas to determine if they could be suitable for similar hydroelectric generation schemes that utilise the existing water supply network.

6.2 Final Analysis and Conclusions

"*As a global community, it is imperative that we act quickly and together to confront this crisis. And this will require innovation and collaboration around the world. It will require the use of renewable energy and new technologies. And it will give each of our nations the opportunity to build healthier communities and stronger economies.*" (Harris, US Vice President, 2021)

As the above quote by the United States of America Vice President Kamala Harris indicates, the reality of climate change is something that, done quickly enough, we can prevent from worsening and even reverse the effects through engineering innovative technology and harnessing renewable energy. Our world has no choice but to examine and reassess both new and existing designs of infrastructure to enhance its capability, improve the efficiency and leave a zero-carbon footprint. With energy demand increasing and the effects of climate change becoming more severe, we must focus on the conservation of energy and the environment.

As outlined in chapter 5, the proposed private service line hydroelectric power generation scheme is not financially viable as a single standalone installation, as materials and maintenance would pose too great a risk without a substantial monetary gain to offset this concern. However, as a community collaborative development, producing 84.091 GWh/year or 0.1%, if initiated by a larger organisation or government body, the costs of materials and labour would be

substantially reduced. As outlined in section 2.3, California can supply the current electricity demand with a peak of 94.5%, and it is imperative that every step is taken to reach the clean energy target. To do this a wholistic approach needs to be taken, where the existing infrastructure is assessed and enhanced to ensure that there are no unnecessary energy losses, maximising efficiency and complimenting zero carbon emission targets by using any available recoverable energy.

With a Los Angeles government initiative, the proposed scheme would not be primarily assessed on the monetary profits, but rather on the overall energy production generated. California, in showing initiative with its clean energy target by 2045, has already set an example for other states within the United States of America to follow on how to combat climate change. Now, the bigger challenge is to achieve that task with the growing energy demand and replace all remaining fossil fuels with renewable sources.

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APPENDICES

Appendix A - Project Specification

University of Southern Queensland
Faculty of Health, Engineering and Sciences
ENG4111/4112 Research Project
Project Specification

For: Nicholas Warry

Title: Design and feasibility study of hydro generators at various stages of mains water supply

Major: Power Engineering

Supervisors: Dr Wijitha Senadeera

Enrollment: ENG4111 – EXT S1, 2021
ENG4112 – EXT S2, 2021

Project Aim: The dissertation topic will primarily be a feasibility study in the placement of hydro generators and electrical storage at selected stages in the water supply network (Catchment, Treatment Plant, Primary Service Reservoir, Service Reservoir, Customer Mains). As dictated by the feasibility outcomes, if it proves to not be beneficial, proposed design parameters will be put forward to suit the location requirements.

Program: Version 2, 11th May 2021

1. Conduct initial background research on various types existing of hydro generation, giving an overview of both small and large systems.
2. Detail geography of Los Angeles (where this study is taking place), such as carbon taxes, carbon emission targets, etc.
3. Specify three to five (3-5) locations with potential to incorporate a hydro generator in line with the water supply mains, such as catchment, treatment plant, reservoir and customer mains.
4. Detail information about the water supply network in and a statistical analysis of the water usage per capita and expected water flow rate at each specified location.

5. Determine the potential output of each location when applying the various types of existing hydro generation, as well as listing costs both install and ongoing to discover if the location and equipment chosen is feasible.
6. If not feasible, list parameters of the hydro generator at each location that would need to be met to achieve the desired output.
7. Design and model a new type of hydro generator that meets above parameters and model using Onshape and SimScale.
8. Build a small scale model of design to test and record data.

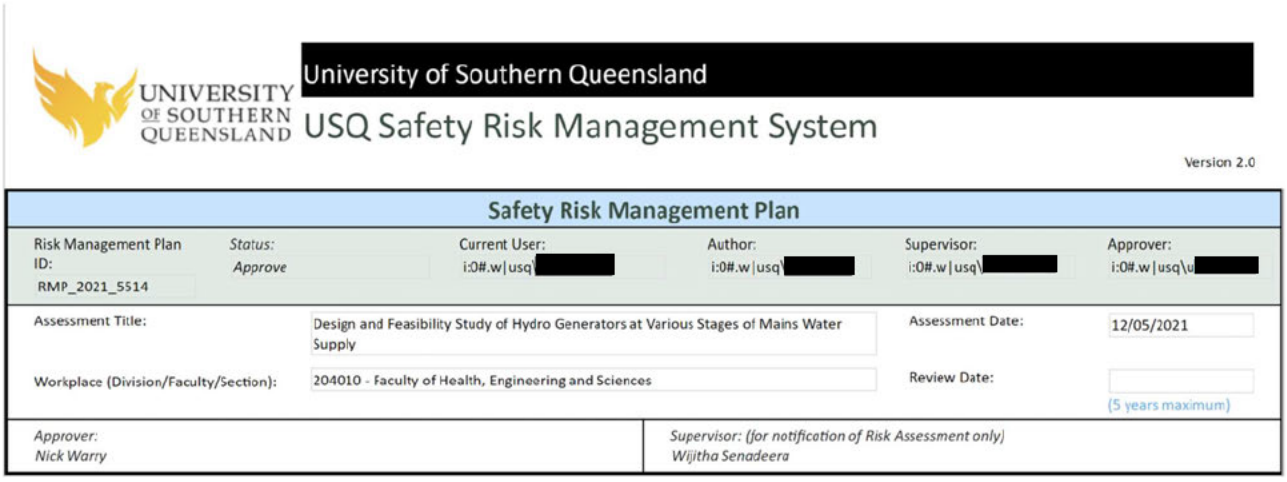
Appendix B - Project Risk Assessment

The risk assessment is an ongoing process which uses the USQ Safety Risk Management System (SRMS) in relation to the project. The SRMS is designed to continually consider the potential hazards that may impact the health and safety of persons involved with the project.

USQ (Work Health and Safety Risk Management Procedure - University of Southern Queensland, 2021) lists the process of risk assessment in the following steps:

"*Step 1: Decide who should be involved*
Step 2: Identify Hazards
Step 3: Analyse consequences (potential injury, property damage, etc.)
Step 4: Assess Risk (probability, frequency, severity of injury or loss)
Step 5: Determine action (methods of removing or reducing Risk)
Step 6: Implement controls (redesign, removal, new methods, audit)
Step 7: Evaluate controls
Step 8: Keep a record of the assessment and review regularly"

These steps are conducted and documented using the USQ SRMS Risk Management Plan (RMP_2021_5514) as follows.



University of Southern Queensland

USQ Safety Risk Management System

Version 2.0

Safety Risk Management Plan

Risk Management Plan ID:	Status:	Current User:	Author:	Supervisor:	Approver:
RMP_2021_5514	Approve	i:0#.w|usq\[redacted]	i:0#.w|usq\[redacted]	i:0#.w|usq\[redacted]	i:0#.w|usq\u[redacted]

Assessment Title:	Design and Feasibility Study of Hydro Generators at Various Stages of Mains Water Supply	Assessment Date:	12/05/2021
Workplace (Division/Faculty/Section):	204010 - Faculty of Health, Engineering and Sciences	Review Date:	(5 years maximum)

Approver: *Nick Warry*	*Supervisor: (for notification of Risk Assessment only)* *Wijitha Senadeera*

Context	
DESCRIPTION:	
What is the task/event/purchase/project/procedure?	Research and design into micro hydro electric generation
Why is it being conducted?	For dissertation topic ERP2021
Where is it being conducted?	Online and at home
Course code (if applicable)	ENG111; ENG4112;
Chemical Name (if applicable)	Water
WHAT ARE THE NOMINAL CONDITIONS?	
Personnel involved	Nick Warry
Equipment	Pressure gauge; hose; multimeter; leds; hose clamps; water supply; camera; hydro generator; flow switch; computer; internet; desk; chair; books; writing implements; lights;
Environment	Indoors and outdoors of the home
Other	
Briefly explain the procedure/process	Design and test effectiveness of hydro electric generation on water supply; Build test model of hydro electric generator on water supply;
Assessment Team - who is conducting the assessment?	
Assessor(s):	Nick Warry
Others consulted: (eg elected health and safety representative, other personnel exposed to risks)	

Risk Matrix

Probability	Consequence				
	Insignificant No Injury 0-$5K	Minor First Aid $5K-$50K	Moderate Med Treatment $50K-$100K	Major Serious Injury $100K-$250K	Catastrophic Death More than $250K
Almost Certain 1 in 2	M	H	E	E	E
Likely 1 in 100	M	H	H	E	E
Possible 1 in 1,000	L	M	H	H	H
Unlikely 1 in 10,000	L	L	M	M	M
Rare 1 in 1,000,000	L	L	L	L	L

Recommended Action Guide	
Extreme:	**E**= Extreme Risk – Task ***MUST NOT*** proceed
High:	**H** = High Risk – Special Procedures Required (Contact USQSafe) Approval by VC only
Medium:	**M**= Medium Risk - A Risk Management Plan/Safe Work Method Statement is required
Low:	**L**= Low Risk - Manage by routine procedures.

Risk Register and Analysis

	Step 1	Step 2	Step 2a	Step 2b	Step 3			Step 4				
	Hazards: From step 1 or more if identified	The Risk: What can happen if exposed to the hazard without existing controls in place?	Consequence: What is the harm that can be caused by the hazard without existing controls in place?	Existing Controls: What are the existing controls that are already in place?	Risk Assessment: Consequence x Probability = Risk Level			Additional Controls: Enter additional controls if required to reduce the risk level	Risk assessment with additional controls: Has the consequence or probability changed?			
					Probability	Risk Level	ALARP		Consequence	Probability	Risk Level	ALARP
	Example											
	Working in temperatures over 35° C	Heat stress/heat stroke/exhaustion leading to serious personal injury/death	catastrophic	Regular breaks, chilled water available, loose clothing, fatigue management policy.	possible	high	No	temporary shade shelters, essential tasks only, close supervision, buddy system	catastrophic	unlikely	mod	Yes
1	Sitting at des...	Muscle and eye strain	Minor	Regular breaks	Possibl	Me...	☐	Regular breaks with targeted and controlled stretches. Adjust lighting to suit needs.	Insignifica	Possible	Low	☑
2	Model equip...	Impact injury. Damage to eyes.	Moderate	Ensure equipment is designed for planned use.	Possibl	High	☐	Wear safety glasses and appropriate PPE (long sleeve shirt and trousers). Maintain a safe distance during testing. Observe equipment during test. Ability to quickly shut off water supply or release pressure.	Insignifica	Unlikely	Low	☑
3	Working wit...	Electrocution. Shocks.	Catastrophic	Scaling model to a safe working level of electricity (ELV)	Rare	Low	☐	Using appropriate PPE where suitable.	Insignifica	Rare	Low	☑
4	Working wit...	Cuts or other injuries to the body	Minor	Familiarisation of use in tools through appropriate experience and training.	Rare	Low	☐	PPE where suitable. Patience to ensure adequate time taken. Good lighting.	Insignifica	Rare	Low	☑

Step 5 - Action Plan (for controls not already in place)

	Additional Controls:	Exclude from Action Plan: (repeated control)	Resources:	Persons Responsible:	Proposed Implementation Date:
1	Regular breaks with targeted and controlled stretches. Adjust lighting to suit needs.	☐	Massage chair; Internet for specific stret...	Nick Warry	12/05/2021
2	Wear safety glasses and appropriate PPE (long sleeve shirt and trousers). Maintain a safe distance during testing. Observe equipment during test. Ability to quickly shut off water supply or release pressure.	☐	Safety glasses; Long sleeve shirt; Trouser...	Nick Warry	12/05/2021
3	Using appropriate PPE where suitable.	☑	Gloves	Nick Warry	12/05/2021
4	PPE where suitable. Patience to ensure adequate time taken. Good lighting.	☐	Gloves; Daylight hours;	Nick Warry	12/05/2021

Supporting Attachments

No file attached

Step 6 – Request Approval

Drafters Name: Nick Warry *Draft Date:* 12/05/2021

Drafters Comments:

Assessment Approval: **All risks are marked as ALARP**

Maximum Residual Risk Level: **Low - Manager/Supervisor Approval Required**

Document Status: Approve

Step 6 – Approval

Approvers Name: Nick Warry *Approvers Position Title:* USQ Student - Manager of Dissertation Project

Approvers Comments:

I am satisfied that the risks are as low as reasonably practicable and that the resources required will be provided.

Approval Decision: Approve *Approve / Reject Date:* 12/05/2021 *Document Status:* Approve

Appendix C - Project Timeline

Project Name	Project Duration	Project Start Date	Project End Date
Design and feasibility study of hydro generators at various stages of mains water supply	35 Weeks	Week 1	Week 35

	Task Description	Proposed Task Duration	Start Date	End Date	Week 01	Week 02	Week 03	Week 04	Week 05	Week 06	Week 07	Week 08	Week 09	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15	Week 16	Week 17	Week 18	Week 19	Week 20	Week 21	Week 22	Week 23	Week 24	Week 25	Week 26	Week 27	Week 28	Week 29	Week 30	Week 31	Week 32	Week 33	Week 34	Week 35
					SEMESTER 1 - ENG4111																				SEMESTER 2 - ENG4112														
1	Project Approval And Commencement	2 Weeks	Week 01	Week 02																																			
2	Liase With Supervisor Dr Senadeera	21 Hours	Week 03	Week 30																																			
3	Write And Submit Versions Of Spec	3 Weeks	Week 03	Week 05																																			
4	Indepth Reseach And Literature Review	2 Weeks	Week 06	Week 07																																			
5	Specify Locations For Hydro Generators	1 Weeks	Week 08	Week 08																																			
6	Research Industrial Hydro Systems	1 Weeks	Week 09	Week 09																																			
7	Research Micro Hydro Systems	1 Weeks	Week 10	Week 10																																			
8	Research Types Of ESS To Be Used	1 Weeks	Week 11	Week 11																																			
9	Confirm Type Of ESS To Be Used At Each Location	1 Weeks	Week 12	Week 12																																			
10	Feasibility And Efficiency Study Of Locations	2 Weeks	Week 13	Week 14																																			
11	Write And Submit Progress Report	2 Weeks	Week 15	Week 16																																			
12	Revise Research And Focus Scope Of Report	1 Weeks	Week 17	Week 17																																			
13	Design New Type/s Of Hydro Generator/s	2 Weeks	Week 19	Week 20																																			
14	Model Using Ansys And/Or Matlab	2 Weeks	Week 21	Week 22																																			
15	Build Small Scale Hydro Generator And ESS	2 Weeks	Week 23	Week 24																																			
16	Record Results And Draw Up Conclusions	1 Weeks	Week 26	Week 26																																			
17	Improve Design	1 Weeks	Week 27	Week 27																																			
18	Revise Dissertation And Make Requied Correction	2 Weeks	Week 29	Week 30																																			
19	Present Results At Professional Practice 2	2 Weeks	Week 31	Week 32																																			
20	Finalise And Submit Final Draft	3 Weeks	Week 33	Week 35																																			

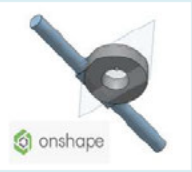
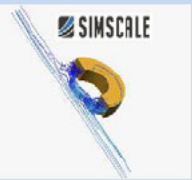
	=	Proposed Length of Task/Activity
	=	Extra Time Allotted If Required

Appendix D - Resource Planning

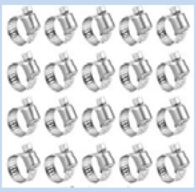
An analysis identifying the resources for this project are detailed below in the following tables. The source of each item is listed within the tables in that it was obtained with the student's own funds for all costs. Purchases were made well in advance to ensure the availability of each item.

An alternative to the silicon tubing was required to mitigate a complication when the tubing burst under pressure. The garden hose was found to be a suitable replacement and was easily procured.

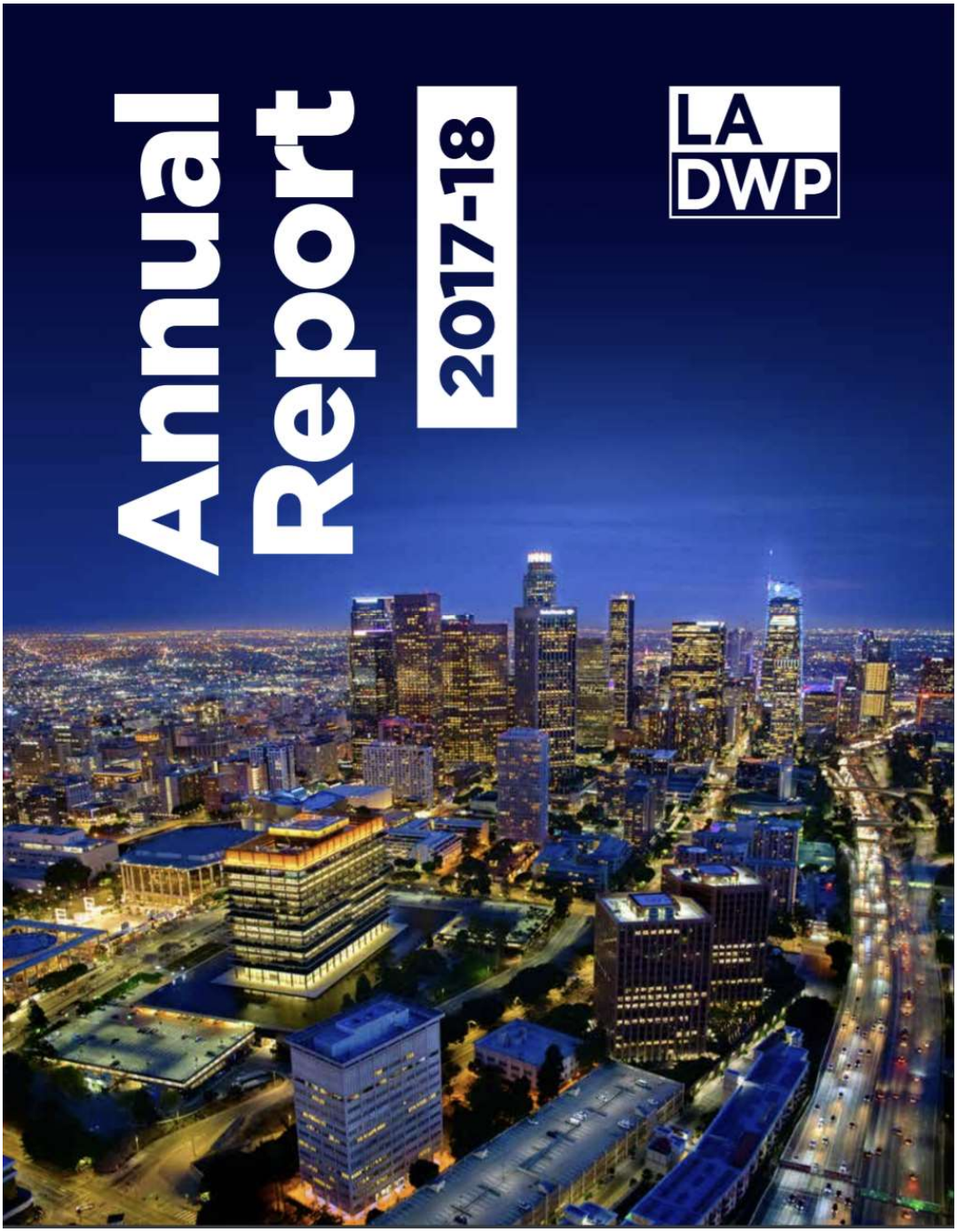
Table D - Project Resources

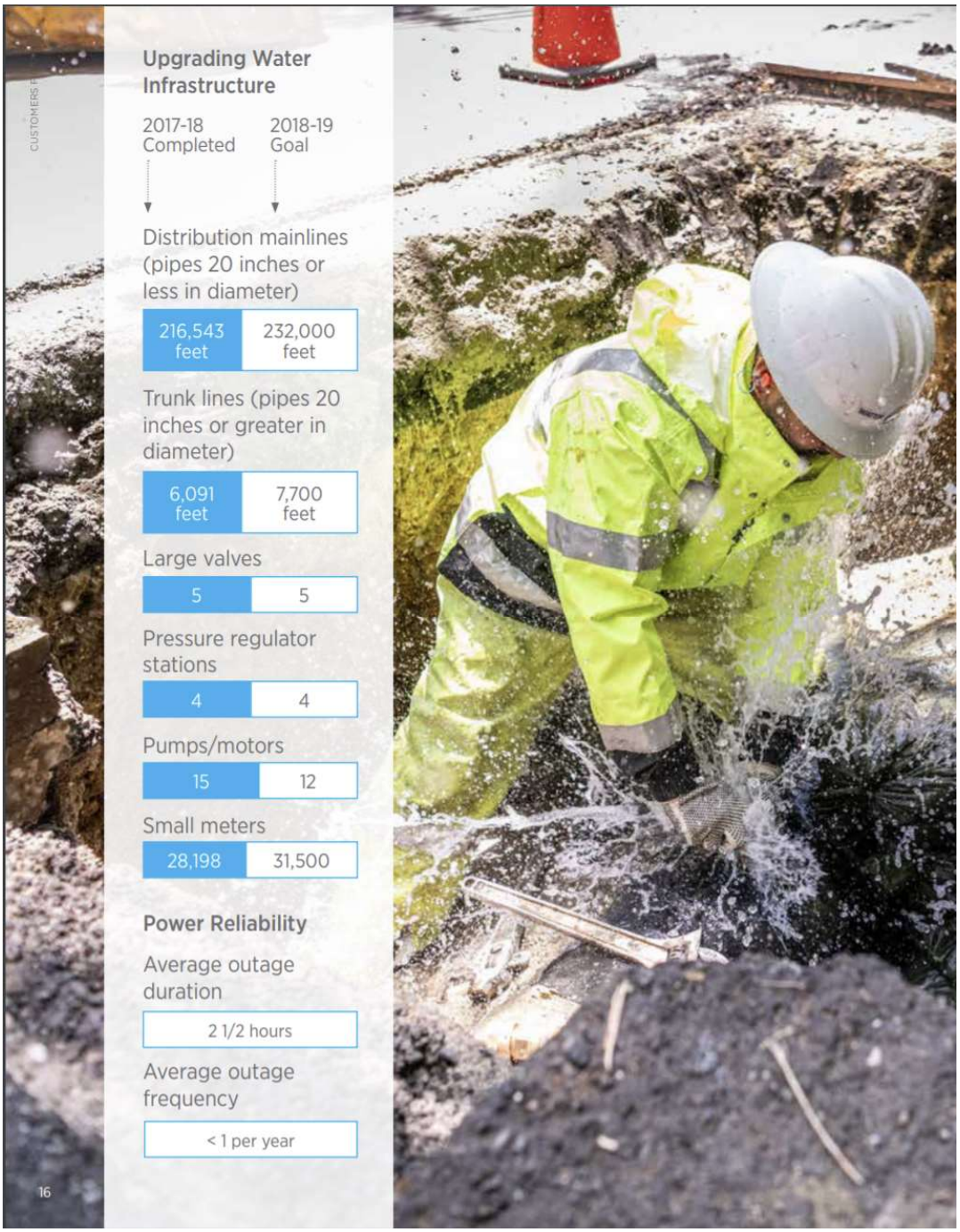
Task	Item	Source	Cost	Image
Simulation	Computer	Student	Previously Purchased	
Simulation	Onshape (software)	Online	Free	
Simulation	SimScale (software)	Online	Free	

Simulation	Office (software)	Student	Previously Purchased	
Task	**Item**	**Source**	**Cost**	**Image**
Model	Tools (pliers, screwdriver, etc.)	Student	$103.89	
Model	Personal Protective Equipment	Student	Previously Purchased	
Model	Multimeter	Student	$21.99	
Model	Garden Hose	Student	$14.20	
Model	Water Pressure Regulator	Student	$38.50	

Model	Silicon Tubing	Student	$13.19	
Task	**Item**	**Source**	**Cost**	**Image**
Model	Hose Clamp Adjustable 16-25 mm	Student	$8.99	
Model	Garden Hose Fittings	Student	$12.99	
Model	12V 10W DC Water Turbine Generator	Student	$16.39	
Model	12V 10W DC Water Turbine Generator	Student	$12.38	

Appendix E – LADWP 2017-18 Annual Report





CUSTOMERS F

Upgrading Water Infrastructure

	2017-18 Completed	2018-19 Goal
Distribution mainlines (pipes 20 inches or less in diameter)	216,543 feet	232,000 feet
Trunk lines (pipes 20 inches or greater in diameter)	6,091 feet	7,700 feet
Large valves	5	5
Pressure regulator stations	4	4
Pumps/motors	15	12
Small meters	28,198	31,500

Power Reliability

Average outage duration	2 1/2 hours
Average outage frequency	< 1 per year

16

Reliability

Customer confidence in their water and power service is important to us, and we strive to deliver the highest level of reliability and quality in the water and power we provide. LADWP maintains a vast water distribution infrastructure and every foot of our more than 7,000 miles of pipe is critical to the reliable delivery of drinking water to Los Angeles residents. With a significant amount of pipe installed at the turn of the last century, LADWP is investing over $2.85 billion in the next 10 years to aggressively upgrade and replace critical infrastructure.

Despite the challenges of aging water infrastructure, LADWP maintains a high level of reliability. Our leak rate has averaged 19 leaks per 100 miles of pipeline over the past five years, below the national average of 25 leaks per 100 miles of pipeline. We also meet state and federal drinking water standards, guaranteeing that we provide the safest, most easily accessible water for our customers.

LADWP is also upgrading and replacing critical aging power infrastructure to ensure continued reliability for our customers. We continue to ramp up the replacement of distribution infrastructure, such as poles, cross-arms, transformers, overhead circuits, and underground cables through our Power System Reliability Program (PSRP). We've invested approximately $2.3 billion over the past three years for rebuilding infrastructure and proactive maintenance.

In FY 2017-18, LADWP fared well compared to other utilities in nationwide industry standards for outage frequency and duration. LADWP customers can experience an average of less than one outage per year, and average two and a half hours without power. By comparison, the national average is 1.3 outages per customer, and each outage lasts over four hours.

Path to Higher Renewable Energy

In calendar year 2017, over 30% of all retail electricity sales came from renewable resources, including 250 megawatts (MW) from the Beacon Solar Plant, completed in December 2017 in the Mojave Desert. Altogether, we now receive about 580 MW from large solar arrays along Highway 14 north of Mojave, Calif. To improve the reliability and capacity of the solar power from this area, we installed a 20 MW utility-scale battery at the Beacon Solar Plant.

At the same time, we have significantly expanded solar on Los Angeles rooftops through our customer net-metering and feed-in tariff programs, ranking as the No. 1 Solar City in America by the Environment California Research and Policy Center's annual survey. We are also expanding our Community Solar Program to bring the economic and environmental benefits of solar to more underserved areas.

Taking Aim at Greenhouse Gas Emissions

In 2016, LADWP exceeded the state's 2030 GHG emissions reduction target 14 years ahead of the deadline. By the end of 2017, LADWP had reduced GHGs to 9.6 million metric tons (MMT)—approximately 47% below our 1990 emissions level. This feat is equivalent to removing about 1.8 million cars off the road for an entire year.

LADWP's long-term resource plan forecasts that our GHG emissions in 2030 will be approximately 79% below LADWP's 1990 baseline, almost achieving the state's 2050 GHG emissions reduction target 20 years early.

Securing a Resilient Local Water Supply and Infrastructure

Our goal is to reduce our reliance on imported, purchased water and source nearly half of L.A.'s water supply locally by 2040.

Climate change and natural disasters pose significant threats to our water supply. To continue to meet the water needs of Los Angeles, LADWP is ensuring the resilience and sustainability of our overall water system through infrastructure and supply planning.

Radical variations in climate patterns directly affect the snowpack regions of California. In recent years, the state experienced an extended dry period followed in 2017 by record rainfall and snowpack. To secure L.A.'s water future, LADWP has set goals to expand local water resources, including stormwater, recycled water and groundwater. We also continue to aggressively incentivize water conservation with rebates and programs that helped L.A. achieve a per capita water use in FY 2017-18 of 112 gallons—the lowest of any major U.S. city. In February 2019, the City announced a major new initiative to recycle 100% of all the city's wastewater by 2035. LADWP will define the strategy to meet this new goal in our 2020 Urban Water Management Plan.

At the same time, LADWP is building a 14-mile seismic resilient pipe network, pioneering the use of earthquake resilient ductile iron pipe (ERDIP) in the United States. To strengthen our city and water system's capacity to withstand and recover quickly from an earthquake, LADWP has installed over two miles of ERDIP throughout Los Angeles, including the East Valley, West Valley, Central, West L.A., and Harbor areas of the city. Among the projects is the largest ERDIP pipe installed to date—a two-mile segment of the 54-inch Foothill Trunk Line where the major water distribution artery crosses the San Fernando Fault in Sylmar. As we expand the seismic resilient pipe network, we are prioritizing placement in areas where hospitals, fire stations and other services most needed for earthquake recovery are located.

WATER SERVICES FACTS IN BRIEF

	FY 2018	FY 2017	FY 2016	FY 2015	FY 2014
Use of Water					
Average Los Angeles Population Served	4,054,400	4,021,488	3,985,114	3,959,840	3,945,037
Average daily use per capita (gallons)*	112	102	104	113	n/a
Water Sales for Fiscal Year (Millions of Billing Units of 100 cu. Ft)	205.3	196.0	199.2	216.2	236.2
Water Supply (Millions of Billing Units of 100 cu. Ft.)					
Local supply	9.5	22.3	34.4	39.4	34.6
DWP Aqueduct	134.0	92.6	22.3	25.1	26.6
MWD	79.6	95.7	150.6	167.9	192.5
Recycled Water	4.3	3.5	4.3	4.5	4.4
Gross Supply	227.4	214.1	211.6	236.9	258.1
Diversion from (to) local storage	-0.1	-3.4	1.0	-10.0	-2.5
Net supply to distribution systems	227.3	210.7	212.6	226.9	255.6
Bond Ratings					
Moody's/S&P/Fitch	Aa2/AA+/AA	Aa2/AA+/AA	Aa2/AA+/AA	Aa2/AA/AA	Aa2/AA/AA

ENERGY SERVICES FACTS IN BRIEF

	FY 2018	FY 2017	FY 2016	FY 2015	FY 2014
Number of Customers					
Residential	1,385,470	1,378,172	1,370,137	1,363,366	1,368,220
Commercial and Industrial	123,680	122,841	122,734	122,609	127,289
All Other	6,391	6,651	7,002	7,230	7,915
Total customers of all classes	1,515,541	1,507,664	1,499,873	1,493,205	1,503,424
Power Use					
Sales to Ultimate Customers - kilowatt (kW) hours	22,383,310,345	22,490,122,681	23,278,785,593	23,018,220,376	22,760,433,905
Sales to Other Utilities - kW Hours	532,293,000	1,425,847,000	1,880,402,376	2,330,069,000	2,550,419,000
Average annual kW hours per residential customer	5,248	5,285	5,450	5,380	5,341
Net dependable capacity, megawatts	7,850	7,787	8,038	7,976	7,966
Bond Ratings					
Moody's/S&P/Fitch	Aa2/AA/AA	Aa2/AA-/AA-	Aa2/AA-/AA-	Aa3/AA-/AA-	Aa3/AA-/AA-

WATER AND POWER (CONSOLIDATED) FINANCIAL FACTS IN BRIEF

($ Billions)	FY 2018	FY 2017	FY 2016	FY 2015	FY 2014
Financial Data					
Total Assets	26.9	26.7	25.6	24.4	23.5
Total Net Position	8.4	8.9	8.6	8.2	8.1
Total Annual Operating Revenue	5.0	4.8	4.6	4.4	4.4
Total Annual Budget	6.1	6.3	6.4	6.0	6.0
Retiree Benefits Data Based on Market Value of Assets					
Unfunded Pension Liability	0.9	1.3	2.2	1.1	1.3
Funded Pension %	93.1%	89.4%	82.2%	89.8%	88.4%
Unfunded Retiree Medical Liability	0.4	0.4	0.6	0.3	0.3
Funded Retiree Medical %	84.5%	81.4%	72.5%	85.8%	82.8%

*Beginning in Fiscal Year 2015, the Department replaced Average Metered Consumption Per Person Per Day with Average Consumption Per Person.

WATER SERVICES SELECTED FINANCIAL DATA AND STATISTICS

($ Millions)	FY 2018	FY 2017	FY 2016	FY 2015	FY 2014
Operating Revenue					
Residential	$509.6	$450.4	$458.0	$431.9	$475.9
Multi Dwelling	352.1	338.6	339.8	331.2	342.4
Commercial and Industrial	254.7	264.7	277.8	269.0	269.4
Other	73.7	64.9	56.2	50.4	54.1
Total Operating Revenue	$1,190.2	$1,118.6	$1,131.7	$1,082.6	$1,141.8
Operating Income	$339.0	261.1	251.8	212.7	248.1
As % of operating revenues	28.5%	23.3%	22.2%	19.6%	21.7%
Change in Net Position*	$200.3	$140.5	$154.2	$108.0	$152.4
Balance Sheet					
Net utility plant	$8,033.0	$7,554.0	$7,013.0	$6,513.8	$5,950.2
Capital additions, net	479.0	541.0	499.3	563.6	538.3
Capitalization					
Net Position	$3,018.3	3,136.2	2,995.7	2,841.5	2,733.5
Long-term debt	5,786.4	5,569.2	5,249.6	4,568.5	4,174.7
Interest on debt	205.3	194.5	181.3	173.6	160.4
Key Financial Planning Metrics					
Debt Service Ratio	1.82	1.74	1.95	1.88	2.11
Number of Days Cash on Hand	183	165	154	173	168
Debt to Capitalization %	65%	64%	63%	61%	60%
Operations					
Gallons sold (billions)	153.6	146.5	149.0	161.7	176.7
Customers - average number (thousands)	683	680	678	676	679
Average Revenue per hundred cu. ft. Sold (in dollars)					
Residential	$6.48	$6.21	$6.30	$5.23	$5.04
Multiple Dwelling	5.62	5.54	5.46	5.06	4.86
Commercial and Industrial	5.53	5.89	5.88	5.38	5.12
Water Supply (millions of billing units of 100 cu. ft.)					
Local supply	9.5	22.3	34.4	39.4	34.6
DWP Aqueduct	134.0	92.6	22.3	25.1	26.6
Metropolitan Water District	79.6	95.7	150.6	167.9	192.5
Recycled Water	4.3	3.5	4.3	4.5	4.4
Gross Supply	227.4	214.1	211.6	236.9	258.1
Diversion from (to) local storage	-0.1	-3.4	1.0	-10.0	-2.5
Net supply to distribution systems	227.3	210.7	212.6	226.9	255.6

*The Change in Net Position amount under Fiscal Year 2018 excludes the cumulative effect of change in accounting for post retirement benefits other than pensions under GASB 75.

Appendix F – Tesla Powerwall Datasheet

POWERWALL

Tesla Powerwall is a fully-integrated AC battery system for residential or light commercial use. Its rechargeable lithium-ion battery pack provides energy storage for solar self-consumption, time-based control, and backup.

Powerwall's electrical interface provides a simple connection to any home or building. Its revolutionary compact design achieves market-leading energy density and is easy to install, enabling owners to quickly realize the benefits of reliable, clean power.

PERFORMANCE SPECIFICATIONS

AC Voltage (Nominal)	120/240 V
Feed-In Type	Split Phase
Grid Frequency	60 Hz
Total Energy[1]	14 kWh
Usable Energy[1]	13.5 kWh
Real Power, max continuous	5 kW (charge and discharge)
Real Power, peak (10s, off-grid/backup)	7 kW (charge and discharge)
Apparent Power, max continuous	5.8 kVA (charge and discharge)
Apparent Power, peak (10s, off-grid/backup)	7.2 kVA (charge and discharge)
Maximum Supply Fault Current	10 kA
Maximum Output Fault Current	32 A
Overcurrent Protection Device	30 A
Imbalance for Split-Phase Loads	100%
Power Factor Output Range	+/- 1.0 adjustable
Power Factor Range (full-rated power)	+/- 0.85
Internal Battery DC Voltage	50 V
Round Trip Efficiency[1,2]	90%
Warranty	10 years

[1]Values provided for 25°C (77°F), 3.3 kW charge/discharge power.
[2]AC to battery to AC, at beginning of life.

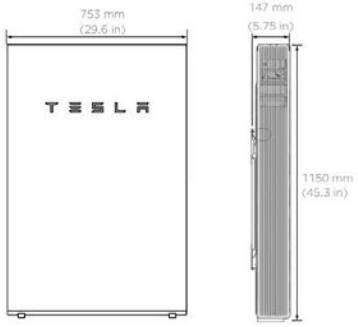
COMPLIANCE INFORMATION

Certifications	UL 1642, UL 1741, UL 1973, UL 9540, IEEE 1547, UN 38.3
Grid Connection	Worldwide Compatibility
Emissions	FCC Part 15 Class B, ICES 003
Environmental	RoHS Directive 2011/65/EU
Seismic	AC156, IEEE 693-2005 (high)

MECHANICAL SPECIFICATIONS

Dimensions[3]	1150 mm x 753 mm x 147 mm (45.3 in x 29.6 in x 5.75 in)
Weight[3]	114 kg (251.3 lbs)
Mounting options	Floor or wall mount

[3]Dimensions and weight differ slightly if manufactured before March 2019. Contact Tesla for additional information.



ENVIRONMENTAL SPECIFICATIONS

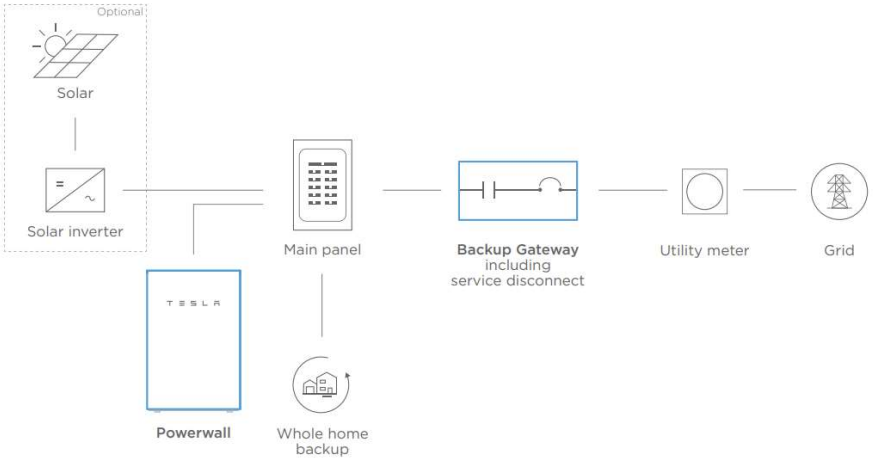
Operating Temperature	-20°C to 50°C (-4°F to 122°F)
Recommended Temperature	0°C to 30°C (32°F to 86°F)
Operating Humidity (RH)	Up to 100%, condensing
Storage Conditions	-20°C to 30°C (-4°F to 86°F) Up to 95% RH, non-condensing State of Energy (SoE): 25% initial
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R
Ingress Rating	IP67 (Battery & Power Electronics) IP56 (Wiring Compartment)
Wet Location Rating	Yes
Noise Level @ 1m	< 40 dBA at 30°C (86°F)

TESLA

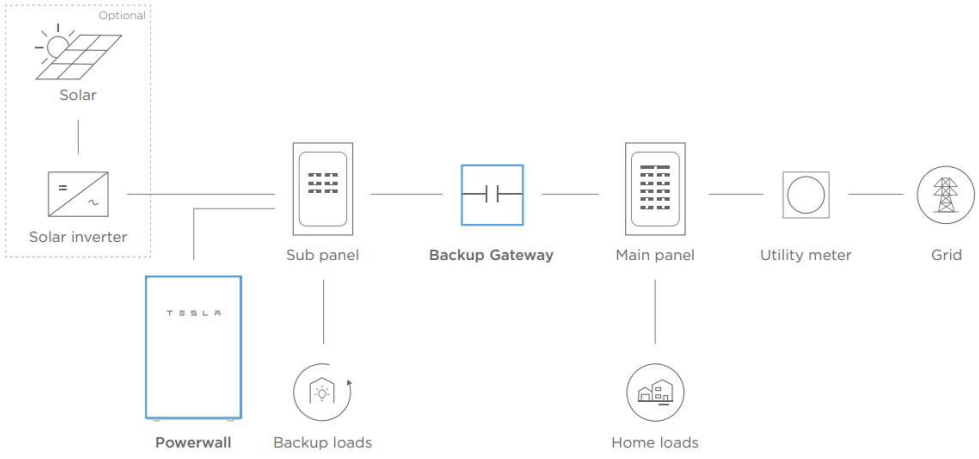
TESLA.COM/ENERGY

TYPICAL SYSTEM LAYOUTS

WHOLE HOME BACKUP



PARTIAL HOME BACKUP



Appendix G – Tabulated Simulation Velocity

Simulation	V01		V02		V03		V04		V05		V06	
Time (s)	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
1 00E+00	-1 99E-02	0.00E+00	-7.28E-02	0 00E+00	2.32E-02	0.00E+00	2.79E-02	0.00E+00	-2.65E-02	0 00E+00	-2 95E-03	0.00E+00
2 00E+00	-1 99E-02	0.00E+00	-4.33E-02	-8.46E-02	-2.73E-02	-6.11E-02	-1.13E-03	0.00E+00	-2.44E-02	-2.97E-03	-2.17E-02	0.00E+00
3 00E+00	-2 03E-01	-7.72E-03	-4.38E-01	6.57E-04	-3.01E-01	1 06E-02	9.61E-02	-1.68E-01	8.19E-03	0 00E+00	-1 07E-01	0.00E+00
4 00E+00	-1 97E-01	-7.19E-02	-1.54E-01	3.25E-04	-7.73E-02	-1.60E-03	8.05E-02	-3.52E-01	-1.38E-01	0 00E+00	-1 31E-01	0.00E+00
5 00E+00	-6 04E-02	-3.48E-02	-6.98E-02	0 00E+00	3.12E-01	-5 34E-03	-6.01E-01	-2.54E-01	-2.97E-01	0 00E+00	-3 90E-02	0.00E+00
6 00E+00	-1 27E-01	-1.39E-02	1.91E-01	0 00E+00	1.75E-01	-1.11E-02	-7.33E-02	-1.14E-01	-1.32E-01	-3.22E-03	-1 33E-01	-4.44E-04
7 00E+00	-1.44E-01	1.82E-02	-1.50E-02	-2.37E-04	-2.22E-01	-1.65E-02	3.74E-01	1.32E-01	-4.87E-02	-1.55E-03	-8 52E-02	1.57E-04
8 00E+00	-9.16E-02	2.40E-02	-1.25E-01	-7.42E-05	-1.53E-01	9 23E-03	1.05E-01	1.75E-01	-2.17E-01	2.13E-03	-1 08E-01	1.10E-03
9 00E+00	-8.41E-02	1.15E-02	-9.39E-02	5.76E-04	7.96E-02	2.47E-02	-3.11E-01	1.22E-01	-1.26E-01	2.33E-03	-1 00E-01	9.81E-04
1 00E+01	-5 39E-02	7.06E-04	-9.56E-02	4.14E-04	8.72E-02	1 94E-02	-7.73E-03	8.13E-02	-7.88E-02	6.69E-04	-1 02E-01	4.78E-04
1.10E+01	-1 23E-01	-5.35E-04	-1.37E-01	1.35E-04	-4.74E-02	5.48E-03	-2.21E-01	5.53E-02	-1.39E-01	3.32E-05	-9.19E-02	0.00E+00
1 20E+01	-7 06E-02	-1.76E-03	-6.08E-02	1.93E-05	3.48E-02	7 35E-04	1.21E-03	4.25E-02	-9.80E-02	0 00E+00	-8 31E-02	0.00E+00
1 30E+01	-4.19E-02	-4.73E-04	-5.08E-02	0 00E+00	-7.18E-03	7.13E-06	-1.10E-02	4.53E-02	-6.49E-02	0 00E+00	-8 22E-02	0.00E+00
1.40E+01	-1 09E-01	6.38E-06	-1.02E-01	0 00E+00	-1.67E-01	6 34E-04	-1.36E-01	4.30E-02	-1.28E-01	0 00E+00	-6.77E-02	1.64E-05
1 50E+01	-6 24E-02	-1.09E-04	-4.07E-02	0 00E+00	-9.79E-02	5 30E-04	-2.06E-02	3.57E-02	-7.46E-02	0 00E+00	-6 04E-02	4.37E-05
1.60E+01	-4 33E-02	4.66E-05	-4.38E-02	0 00E+00	-8.32E-02	1 50E-04	1.19E-02	2.85E-02	-6.11E-02	0 00E+00	-5.49E-02	1.62E-05
1.70E+01	-6.75E-02	4.92E-05	-3.13E-02	0 00E+00	-1.22E-01	0.00E+00	-9.78E-02	2.31E-02	-9.02E-02	0 00E+00	-3 87E-02	0.00E+00
1 80E+01	-4.79E-02	7.58E-06	-7.57E-02	-1.32E-04	-8.35E-02	0.00E+00	-3.66E-03	2.14E-02	-5.40E-02	0 00E+00	-4 02E-02	0.00E+00
1 90E+01	-3 85E-02	0.00E+00	-1.97E-02	-5.92E-04	-7.05E-02	0.00E+00	5.66E-03	1.98E-02	-4.65E-02	0 00E+00	-3 26E-02	0.00E+00
2 00E+01	-3.15E-02	0.00E+00	-8.48E-03	-9.82E-04	-9.15E-02	0.00E+00	2.62E-02	1.78E-02	-6.30E-02	0 00E+00	-2.49E-02	0.00E+00
2.10E+01	-3 39E-02	0.00E+00	-5.03E-02	-3.82E-03	-6.35E-02	0.00E+00	-7.18E-03	1.64E-02	-2.74E-02	0 00E+00	-1.76E-02	0.00E+00
2 20E+01	-2.43E-02	0.00E+00	3.88E-03	-2.22E-03	-5.59E-02	0.00E+00	1.93E-02	1.61E-02	-1.98E-02	-4.11E-05	-1 05E-02	-2.72E-05
2 30E+01	-1 83E-02	0.00E+00	1.24E-02	5.71E-04	-4.90E-02	0.00E+00	2.56E-02	1.72E-02	8.44E-04	-9.69E-04	-2.64E-03	-7.00E-04
2.40E+01	-1.68E-02	0.00E+00	-4.32E-03	6.86E-03	-1.78E-02	0.00E+00	3.19E-02	2.23E-02	-1.55E-03	-2.75E-03	2 91E-03	-2.61E-03
2 50E+01	-1 03E-02	0.00E+00	2.61E-02	1.48E-02	-3.52E-02	0.00E+00	3.81E-02	2.69E-02	6.15E-03	-2.03E-03	9 21E-03	-1.36E-03
2.60E+01	-4 01E-03	-3.05E-05	3.41E-02	2.37E-02	-2.84E-02	0.00E+00	4.36E-02	3.21E-02	1.41E-02	5.31E-03	1.48E-02	4.26E-03
2.70E+01	-3.47E-05	-3.26E-03	4.02E-02	3.22E-02	-1.78E-02	0.00E+00	4.69E-02	3.67E-02	2.19E-02	1.62E-02	2.15E-02	1.17E-02
2 80E+01	6 27E-03	5.56E-04	4.72E-02	3.94E-02	-1.33E-02	-2 05E-06	5.37E-02	4.17E-02	3.08E-02	2.74E-02	2.75E-02	1.93E-02
2 90E+01	1 24E-02	5.32E-03	5.58E-02	4.56E-02	-6.24E-03	-4.67E-04	5.83E-02	4.79E-02	3.91E-02	3.71E-02	3 33E-02	2.59E-02
3 00E+01	1.74E-02	1.09E-02	6.85E-02	5.18E-02	3.89E-04	-2.19E-03	6.32E-02	5.46E-02	4.45E-02	4.56E-02	3 91E-02	3.17E-02
3.10E+01	2 33E-02	1.67E-02	6.49E-02	5.87E-02	8.28E-03	-5 07E-04	6.60E-02	6.14E-02	5.40E-02	5.36E-02	4.47E-02	3.76E-02
3 20E+01	2 93E-02	2.27E-02	7.25E-02	6.65E-02	1.44E-02	4 99E-03	7.26E-02	6.81E-02	6.12E-02	6.15E-02	4 99E-02	4.44E-02
3 30E+01	3 50E-02	2.89E-02	7.64E-02	7.41E-02	2.14E-02	1 25E-02	7.66E-02	7.43E-02	7.37E-02	6.90E-02	5 56E-02	5.20E-02
3.40E+01	4.10E-02	3.57E-02	8.35E-02	8.07E-02	1.96E-02	2 08E-02	8.11E-02	8.01E-02	7.61E-02	7.61E-02	6 09E-02	5.90E-02
3 50E+01	4.69E-02	4.31E-02	1.02E-01	8.54E-02	3.43E-02	2 93E-02	8.42E-02	8.55E-02	8.31E-02	8.29E-02	6.61E-02	6.51E-02
3.60E+01	5 25E-02	5.04E-02	6.13E-02	8.99E-02	4.04E-02	3.76E-02	8.84E-02	9.01E-02	9.21E-02	8.98E-02	7.12E-02	7.04E-02
3.70E+01	5 82E-02	5.68E-02	1.05E-01	9.56E-02	5.06E-02	4 51E-02	9.33E-02	9.41E-02	9.59E-02	9.65E-02	7.63E-02	7.57E-02
3 80E+01	6 26E-02	6.21E-02	9.99E-02	1.02E-01	5.04E-02	5.14E-02	9.76E-02	9.79E-02	1.02E-01	1.03E-01	8 32E-02	8.12E-02
3 90E+01	6.69E-02	6.68E-02	6.95E-02	1.06E-01	5.77E-02	5.72E-02	1.02E-01	1.02E-01	1.11E-01	1.09E-01	8.76E-02	8.64E-02
4 00E+01	7 09E-02	7.11E-02	1.12E-01	1.09E-01	5.93E-02	6 26E-02	1.02E-01	1.05E-01	1.14E-01	1.14E-01	9.16E-02	9.13E-02
4.10E+01	7.49E-02	7.50E-02	9.94E-02	1.12E-01	6.27E-02	6 81E-02	9.52E-02	1.09E-01	1.19E-01	1.19E-01	9 95E-02	9.60E-02
4 20E+01	7.66E-02	7.87E-02	2.50E-01	1.15E-01	7.47E-02	7 34E-02	9.75E-02	1.13E-01	1.25E-01	1.25E-01	1 00E-01	1.01E-01
4 30E+01	8 28E-02	8.20E-02	1.44E-01	1.19E-01	7.99E-02	7 86E-02	9.75E-02	1.16E-01	1.32E-01	1.29E-01	1 06E-01	1.05E-01
4.40E+01	8 26E-02	8.51E-02	1.49E-01	1.23E-01	9.35E-02	8 36E-02	9.68E-02	1.19E-01	1.33E-01	1.34E-01	1.12E-01	1.09E-01
4 50E+01	8.76E-02	8.80E-02	1.13E-01	1.26E-01	9.08E-02	8 83E-02	9.86E-02	1.22E-01	1.37E-01	1.38E-01	1.11E-01	1.13E-01
4.60E+01	8 94E-02	9.09E-02	9.37E-02	1.28E-01	9.45E-02	9 29E-02	1.06E-01	1.24E-01	1.48E-01	1.42E-01	1.17E-01	1.16E-01
4.70E+01	9 26E-02	9.36E-02	8.76E-02	1.31E-01	9.22E-02	9.73E-02	1.12E-01	1.27E-01	1.44E-01	1.45E-01	1 21E-01	1.19E-01
4 80E+01	9.47E-02	9.62E-02	1.02E-01	1.33E-01	9.61E-02	1 02E-01	1.11E-01	1.30E-01	1.48E-01	1.49E-01	1.19E-01	1.22E-01
4 90E+01	9.79E-02	9.88E-02	1.58E-01	1.34E-01	1.00E-01	1 06E-01	1.16E-01	1.32E-01	1.64E-01	1.52E-01	1 26E-01	1.25E-01
5 00E+01	1 02E-01	1.01E-01	9.48E-02	1.28E-01	1.06E-01	1.10E-01	1.19E-01	1.35E-01	1.53E-01	1.55E-01	1 27E-01	1.27E-01
5.10E+01	1 02E-01	1.04E-01	9.77E-02	1.26E-01	1.18E-01	1.14E-01	1.16E-01	1.37E-01	1.57E-01	1.58E-01	1 29E-01	1.30E-01
5 20E+01	1 05E-01	1.06E-01	1.59E-01	1.32E-01	1.21E-01	1.18E-01	1.19E-01	1.39E-01	1.70E-01	1.61E-01	1 33E-01	1.32E-01
5 30E+01	1 08E-01	1.08E-01	1.61E-01	1.32E-01	1.26E-01	1 21E-01	1.26E-01	1.42E-01	1.58E-01	1.63E-01	1 33E-01	1.34E-01
5.40E+01	1.11E-01	1.10E-01	8.03E-02	1.33E-01	1.28E-01	1 25E-01	1.28E-01	1.44E-01	1.67E-01	1.66E-01	1 35E-01	1.36E-01
5 50E+01	1.11E-01	1.12E-01	1.46E-01	1.40E-01	1.32E-01	1 28E-01	1.26E-01	1.46E-01	1.74E-01	1.68E-01	1.40E-01	1.38E-01
5.60E+01	1.14E-01	1.15E-01	1.09E-01	1.50E-01	1.35E-01	1 31E-01	1.36E-01	1.48E-01	1.63E-01	1.71E-01	1 38E-01	1.40E-01
5.70E+01	1.16E-01	1.17E-01	2.34E-01	1.58E-01	1.38E-01	1 34E-01	1.41E-01	1.50E-01	1.75E-01	1.73E-01	1.40E-01	1.41E-01
5 80E+01	1.17E-01	1.19E-01	1.24E-01	1.66E-01	1.41E-01	1 37E-01	1.34E-01	1.51E-01	1.77E-01	1.75E-01	1.44E-01	1.43E-01
5 90E+01	1 20E-01	1.21E-01	1.26E-01	1.80E-01	1.43E-01	1.40E-01	1.46E-01	1.53E-01	1.71E-01	1.77E-01	1.44E-01	1.44E-01
6 00E+01	1 23E-01	1.24E-01	1.62E-01	2.00E-01	1.45E-01	1.42E-01	1.50E-01	1.55E-01	1.82E-01	1.79E-01	1.44E-01	1.46E-01
6.10E+01	1 26E-01	1.28E-01	1.49E-01	2.24E-01	1.47E-01	1.45E-01	1.47E-01	1.57E-01	1.77E-01	1.81E-01	1.48E-01	1.47E-01
6 20E+01	1 29E-01	1.34E-01	1.03E-01	2.49E-01	1.49E-01	1.47E-01	1.49E-01	1.58E-01	1.88E-01	1.83E-01	1.48E-01	1.48E-01
6 30E+01	1 30E-01	1.43E-01	1.80E-01	2.76E-01	1.52E-01	1.49E-01	1.49E-01	1.60E-01	1.80E-01	1.85E-01	1.49E-01	1.50E-01

Simulation	V01		V02		V03		V04		V05		V06	
Time (s)	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
6.40E+01	1 31E-01	1.58E-01	1.28E-01	3.03E-01	1.54E-01	1 51E-01	1.51E-01	1.61E-01	1.90E-01	1.87E-01	1 52E-01	1.51E-01
6 50E+01	1 33E-01	1.79E-01	1.48E-01	3.30E-01	1.55E-01	1 53E-01	1.52E-01	1.63E-01	1.84E-01	1.89E-01	1 52E-01	1.52E-01
6.60E+01	1 33E-01	2.04E-01	1.82E-01	3.58E-01	1.57E-01	1 55E-01	1.55E-01	1.65E-01	1.94E-01	1.90E-01	1 53E-01	1.54E-01
6.70E+01	1 35E-01	2.32E-01	2.02E-01	3.88E-01	1.59E-01	1 57E-01	1.58E-01	1.66E-01	1.89E-01	1.92E-01	1 56E-01	1.55E-01
6 80E+01	1 37E-01	2.61E-01	1.17E-01	4.17E-01	1.56E-01	1 58E-01	1.59E-01	1.67E-01	1.95E-01	1.94E-01	1 56E-01	1.56E-01
6 90E+01	1 38E-01	2.91E-01	1.38E-01	4.48E-01	1.58E-01	1.60E-01	1.60E-01	1.69E-01	1.92E-01	1.96E-01	1 58E-01	1.57E-01
7 00E+01	1 38E-01	3.19E-01	1.39E-01	4.78E-01	1.64E-01	1.61E-01	1.64E-01	1.70E-01	2.00E-01	1.97E-01	1 59E-01	1.59E-01
7.10E+01	1.40E-01	3.45E-01	1.40E-01	5.08E-01	1.61E-01	1.63E-01	1.66E-01	1.71E-01	1.95E-01	1.99E-01	1 59E-01	1.60E-01
7 20E+01	1.41E-01	3.67E-01	1.47E-01	5.38E-01	1.63E-01	1.64E-01	1.64E-01	1.73E-01	2.02E-01	2.01E-01	1.62E-01	1.61E-01
7 30E+01	1.42E-01	3.84E-01	1.24E-01	5.64E-01	1.68E-01	1.66E-01	1.70E-01	1.74E-01	1.97E-01	2.04E-01	1.62E-01	1.62E-01
7.40E+01	1.43E-01	3.98E-01	1.64E-01	5.89E-01	1.65E-01	1.67E-01	1.71E-01	1.75E-01	2.05E-01	2.06E-01	1.65E-01	1.64E-01
7 50E+01	1.44E-01	4.07E-01	1.91E-01	6.09E-01	1.70E-01	1.68E-01	1.72E-01	1.77E-01	2.01E-01	2.08E-01	1.64E-01	1.65E-01
7.60E+01	1.45E-01	4.13E-01	1.45E-01	6.25E-01	1.68E-01	1.70E-01	1.73E-01	1.78E-01	2.07E-01	2.11E-01	1.67E-01	1.66E-01
7.70E+01	1.47E-01	4.18E-01	1.41E-01	6.35E-01	1.72E-01	1.71E-01	1.83E-01	1.79E-01	2.04E-01	2.13E-01	1.67E-01	1.68E-01
7 80E+01	1.47E-01	4.22E-01	1.47E-01	6.43E-01	1.70E-01	1.72E-01	1.83E-01	1.80E-01	2.09E-01	2.15E-01	1.69E-01	1.69E-01
7 90E+01	1.48E-01	4.25E-01	1.89E-01	6.44E-01	1.75E-01	1.74E-01	1.77E-01	1.81E-01	2.06E-01	2.17E-01	1.69E-01	1.71E-01
8 00E+01	1 50E-01	4.31E-01	1.38E-01	6.45E-01	1.73E-01	1.75E-01	1.84E-01	1.82E-01	2.12E-01	2.18E-01	1.72E-01	1.73E-01
8.10E+01	1 50E-01	4.38E-01	1.24E-01	6.45E-01	1.76E-01	1.76E-01	1.87E-01	1.83E-01	2.08E-01	2.20E-01	1.72E-01	1.75E-01
8 20E+01	1 51E-01	4.44E-01	1.43E-01	6.44E-01	1.75E-01	1.78E-01	1.82E-01	1.84E-01	2.14E-01	2.20E-01	1.73E-01	1.78E-01
8 30E+01	1 52E-01	4.48E-01	1.90E-01	6.41E-01	1.79E-01	1.79E-01	1.87E-01	1.86E-01	2.11E-01	2.21E-01	1.75E-01	1.81E-01
8.40E+01	1 53E-01	4.49E-01	1.37E-01	6.39E-01	1.77E-01	1 81E-01	1.84E-01	1.87E-01	2.16E-01	2.21E-01	1.77E-01	1.87E-01
8 50E+01	1 54E-01	4.48E-01	1.31E-01	6.36E-01	1.81E-01	1 83E-01	1.91E-01	1.87E-01	2.13E-01	2.22E-01	1.76E-01	1.96E-01
8.60E+01	1 55E-01	4.44E-01	1.29E-01	6.33E-01	1.79E-01	1 84E-01	1.87E-01	1.88E-01	2.19E-01	2.23E-01	1.79E-01	2.08E-01
8.70E+01	1 56E-01	4.39E-01	1.84E-01	6.31E-01	1.82E-01	1 86E-01	1.91E-01	1.89E-01	2.16E-01	2.26E-01	1.78E-01	2.21E-01
8 80E+01	1 57E-01	4.33E-01	1.48E-01	6.28E-01	1.82E-01	1 87E-01	1.87E-01	1.90E-01	2.22E-01	2.28E-01	1 80E-01	2.33E-01
8 90E+01	1 58E-01	4.26E-01	1.80E-01	6.27E-01	1.84E-01	1 87E-01	1.93E-01	1.91E-01	2.17E-01	2.30E-01	1 81E-01	2.45E-01
9 00E+01	1 59E-01	4.19E-01	1.66E-01	6.27E-01	1.83E-01	1 88E-01	1.91E-01	1.92E-01	2.23E-01	2.32E-01	1 82E-01	2.56E-01
9.10E+01	1 58E-01	4.11E-01	1.31E-01	6.26E-01	1.86E-01	1 88E-01	1.96E-01	1.93E-01	2.21E-01	2.34E-01	1 83E-01	2.66E-01
9 20E+01	1.61E-01	4.04E-01	1.24E-01	6.28E-01	1.85E-01	1 88E-01	1.92E-01	1.94E-01	2.25E-01	2.35E-01	1 84E-01	2.74E-01
9 30E+01	1.60E-01	3.99E-01	1.16E-01	6.29E-01	1.88E-01	1 89E-01	1.96E-01	1.95E-01	2.23E-01	2.36E-01	1 85E-01	2.79E-01
9.40E+01	1.62E-01	3.93E-01	1.34E-01	6.32E-01	1.87E-01	1 89E-01	1.97E-01	1.95E-01	2.27E-01	2.35E-01	1 86E-01	2.83E-01
9 50E+01	1.61E-01	3.89E-01	1.51E-01	6.36E-01	1.90E-01	1 90E-01	1.93E-01	1.96E-01	2.25E-01	2.34E-01	1 87E-01	2.83E-01
9.60E+01	1.64E-01	3.85E-01	1.37E-01	6.39E-01	1.88E-01	1 90E-01	1.95E-01	1.97E-01	2.29E-01	2.33E-01	1 88E-01	2.78E-01
9.70E+01	1.63E-01	3.83E-01	1.30E-01	6.38E-01	1.91E-01	1 90E-01	2.00E-01	1.98E-01	2.26E-01	2.34E-01	1 89E-01	2.69E-01
9 80E+01	1.64E-01	3.79E-01	1.63E-01	6.35E-01	1.90E-01	1 91E-01	1.97E-01	1.98E-01	2.30E-01	2.35E-01	1 90E-01	2.55E-01
9 90E+01	1.66E-01	3.77E-01	1.42E-01	6.30E-01	1.93E-01	1 91E-01	2.00E-01	1.99E-01	2.29E-01	2.36E-01	1 91E-01	2.42E-01
1 00E+02	1.65E-01	3.75E-01	1.54E-01	6.22E-01	1.92E-01	1 91E-01	2.02E-01	2.00E-01	2.32E-01	2.37E-01	1 91E-01	2.32E-01
1 01E+02	1.66E-01	3.73E-01	1.33E-01	6.09E-01	1.94E-01	1 92E-01	2.03E-01	2.00E-01	2.30E-01	2.38E-01	1 92E-01	2.24E-01
1 02E+02	1.68E-01	3.69E-01	1.40E-01	5.95E-01	1.93E-01	1 93E-01	2.04E-01	2.01E-01	2.34E-01	2.39E-01	1 93E-01	2.13E-01
1 03E+02	1.68E-01	3.63E-01	1.72E-01	5.75E-01	1.96E-01	1 94E-01	2.04E-01	2.02E-01	2.32E-01	2.40E-01	1 94E-01	2.07E-01
1 04E+02	1.69E-01	3.57E-01	1.64E-01	5.54E-01	1.95E-01	1 95E-01	2.05E-01	2.02E-01	2.35E-01	2.41E-01	1 95E-01	2.04E-01
1 05E+02	1.68E-01	3.48E-01	1.35E-01	5.29E-01	1.97E-01	1 96E-01	2.05E-01	2.03E-01	2.34E-01	2.42E-01	1 95E-01	2.01E-01
1 06E+02	1.69E-01	3.37E-01	1.54E-01	5.03E-01	1.96E-01	1 97E-01	2.05E-01	2.03E-01	2.36E-01	2.43E-01	1 96E-01	2.01E-01
1 07E+02	1.69E-01	3.25E-01	1.43E-01	4.76E-01	1.99E-01	1 97E-01	2.06E-01	2.04E-01	2.36E-01	2.44E-01	1 97E-01	2.03E-01
1 08E+02	1.71E-01	3.14E-01	1.67E-01	4.49E-01	1.97E-01	1 98E-01	2.06E-01	2.05E-01	2.38E-01	2.46E-01	1 98E-01	2.05E-01
1 09E+02	1.72E-01	3.00E-01	1.48E-01	4.24E-01	2.00E-01	1 99E-01	2.06E-01	2.05E-01	2.36E-01	2.47E-01	1 98E-01	2.08E-01
1.10E+02	1.71E-01	2.83E-01	1.66E-01	4.02E-01	1.99E-01	2 00E-01	2.07E-01	2.06E-01	2.40E-01	2.49E-01	1 99E-01	2.10E-01
1.11E+02	1.73E-01	2.75E-01	1.66E-01	3.79E-01	2.01E-01	2 00E-01	2.08E-01	2.06E-01	2.38E-01	2.50E-01	2 00E-01	2.11E-01
1.12E+02	1.74E-01	2.73E-01	1.48E-01	3.59E-01	2.00E-01	2 01E-01	2.08E-01	2.07E-01	2.40E-01	2.51E-01	2 00E-01	2.12E-01
1.13E+02	1.74E-01	2.71E-01	1.55E-01	3.38E-01	2.02E-01	2 01E-01	2.09E-01	2.07E-01	2.40E-01	2.51E-01	2 01E-01	2.13E-01
1.14E+02	1.74E-01	2.68E-01	1.54E-01	3.24E-01	2.01E-01	2 02E-01	2.09E-01	2.08E-01	2.42E-01	2.52E-01	2 01E-01	2.14E-01
1.15E+02	1.74E-01	2.66E-01	1.58E-01	3.15E-01	2.03E-01	2 02E-01	2.10E-01	2.08E-01	2.40E-01	2.52E-01	2 02E-01	2.17E-01
1.16E+02	1.76E-01	2.65E-01	1.64E-01	3.10E-01	2.02E-01	2 03E-01	2.10E-01	2.09E-01	2.43E-01	2.52E-01	2 03E-01	2.19E-01
1.17E+02	1.76E-01	2.62E-01	1.68E-01	3.07E-01	2.04E-01	2 04E-01	2.11E-01	2.09E-01	2.42E-01	2.53E-01	2 03E-01	2.20E-01
1.18E+02	1.75E-01	2.59E-01	1.70E-01	3.06E-01	2.03E-01	2 04E-01	2.11E-01	2.09E-01	2.44E-01	2.53E-01	2 03E-01	2.22E-01
1.19E+02	1.77E-01	2.56E-01	1.69E-01	3.04E-01	2.05E-01	2 05E-01	2.12E-01	2.10E-01	2.44E-01	2.53E-01	2 04E-01	2.22E-01
1 20E+02	1.77E-01	2.54E-01	1.69E-01	3.02E-01	2.04E-01	2 05E-01	2.12E-01	2.10E-01	2.45E-01	2.53E-01	2 05E-01	2.22E-01
1 21E+02	1.77E-01	2.51E-01	1.61E-01	3.01E-01	2.06E-01	2 06E-01	2.12E-01	2.11E-01	2.44E-01	2.53E-01	2 05E-01	2.22E-01
1 22E+02	1.77E-01	2.49E-01	1.70E-01	2.98E-01	2.05E-01	2 06E-01	2.13E-01	2.11E-01	2.47E-01	2.53E-01	2 06E-01	2.21E-01
1 23E+02	1.79E-01	2.47E-01	1.62E-01	2.95E-01	2.07E-01	2 07E-01	2.13E-01	2.12E-01	2.45E-01	2.52E-01	2 06E-01	2.19E-01
1 24E+02	1.79E-01	2.45E-01	1.64E-01	2.91E-01	2.06E-01	2 08E-01	2.14E-01	2.12E-01	2.47E-01	2.52E-01	2 07E-01	2.17E-01
1 25E+02	1 80E-01	2.44E-01	1.71E-01	2.86E-01	2.08E-01	2 08E-01	2.14E-01	2.12E-01	2.47E-01	2.51E-01	2 07E-01	2.15E-01
1 26E+02	1 80E-01	2.43E-01	1.65E-01	2.81E-01	2.07E-01	2 09E-01	2.14E-01	2.13E-01	2.49E-01	2.51E-01	2 08E-01	2.13E-01
1 27E+02	1 80E-01	2.42E-01	1.67E-01	2.75E-01	2.08E-01	2.10E-01	2.15E-01	2.13E-01	2.46E-01	2.50E-01	2 08E-01	2.12E-01
1 28E+02	1.79E-01	2.40E-01	1.72E-01	2.67E-01	2.08E-01	2.12E-01	2.15E-01	2.13E-01	2.50E-01	2.50E-01	2 09E-01	2.12E-01
1 29E+02	1 80E-01	2.39E-01	1.73E-01	2.60E-01	2.09E-01	2.15E-01	2.15E-01	2.14E-01	2.48E-01	2.50E-01	2 09E-01	2.12E-01
1 30E+02	1 82E-01	2.38E-01	1.66E-01	2.51E-01	2.08E-01	2.18E-01	2.15E-01	2.14E-01	2.50E-01	2.50E-01	2.10E-01	2.13E-01
1 31E+02	1 81E-01	2.38E-01	1.73E-01	2.43E-01	2.10E-01	2 20E-01	2.15E-01	2.14E-01	2.49E-01	2.51E-01	2.10E-01	2.15E-01
1 32E+02	1 81E-01	2.37E-01	1.72E-01	2.33E-01	2.09E-01	2 21E-01	2.16E-01	2.15E-01	2.51E-01	2.52E-01	2.11E-01	2.17E-01
1 33E+02	1 82E-01	2.36E-01	1.69E-01	2.24E-01	2.10E-01	2 22E-01	2.16E-01	2.15E-01	2.50E-01	2.52E-01	2.11E-01	2.18E-01
1 34E+02	1 82E-01	2.36E-01	1.72E-01	2.17E-01	2.10E-01	2 22E-01	2.16E-01	2.15E-01	2.52E-01	2.53E-01	2.11E-01	2.19E-01
1 35E+02	1 82E-01	2.35E-01	1.72E-01	2.08E-01	2.11E-01	2 21E-01	2.16E-01	2.15E-01	2.50E-01	2.54E-01	2.12E-01	2.19E-01
1 36E+02	1 84E-01	2.35E-01	1.74E-01	2.01E-01	2.10E-01	2 21E-01	2.16E-01	2.16E-01	2.53E-01	2.54E-01	2.12E-01	2.19E-01

Simulation	V01		V02		V03		V04		V05		V06	
Time (s)	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
1 37E+02	1 84E-01	2.35E-01	1.69E-01	1.94E-01	2.11E-01	2.19E-01	2.17E-01	2.16E-01	2.52E-01	2.55E-01	2.12E-01	2.19E-01
1 38E+02	1 84E-01	2.36E-01	1.73E-01	1.89E-01	2.11E-01	2.18E-01	2.17E-01	2.16E-01	2.54E-01	2.56E-01	2.13E-01	2.20E-01
1 39E+02	1 84E-01	2.37E-01	1.73E-01	1.87E-01	2.12E-01	2.16E-01	2.17E-01	2.16E-01	2.52E-01	2.57E-01	2.13E-01	2.21E-01
1.40E+02	1 85E-01	2.37E-01	1.72E-01	1.87E-01	2.11E-01	2.14E-01	2.17E-01	2.16E-01	2.55E-01	2.58E-01	2.13E-01	2.23E-01
1.41E+02	1 85E-01	2.37E-01	1.74E-01	1.87E-01	2.13E-01	2.12E-01	2.18E-01	2.17E-01	2.53E-01	2.59E-01	2.14E-01	2.24E-01
1.42E+02	1 86E-01	2.38E-01	1.72E-01	1.88E-01	2.12E-01	2.11E-01	2.18E-01	2.17E-01	2.55E-01	2.59E-01	2.14E-01	2.26E-01
1.43E+02	1 86E-01	2.38E-01	1.73E-01	1.89E-01	2.13E-01	2.11E-01	2.18E-01	2.17E-01	2.54E-01	2.60E-01	2.14E-01	2.28E-01
1.44E+02	1 86E-01	2.37E-01	1.74E-01	1.91E-01	2.13E-01	2.13E-01	2.18E-01	2.17E-01	2.55E-01	2.61E-01	2.15E-01	2.30E-01
1.45E+02	1 86E-01	2.37E-01	1.73E-01	1.93E-01	2.14E-01	2.15E-01	2.18E-01	2.18E-01	2.56E-01	2.61E-01	2.15E-01	2.32E-01
1.46E+02	1 87E-01	2.35E-01	1.72E-01	1.94E-01	2.13E-01	2.17E-01	2.19E-01	2.18E-01	2.55E-01	2.61E-01	2.15E-01	2.33E-01
1.47E+02	1 87E-01	2.34E-01	1.74E-01	1.96E-01	2.14E-01	2.19E-01	2.19E-01	2.18E-01	2.57E-01	2.61E-01	2.16E-01	2.34E-01
1.48E+02	1 87E-01	2.32E-01	1.73E-01	2.00E-01	2.14E-01	2 22E-01	2.19E-01	2.18E-01	2.55E-01	2.60E-01	2.16E-01	2.36E-01
1.49E+02	1 87E-01	2.31E-01	1.75E-01	2.03E-01	2.15E-01	2 25E-01	2.19E-01	2.18E-01	2.57E-01	2.59E-01	2.16E-01	2.38E-01
1 50E+02	1 88E-01	2.29E-01	1.76E-01	2.07E-01	2.14E-01	2 28E-01	2.19E-01	2.19E-01	2.57E-01	2.59E-01	2.17E-01	2.40E-01
1 51E+02	1 88E-01	2.27E-01	1.72E-01	2.10E-01	2.15E-01	2 30E-01	2.19E-01	2.19E-01	2.56E-01	2.59E-01	2.17E-01	2.43E-01
1 52E+02	1 88E-01	2.25E-01	1.74E-01	2.12E-01	2.14E-01	2 33E-01	2.20E-01	2.20E-01	2.55E-01	2.60E-01	2.17E-01	2.46E-01
1 53E+02	1 88E-01	2.23E-01	1.76E-01	2.14E-01	2.15E-01	2 36E-01	2.20E-01	2.21E-01	2.59E-01	2.61E-01	2.18E-01	2.49E-01
1 54E+02	1 89E-01	2.21E-01	1.77E-01	2.15E-01	2.15E-01	2 38E-01	2.20E-01	2.23E-01	2.57E-01	2.62E-01	2.18E-01	2.50E-01
1 55E+02	1 89E-01	2.19E-01	1.73E-01	2.16E-01	2.16E-01	2.40E-01	2.20E-01	2.25E-01	2.58E-01	2.63E-01	2.18E-01	2.51E-01
1 56E+02	1 89E-01	2.16E-01	1.76E-01	2.16E-01	2.15E-01	2.42E-01	2.21E-01	2.28E-01	2.59E-01	2.64E-01	2.18E-01	2.52E-01
1 57E+02	1 89E-01	2.14E-01	1.75E-01	2.16E-01	2.16E-01	2.43E-01	2.21E-01	2.31E-01	2.59E-01	2.65E-01	2.19E-01	2.52E-01
1 58E+02	1 89E-01	2.13E-01	1.78E-01	2.16E-01	2.16E-01	2.45E-01	2.21E-01	2.33E-01	2.58E-01	2.65E-01	2.19E-01	2.51E-01
1 59E+02	1 90E-01	2.12E-01	1.75E-01	2.16E-01	2.17E-01	2.47E-01	2.21E-01	2.35E-01	2.60E-01	2.65E-01	2.19E-01	2.49E-01
1.60E+02	1 90E-01	2.12E-01	1.76E-01	2.16E-01	2.16E-01	2.49E-01	2.21E-01	2.37E-01	2.58E-01	2.64E-01	2.19E-01	2.46E-01
1.61E+02	1 90E-01	2.12E-01	1.75E-01	2.16E-01	2.17E-01	2 52E-01	2.21E-01	2.37E-01	2.60E-01	2.62E-01	2 20E-01	2.42E-01
1.62E+02	1 90E-01	2.12E-01	1.74E-01	2.15E-01	2.16E-01	2 55E-01	2.22E-01	2.37E-01	2.60E-01	2.62E-01	2 20E-01	2.38E-01
1.63E+02	1 91E-01	2.11E-01	1.76E-01	2.15E-01	2.17E-01	2 57E-01	2.22E-01	2.37E-01	2.59E-01	2.61E-01	2 20E-01	2.34E-01
1.64E+02	1 91E-01	2.10E-01	1.77E-01	2.15E-01	2.17E-01	2.60E-01	2.22E-01	2.37E-01	2.59E-01	2.60E-01	2 20E-01	2.29E-01
1.65E+02	1 91E-01	2.09E-01	1.77E-01	2.15E-01	2.18E-01	2.64E-01	2.22E-01	2.37E-01	2.62E-01	2.60E-01	2 21E-01	2.27E-01
1.66E+02	1 91E-01	2.08E-01	1.78E-01	2.15E-01	2.17E-01	2.68E-01	2.22E-01	2.37E-01	2.60E-01	2.61E-01	2 21E-01	2.25E-01
1.67E+02	1 92E-01	2.08E-01	1.79E-01	2.15E-01	2.18E-01	2.73E-01	2.23E-01	2.38E-01	2.61E-01	2.61E-01	2 21E-01	2.24E-01
1.68E+02	1 92E-01	2.09E-01	1.79E-01	2.15E-01	2.18E-01	2 80E-01	2.23E-01	2.40E-01	2.62E-01	2.62E-01	2 21E-01	2.24E-01
1.69E+02	1 92E-01	2.09E-01	1.79E-01	2.15E-01	2.18E-01	2 87E-01	2.23E-01	2.41E-01	2.61E-01	2.62E-01	2 21E-01	2.24E-01
1.70E+02	1 92E-01	2.10E-01	1.80E-01	2.14E-01	2.18E-01	2 96E-01	2.23E-01	2.43E-01	2.62E-01	2.63E-01	2 22E-01	2.25E-01
1.71E+02	1 92E-01	2.12E-01	1.80E-01	2.14E-01	2.19E-01	3 07E-01	2.23E-01	2.45E-01	2.62E-01	2.63E-01	2 22E-01	2.25E-01
1.72E+02	1 93E-01	2.13E-01	1.79E-01	2.14E-01	2.18E-01	3.16E-01	2.24E-01	2.47E-01	2.61E-01	2.63E-01	2 22E-01	2.26E-01
1.73E+02	1 93E-01	2.16E-01	1.81E-01	2.14E-01	2.19E-01	3 26E-01	2.24E-01	2.48E-01	2.63E-01	2.64E-01	2 22E-01	2.27E-01
1.74E+02	1 93E-01	2.18E-01	1.79E-01	2.15E-01	2.19E-01	3 35E-01	2.24E-01	2.50E-01	2.63E-01	2.64E-01	2 22E-01	2.29E-01
1.75E+02	1 93E-01	2.21E-01	1.81E-01	2.16E-01	2.19E-01	3.45E-01	2.24E-01	2.52E-01	2.62E-01	2.65E-01	2 23E-01	2.30E-01
1.76E+02	1 93E-01	2.23E-01	1.81E-01	2.19E-01	2.19E-01	3 53E-01	2.24E-01	2.53E-01	2.64E-01	2.65E-01	2 23E-01	2.31E-01
1.77E+02	1 93E-01	2.25E-01	1.81E-01	2.24E-01	2.19E-01	3.61E-01	2.24E-01	2.55E-01	2.64E-01	2.66E-01	2 23E-01	2.32E-01
1.78E+02	1 93E-01	2.26E-01	1.83E-01	2.29E-01	2.19E-01	3.68E-01	2.25E-01	2.56E-01	2.62E-01	2.67E-01	2 23E-01	2.33E-01
1.79E+02	1 93E-01	2.25E-01	1.83E-01	2.37E-01	2.20E-01	3.74E-01	2.25E-01	2.57E-01	2.64E-01	2.68E-01	2 23E-01	2.34E-01
1 80E+02	1 94E-01	2.25E-01	1.81E-01	2.44E-01	2.19E-01	3 80E-01	2.25E-01	2.58E-01	2.64E-01	2.70E-01	2 24E-01	2.34E-01
1 81E+02	1 94E-01	2.25E-01	1.82E-01	2.53E-01	2.20E-01	3 84E-01	2.25E-01	2.58E-01	2.63E-01	2.71E-01	2 24E-01	2.35E-01
1 82E+02	1 94E-01	2.27E-01	1.82E-01	2.62E-01	2.20E-01	3 87E-01	2.25E-01	2.58E-01	2.63E-01	2.74E-01	2 24E-01	2.35E-01
1 83E+02	1 94E-01	2.30E-01	1.82E-01	2.71E-01	2.20E-01	3 89E-01	2.25E-01	2.58E-01	2.65E-01	2.76E-01	2 24E-01	2.35E-01
1 84E+02	1 94E-01	2.33E-01	1.82E-01	2.81E-01	2.20E-01	3 89E-01	2.25E-01	2.57E-01	2.64E-01	2.79E-01	2 24E-01	2.35E-01
1 85E+02	1 94E-01	2.35E-01	1.81E-01	2.90E-01	2.21E-01	3 89E-01	2.25E-01	2.56E-01	2.64E-01	2.83E-01	2 24E-01	2.35E-01
1 86E+02	1 94E-01	2.38E-01	1.84E-01	3.01E-01	2.20E-01	3 87E-01	2.26E-01	2.56E-01	2.65E-01	2.89E-01	2 24E-01	2.35E-01
1 87E+02	1 94E-01	2.38E-01	1.83E-01	3.11E-01	2.21E-01	3 84E-01	2.26E-01	2.55E-01	2.64E-01	2.94E-01	2 25E-01	2.35E-01
1 88E+02	1 95E-01	2.38E-01	1.83E-01	3.22E-01	2.20E-01	3 81E-01	2.26E-01	2.55E-01	2.64E-01	3.01E-01	2 25E-01	2.36E-01
1 89E+02	1 95E-01	2.37E-01	1.84E-01	3.32E-01	2.21E-01	3.76E-01	2.26E-01	2.56E-01	2.64E-01	3.07E-01	2 25E-01	2.36E-01
1 90E+02	1 95E-01	2.34E-01	1.82E-01	3.42E-01	2.21E-01	3.71E-01	2.26E-01	2.56E-01	2.65E-01	3.13E-01	2 25E-01	2.36E-01
1 91E+02	1 95E-01	2.31E-01	1.84E-01	3.53E-01	2.21E-01	3.65E-01	2.26E-01	2.57E-01	2.65E-01	3.18E-01	2 25E-01	2.35E-01
1 92E+02	1 95E-01	2.28E-01	1.83E-01	3.66E-01	2.21E-01	3 59E-01	2.26E-01	2.58E-01	2.65E-01	3.23E-01	2 25E-01	2.35E-01
1 93E+02	1 95E-01	2.27E-01	1.84E-01	3.79E-01	2.21E-01	3 53E-01	2.27E-01	2.59E-01	2.66E-01	3.27E-01	2 25E-01	2.34E-01
1 94E+02	1 95E-01	2.31E-01	1.84E-01	3.92E-01	2.21E-01	3.47E-01	2.27E-01	2.61E-01	2.65E-01	3.30E-01	2 26E-01	2.33E-01
1 95E+02	1 95E-01	2.39E-01	1.84E-01	4.02E-01	2.22E-01	3.41E-01	2.27E-01	2.62E-01	2.66E-01	3.33E-01	2 26E-01	2.33E-01
1 96E+02	1 95E-01	2.51E-01	1.84E-01	4.11E-01	2.21E-01	3 34E-01	2.27E-01	2.62E-01	2.66E-01	3.36E-01	2 26E-01	2.32E-01
1 97E+02	1 96E-01	2.63E-01	1.84E-01	4.18E-01	2.22E-01	3 28E-01	2.27E-01	2.63E-01	2.66E-01	3.39E-01	2 26E-01	2.30E-01
1 98E+02	1 96E-01	2.76E-01	1.85E-01	4.26E-01	2.21E-01	3 22E-01	2.27E-01	2.63E-01	2.66E-01	3.41E-01	2 26E-01	2.29E-01
1 99E+02	1 96E-01	2.86E-01	1.84E-01	4.32E-01	2.22E-01	3.18E-01	2.27E-01	2.64E-01	2.66E-01	3.44E-01	2 26E-01	2.27E-01
2 00E+02	1 96E-01	2.94E-01	1.84E-01	4.40E-01	2.22E-01	3.15E-01	2.27E-01	2.64E-01	2.66E-01	3.46E-01	2 26E-01	2.26E-01
2 01E+02	1 96E-01	3.01E-01	1.85E-01	4.49E-01	2.22E-01	3.16E-01	2.27E-01	2.64E-01	2.66E-01	3.48E-01	2 26E-01	2.25E-01
2 02E+02	1 96E-01	3.07E-01	1.85E-01	4.57E-01	2.22E-01	3.19E-01	2.27E-01	2.64E-01	2.66E-01	3.50E-01	2 26E-01	2.25E-01
2 03E+02	1 96E-01	3.12E-01	1.86E-01	4.63E-01	2.22E-01	3 22E-01	2.27E-01	2.64E-01	2.66E-01	3.51E-01	2 26E-01	2.26E-01
2 04E+02	1 96E-01	3.15E-01	1.86E-01	4.68E-01	2.22E-01	3 26E-01	2.27E-01	2.64E-01	2.66E-01	3.53E-01	2 26E-01	2.27E-01
2 05E+02	1 96E-01	3.20E-01	1.85E-01	4.72E-01	2.22E-01	3 29E-01	2.27E-01	2.64E-01	2.66E-01	3.54E-01	2 27E-01	2.28E-01
2 06E+02	1 97E-01	3.27E-01	1.85E-01	4.75E-01	2.22E-01	3 32E-01	2.27E-01	2.63E-01	2.66E-01	3.54E-01	2 27E-01	2.28E-01
2 07E+02	1 97E-01	3.37E-01	1.86E-01	4.76E-01	2.23E-01	3 35E-01	2.27E-01	2.62E-01	2.67E-01	3.54E-01	2 27E-01	2.30E-01
2 08E+02	1 97E-01	3.47E-01	1.85E-01	4.79E-01	2.22E-01	3 39E-01	2.27E-01	2.62E-01	2.67E-01	3.53E-01	2 27E-01	2.32E-01
2 09E+02	1 97E-01	3.57E-01	1.86E-01	4.85E-01	2.23E-01	3.42E-01	2.27E-01	2.60E-01	2.67E-01	3.52E-01	2 27E-01	2.35E-01

Simulation	V01		V02		V03		V04		V05		V06	
Time (s)	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
2.10E+02	1 97E-01	3.66E-01	1.86E-01	4.91E-01	2.22E-01	3.45E-01	2.27E-01	2.59E-01	2.67E-01	3.50E-01	2 27E-01	2.39E-01
2.11E+02	1 97E-01	3.73E-01	1.86E-01	4.98E-01	2.23E-01	3.49E-01	2.27E-01	2.58E-01	2.67E-01	3.47E-01	2 27E-01	2.43E-01
2.12E+02	1 97E-01	3.80E-01	1.85E-01	5.07E-01	2.23E-01	3 53E-01	2.28E-01	2.56E-01	2.67E-01	3.44E-01	2 27E-01	2.47E-01
2.13E+02	1 97E-01	3.85E-01	1.86E-01	5.18E-01	2.23E-01	3 56E-01	2.28E-01	2.55E-01	2.67E-01	3.40E-01	2 27E-01	2.51E-01
2.14E+02	1 97E-01	3.88E-01	1.84E-01	5.32E-01	2.23E-01	3 59E-01	2.28E-01	2.54E-01	2.67E-01	3.36E-01	2 27E-01	2.55E-01
2.15E+02	1 97E-01	3.92E-01	1.85E-01	5.46E-01	2.23E-01	3.61E-01	2.28E-01	2.52E-01	2.67E-01	3.31E-01	2 27E-01	2.58E-01
2.16E+02	1 98E-01	3.98E-01	1.86E-01	5.57E-01	2.23E-01	3.62E-01	2.28E-01	2.51E-01	2.67E-01	3.26E-01	2 27E-01	2.62E-01
2.17E+02	1 98E-01	4.03E-01	1.86E-01	5.74E-01	2.23E-01	3.63E-01	2.28E-01	2.50E-01	2.67E-01	3.22E-01	2 27E-01	2.64E-01
2.18E+02	1 98E-01	4.07E-01	1.86E-01	5.90E-01	2.23E-01	3.63E-01	2.28E-01	2.50E-01	2.67E-01	3.16E-01	2 27E-01	2.65E-01
2.19E+02	1 98E-01	4.11E-01	1.87E-01	6.07E-01	2.23E-01	3.63E-01	2.28E-01	2.50E-01	2.67E-01	3.11E-01	2 28E-01	2.64E-01
2 20E+02	1 98E-01	4.14E-01	1.87E-01	6.24E-01	2.23E-01	3.62E-01	2.28E-01	2.51E-01	2.67E-01	3.07E-01	2 28E-01	2.64E-01
2 21E+02	1 98E-01	4.16E-01	1.87E-01	6.40E-01	2.23E-01	3 59E-01	2.28E-01	2.53E-01	2.68E-01	3.03E-01	2 28E-01	2.66E-01
2 22E+02	1 98E-01	4.17E-01	1.85E-01	6.53E-01	2.23E-01	3 56E-01	2.28E-01	2.54E-01	2.68E-01	2.99E-01	2 28E-01	2.68E-01
2 23E+02	1 98E-01	4.21E-01	1.87E-01	6.63E-01	2.24E-01	3 51E-01	2.28E-01	2.56E-01	2.68E-01	2.95E-01	2 28E-01	2.69E-01
2 24E+02	1 98E-01	4.25E-01	1.87E-01	6.72E-01	2.23E-01	3.46E-01	2.28E-01	2.58E-01	2.68E-01	2.90E-01	2 28E-01	2.68E-01
2 25E+02	1 98E-01	4.32E-01	1.87E-01	6.79E-01	2.24E-01	3.40E-01	2.28E-01	2.60E-01	2.67E-01	2.85E-01	2 28E-01	2.68E-01
2 26E+02	1 98E-01	4.39E-01	1.88E-01	6.83E-01	2.24E-01	3 35E-01	2.28E-01	2.62E-01	2.68E-01	2.80E-01	2 28E-01	2.66E-01
2 27E+02	1 98E-01	4.48E-01	1.88E-01	6.83E-01	2.24E-01	3 29E-01	2.28E-01	2.64E-01	2.68E-01	2.74E-01	2 28E-01	2.65E-01
2 28E+02	1 99E-01	4.55E-01	1.87E-01	6.83E-01	2.24E-01	3 23E-01	2.28E-01	2.65E-01	2.68E-01	2.70E-01	2 28E-01	2.64E-01
2 29E+02	1 99E-01	4.62E-01	1.87E-01	6.78E-01	2.24E-01	3 20E-01	2.28E-01	2.67E-01	2.68E-01	2.64E-01	2 28E-01	2.64E-01
2 30E+02	1 99E-01	4.70E-01	1.87E-01	6.72E-01	2.24E-01	3.18E-01	2.28E-01	2.68E-01	2.68E-01	2.62E-01	2 28E-01	2.65E-01
2 31E+02	1 99E-01	4.78E-01	1.87E-01	6.65E-01	2.24E-01	3.16E-01	2.28E-01	2.71E-01	2.68E-01	2.63E-01	2 28E-01	2.68E-01
2 32E+02	1 99E-01	4.85E-01	1.88E-01	6.56E-01	2.24E-01	3.15E-01	2.28E-01	2.74E-01	2.68E-01	2.64E-01	2 29E-01	2.72E-01
2 33E+02	1 99E-01	4.89E-01	1.89E-01	6.46E-01	2.24E-01	3.13E-01	2.28E-01	2.78E-01	2.68E-01	2.66E-01	2 29E-01	2.79E-01
2 34E+02	1 99E-01	4.92E-01	1.88E-01	6.34E-01	2.24E-01	3.13E-01	2.28E-01	2.82E-01	2.68E-01	2.67E-01	2 29E-01	2.86E-01
2 35E+02	1 99E-01	4.92E-01	1.88E-01	6.21E-01	2.24E-01	3.12E-01	2.29E-01	2.87E-01	2.68E-01	2.68E-01	2 29E-01	2.93E-01
2 36E+02	1 99E-01	4.93E-01	1.88E-01	6.04E-01	2.24E-01	3.12E-01	2.29E-01	2.91E-01	2.68E-01	2.68E-01	2 29E-01	3.00E-01
2 37E+02	1 99E-01	4.90E-01	1.87E-01	5.86E-01	2.25E-01	3.12E-01	2.29E-01	2.95E-01	2.68E-01	2.68E-01	2 29E-01	3.06E-01
2 38E+02	1 99E-01	4.88E-01	1.87E-01	5.66E-01	2.25E-01	3.12E-01	2.29E-01	2.99E-01	2.68E-01	2.67E-01	2 29E-01	3.10E-01
2 39E+02	1 99E-01	4.84E-01	1.88E-01	5.44E-01	2.25E-01	3.13E-01	2.29E-01	3.02E-01	2.68E-01	2.68E-01	2 29E-01	3.14E-01
2.40E+02	1 99E-01	4.79E-01	1.88E-01	5.23E-01	2.25E-01	3.14E-01	2.29E-01	3.05E-01	2.68E-01	2.68E-01	2 29E-01	3.16E-01
2.41E+02	2 00E-01	4.70E-01	1.88E-01	5.04E-01	2.25E-01	3.15E-01	2.29E-01	3.07E-01	2.68E-01	2.68E-01	2 29E-01	3.19E-01
2.42E+02	2 00E-01	4.56E-01	1.89E-01	4.82E-01	2.25E-01	3.16E-01	2.29E-01	3.09E-01	2.68E-01	2.69E-01	2 29E-01	3.23E-01
2.43E+02	2 00E-01	4.40E-01	1.89E-01	4.64E-01	2.25E-01	3.17E-01	2.29E-01	3.11E-01	2.68E-01	2.68E-01	2 29E-01	3.27E-01
2.44E+02	2 00E-01	4.25E-01	1.88E-01	4.46E-01	2.25E-01	3.18E-01	2.29E-01	3.11E-01	2.68E-01	2.68E-01	2 30E-01	3.32E-01
2.45E+02	2 00E-01	4.09E-01	1.89E-01	4.27E-01	2.25E-01	3 20E-01	2.29E-01	3.11E-01	2.68E-01	2.68E-01	2 30E-01	3.38E-01
2.46E+02	2 00E-01	3.93E-01	1.89E-01	4.14E-01	2.25E-01	3 21E-01	2.29E-01	3.11E-01	2.68E-01	2.68E-01	2 30E-01	3.43E-01
2.47E+02	2 00E-01	3.72E-01	1.89E-01	4.02E-01	2.25E-01	3 22E-01	2.29E-01	3.11E-01	2.68E-01	2.68E-01	2 30E-01	3.50E-01
2.48E+02	2 00E-01	3.56E-01	1.90E-01	3.95E-01	2.25E-01	3 23E-01	2.29E-01	3.10E-01	2.68E-01	2.68E-01	2 30E-01	3.57E-01
2.49E+02	2 00E-01	3.39E-01	1.88E-01	3.90E-01	2.25E-01	3 24E-01	2.29E-01	3.09E-01	2.68E-01	2.68E-01	2 30E-01	3.63E-01
2 50E+02	2 00E-01	3.26E-01	1.89E-01	3.87E-01	2.25E-01	3 25E-01	2.29E-01	3.08E-01	2.68E-01	2.68E-01	2 30E-01	3.69E-01
2 51E+02	2 00E-01	3.15E-01	1.89E-01	3.84E-01	2.25E-01	3 27E-01	2.29E-01	3.08E-01	2.68E-01	2.68E-01	2 30E-01	3.76E-01
2 52E+02	2 00E-01	3.03E-01	1.89E-01	3.82E-01	2.25E-01	3 27E-01	2.29E-01	3.07E-01	2.68E-01	2.68E-01	2 30E-01	3.84E-01
2 53E+02	2 00E-01	2.93E-01	1.89E-01	3.79E-01	2.25E-01	3 28E-01	2.29E-01	3.06E-01	2.68E-01	2.68E-01	2 30E-01	3.92E-01
2 54E+02	2 00E-01	2.86E-01	1.89E-01	3.79E-01	2.25E-01	3 28E-01	2.29E-01	3.06E-01	2.68E-01	2.68E-01	2 30E-01	4.00E-01
2 55E+02	2 00E-01	2.78E-01	1.89E-01	3.81E-01	2.25E-01	3 29E-01	2.29E-01	3.06E-01	2.68E-01	2.68E-01	2 30E-01	4.07E-01
2 56E+02	2 00E-01	2.73E-01	1.89E-01	3.86E-01	2.25E-01	3 29E-01	2.29E-01	3.06E-01	2.69E-01	2.69E-01	2 31E-01	4.13E-01
2 57E+02	2 01E-01	2.67E-01	1.89E-01	3.94E-01	2.25E-01	3 29E-01	2.29E-01	3.07E-01	2.69E-01	2.69E-01	2 31E-01	4.19E-01
2 58E+02	2 01E-01	2.65E-01	1.90E-01	4.03E-01	2.25E-01	3 28E-01	2.29E-01	3.09E-01	2.69E-01	2.69E-01	2 31E-01	4.23E-01
2 59E+02	2 01E-01	2.61E-01	1.90E-01	4.12E-01	2.25E-01	3 28E-01	2.30E-01	3.11E-01	2.69E-01	2.69E-01	2 31E-01	4.25E-01
2.60E+02	2 01E-01	2.58E-01	1.89E-01	4.21E-01	2.25E-01	3 27E-01	2.30E-01	3.14E-01	2.69E-01	2.69E-01	2 31E-01	4.27E-01
2.61E+02	2 01E-01	2.57E-01	1.89E-01	4.28E-01	2.25E-01	3 25E-01	2.30E-01	3.18E-01	2.69E-01	2.69E-01	2 31E-01	4.29E-01
2.62E+02	2 01E-01	2.57E-01	1.89E-01	4.30E-01	2.25E-01	3 24E-01	2.30E-01	3.22E-01	2.69E-01	2.69E-01	2 31E-01	4.31E-01
2.63E+02	2 01E-01	2.56E-01	1.90E-01	4.29E-01	2.25E-01	3 22E-01	2.30E-01	3.28E-01	2.69E-01	2.69E-01	2 31E-01	4.32E-01
2.64E+02	2 01E-01	2.55E-01	1.90E-01	4.20E-01	2.25E-01	3 20E-01	2.30E-01	3.34E-01	2.69E-01	2.69E-01	2 31E-01	4.35E-01
2.65E+02	2 01E-01	2.55E-01	1.90E-01	4.09E-01	2.26E-01	3.17E-01	2.30E-01	3.41E-01	2.69E-01	2.69E-01	2 31E-01	4.37E-01
2.66E+02	2 01E-01	2.55E-01	1.90E-01	4.01E-01	2.26E-01	3.15E-01	2.30E-01	3.48E-01	2.69E-01	2.69E-01	2 31E-01	4.37E-01
2.67E+02	2 01E-01	2.54E-01	1.91E-01	3.98E-01	2.26E-01	3.12E-01	2.30E-01	3.56E-01	2.69E-01	2.69E-01	2 31E-01	4.37E-01
2.68E+02	2 01E-01	2.57E-01	1.90E-01	3.98E-01	2.26E-01	3 09E-01	2.30E-01	3.63E-01	2.69E-01	2.69E-01	2 31E-01	4.35E-01
2.69E+02	2 01E-01	2.59E-01	1.90E-01	3.94E-01	2.26E-01	3 06E-01	2.30E-01	3.71E-01	2.69E-01	2.69E-01	2 31E-01	4.34E-01
2.70E+02	2 01E-01	2.62E-01	1.90E-01	3.91E-01	2.26E-01	3 03E-01	2.30E-01	3.79E-01	2.69E-01	2.69E-01	2 31E-01	4.32E-01
2.71E+02	2 01E-01	2.64E-01	1.90E-01	3.86E-01	2.26E-01	3 00E-01	2.30E-01	3.87E-01	2.69E-01	2.69E-01	2 31E-01	4.31E-01
2.72E+02	2 01E-01	2.65E-01	1.91E-01	3.81E-01	2.26E-01	2 98E-01	2.30E-01	3.96E-01	2.69E-01	2.69E-01	2 31E-01	4.31E-01
2.73E+02	2 01E-01	2.65E-01	1.91E-01	3.74E-01	2.26E-01	2 97E-01	2.30E-01	4.05E-01	2.69E-01	2.69E-01	2 31E-01	4.30E-01
2.74E+02	2 01E-01	2.63E-01	1.90E-01	3.67E-01	2.26E-01	2 97E-01	2.30E-01	4.13E-01	2.69E-01	2.69E-01	2 32E-01	4.29E-01
2.75E+02	2 01E-01	2.61E-01	1.90E-01	3.59E-01	2.26E-01	2 98E-01	2.30E-01	4.21E-01	2.69E-01	2.69E-01	2 32E-01	4.25E-01
2.76E+02	2 01E-01	2.59E-01	1.91E-01	3.53E-01	2.26E-01	2 99E-01	2.30E-01	4.29E-01	2.69E-01	2.69E-01	2 32E-01	4.20E-01
2.77E+02	2 01E-01	2.55E-01	1.91E-01	3.55E-01	2.26E-01	3 00E-01	2.30E-01	4.36E-01	2.69E-01	2.69E-01	2 32E-01	4.15E-01
2.78E+02	2 01E-01	2.53E-01	1.90E-01	3.60E-01	2.26E-01	3 01E-01	2.30E-01	4.43E-01	2.70E-01	2.69E-01	2 32E-01	4.08E-01
2.79E+02	2 02E-01	2.49E-01	1.90E-01	3.67E-01	2.26E-01	3 03E-01	2.30E-01	4.49E-01	2.70E-01	2.69E-01	2 32E-01	4.00E-01
2 80E+02	2 01E-01	2.46E-01	1.89E-01	3.75E-01	2.26E-01	3 05E-01	2.30E-01	4.53E-01	2.70E-01	2.69E-01	2 32E-01	3.93E-01
2 81E+02	2 02E-01	2.45E-01	1.90E-01	3.84E-01	2.26E-01	3 07E-01	2.30E-01	4.57E-01	2.70E-01	2.69E-01	2 32E-01	3.83E-01
2 82E+02	2 02E-01	2.42E-01	1.90E-01	3.95E-01	2.26E-01	3 08E-01	2.30E-01	4.58E-01	2.70E-01	2.69E-01	2 32E-01	3.70E-01

Simulation	V01		V02		V03		V04		V05		V06	
Time (s)	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
2.83E+02	2 02E-01	2.40E-01	1 90E-01	4.05E-01	2.26E-01	3.10E-01	2.30E-01	4.59E-01	2.70E-01	2.69E-01	2.32E-01	3 56E-01
2.84E+02	2 02E-01	2.36E-01	1 91E-01	4.14E-01	2.26E-01	3.11E-01	2.30E-01	4.58E-01	2.70E-01	2.70E-01	2.32E-01	3.46E-01
2.85E+02	2 02E-01	2.34E-01	1 91E-01	4.21E-01	2.26E-01	3.12E-01	2.30E-01	4.54E-01	2.70E-01	2.70E-01	2.32E-01	3 38E-01
2.86E+02	2 02E-01	2.32E-01	1 90E-01	4.30E-01	2.26E-01	3.12E-01	2.30E-01	4.49E-01	2.70E-01	2.70E-01	2.32E-01	3 33E-01
2.87E+02	2 02E-01	2.33E-01	1 91E-01	4.39E-01	2.26E-01	3.13E-01	2.30E-01	4.43E-01	2.70E-01	2.70E-01	2.32E-01	3 30E-01
2.88E+02	2 02E-01	2.32E-01	1 90E-01	4.48E-01	2.26E-01	3.13E-01	2.30E-01	4.35E-01	2.70E-01	2.71E-01	2.32E-01	3 28E-01
2.89E+02	2 02E-01	2.31E-01	1 91E-01	4.57E-01	2.26E-01	3.13E-01	2.30E-01	4.26E-01	2.70E-01	2.72E-01	2.32E-01	3 26E-01
2.90E+02	2 02E-01	2.30E-01	1 90E-01	4.67E-01	2.26E-01	3.13E-01	2.30E-01	4.16E-01	2.70E-01	2.73E-01	2.32E-01	3 23E-01
2.91E+02	2 02E-01	2.30E-01	1 89E-01	4.79E-01	2.26E-01	3.13E-01	2.30E-01	4.05E-01	2.70E-01	2.74E-01	2.32E-01	3.19E-01
2.92E+02	2 02E-01	2.30E-01	1 91E-01	4.92E-01	2.26E-01	3.14E-01	2.30E-01	3.94E-01	2.70E-01	2.74E-01	2.32E-01	3.16E-01
2.93E+02	2 02E-01	2.31E-01	1 91E-01	5.07E-01	2.26E-01	3.14E-01	2.30E-01	3.78E-01	2.70E-01	2.75E-01	2.32E-01	3.12E-01
2.94E+02	2 02E-01	2.32E-01	1 91E-01	5.22E-01	2.27E-01	3.14E-01	2.30E-01	3.70E-01	2.70E-01	2.76E-01	2.32E-01	3 08E-01
2.95E+02	2 02E-01	2.33E-01	1 90E-01	5.36E-01	2.27E-01	3.14E-01	2.30E-01	3.68E-01	2.70E-01	2.77E-01	2.32E-01	3 06E-01
2.96E+02	2 02E-01	2.35E-01	1 90E-01	5.48E-01	2.27E-01	3.14E-01	2.30E-01	3.68E-01	2.70E-01	2.78E-01	2.32E-01	3 04E-01
2.97E+02	2 02E-01	2.37E-01	1 90E-01	5.57E-01	2.27E-01	3.15E-01	2.30E-01	3.71E-01	2.70E-01	2.79E-01	2.32E-01	3 02E-01
2.98E+02	2 02E-01	2.41E-01	1 91E-01	5.66E-01	2.27E-01	3.15E-01	2.30E-01	3.75E-01	2.70E-01	2 80E-01	2.32E-01	3 01E-01
2.99E+02	2 02E-01	2.45E-01	1 90E-01	5.70E-01	2.27E-01	3.15E-01	2.30E-01	3.77E-01	2.70E-01	2 80E-01	2.32E-01	3 00E-01
3.00E+02	2 02E-01	2.51E-01	1 91E-01	5.74E-01	2.27E-01	3.14E-01	2.30E-01	3.79E-01	2.70E-01	2 80E-01	2.32E-01	3 00E-01
3.01E+02	2 02E-01	2.58E-01	1 91E-01	5.77E-01	2.27E-01	3.14E-01	2.30E-01	3.79E-01	2.70E-01	2 80E-01	2.32E-01	3 00E-01
3.02E+02	2 03E-01	2.66E-01	1 91E-01	5.74E-01	2.27E-01	3.14E-01	2.30E-01	3.80E-01	2.70E-01	2 80E-01	2.32E-01	3 00E-01
3.03E+02	2 03E-01	2.77E-01	1 91E-01	5.70E-01	2.27E-01	3.13E-01	2.30E-01	3.79E-01	2.70E-01	2.79E-01	2.32E-01	2 99E-01
3.04E+02	2 03E-01	2.89E-01	1 90E-01	5.60E-01	2.27E-01	3.12E-01	2.30E-01	3.75E-01	2.70E-01	2.78E-01	2.32E-01	2 98E-01
3.05E+02	2 03E-01	3.02E-01	1 91E-01	5.53E-01	2.27E-01	3.11E-01	2.30E-01	3.69E-01	2.70E-01	2.79E-01	2.32E-01	2 97E-01
3.06E+02	2 03E-01	3.15E-01	1 91E-01	5.42E-01	2.27E-01	3.10E-01	2.30E-01	3.64E-01	2.70E-01	2 80E-01	2.32E-01	2 96E-01
3.07E+02	2 03E-01	3.28E-01	1 91E-01	5.31E-01	2.27E-01	3.08E-01	2.30E-01	3.58E-01	2.70E-01	2 81E-01	2.32E-01	2 95E-01
3.08E+02	2 03E-01	3.41E-01	1 90E-01	5.18E-01	2.27E-01	3.07E-01	2.30E-01	3.52E-01	2.70E-01	2 82E-01	2.32E-01	2 93E-01
3.09E+02	2 03E-01	3.53E-01	1 91E-01	5.10E-01	2.27E-01	3.06E-01	2.30E-01	3.45E-01	2.70E-01	2 84E-01	2.32E-01	2 91E-01
3.10E+02	2 03E-01	3.65E-01	1 91E-01	4.98E-01	2.27E-01	3.04E-01	2.30E-01	3.41E-01	2.70E-01	2 86E-01	2.32E-01	2 88E-01
3.11E+02	2 03E-01	3.76E-01	1 91E-01	4.84E-01	2.27E-01	3.02E-01	2.30E-01	3.38E-01	2.70E-01	2 87E-01	2.32E-01	2 84E-01
3.12E+02	2 03E-01	3.87E-01	1 91E-01	4.66E-01	2.27E-01	3.00E-01	2.30E-01	3.39E-01	2.70E-01	2 90E-01	2.32E-01	2 80E-01
3.13E+02	2 03E-01	3.97E-01	1 91E-01	4.50E-01	2.27E-01	2.98E-01	2.30E-01	3.40E-01	2.70E-01	2 92E-01	2.32E-01	2.75E-01
3.14E+02	2 03E-01	4.06E-01	1 90E-01	4.34E-01	2.27E-01	2.96E-01	2.30E-01	3.45E-01	2.70E-01	2 94E-01	2.32E-01	2.70E-01
3.15E+02	2 03E-01	4.13E-01	1 91E-01	4.20E-01	2.27E-01	2.94E-01	2.30E-01	3.52E-01	2.71E-01	2 97E-01	2.32E-01	2.63E-01
3.16E+02	2 03E-01	4.17E-01	1 90E-01	4.04E-01	2.27E-01	2.91E-01	2.30E-01	3.58E-01	2.71E-01	2 99E-01	2.32E-01	2 55E-01
3.17E+02	2 03E-01	4.16E-01	1 91E-01	3.88E-01	2.27E-01	2.88E-01	2.30E-01	3.64E-01	2.71E-01	3 01E-01	2.32E-01	2.48E-01
3.18E+02	2 03E-01	4.12E-01	1 90E-01	3.76E-01	2.27E-01	2.86E-01	2.30E-01	3.69E-01	2.71E-01	3 03E-01	2.32E-01	2.45E-01
3.19E+02	2 03E-01	4.15E-01	1 90E-01	3.65E-01	2.27E-01	2.83E-01	2.30E-01	3.74E-01	2.71E-01	3 05E-01	2.32E-01	2.43E-01
3.20E+02	2 03E-01	4.14E-01	1 90E-01	3.61E-01	2.27E-01	2.80E-01	2.30E-01	3.78E-01	2.71E-01	3 07E-01	2.32E-01	2.43E-01
3.21E+02	2 03E-01	4.13E-01	1 90E-01	3.59E-01	2.27E-01	2.77E-01	2.30E-01	3.82E-01	2.71E-01	3 08E-01	2.32E-01	2.45E-01
3.22E+02	2 03E-01	4.09E-01	1 90E-01	3.63E-01	2.27E-01	2.75E-01	2.30E-01	3.86E-01	2.71E-01	3 09E-01	2.32E-01	2.47E-01
3.23E+02	2 03E-01	4.04E-01	1 91E-01	3.63E-01	2.27E-01	2.73E-01	2.30E-01	3.90E-01	2.71E-01	3.10E-01	2.32E-01	2 50E-01
3.24E+02	2 03E-01	4.00E-01	1 91E-01	3.63E-01	2.27E-01	2.73E-01	2.30E-01	3.94E-01	2.71E-01	3.11E-01	2.32E-01	2 53E-01
3.25E+02	2 03E-01	3.92E-01	1 90E-01	3.62E-01	2.27E-01	2.73E-01	2.30E-01	3.98E-01	2.71E-01	3.11E-01	2.32E-01	2 56E-01
3.26E+02	2 03E-01	3.89E-01	1 91E-01	3.60E-01	2.27E-01	2.74E-01	2.30E-01	4.02E-01	2.71E-01	3.12E-01	2.32E-01	2 59E-01
3.27E+02	2 03E-01	3.86E-01	1 90E-01	3.58E-01	2.27E-01	2.74E-01	2.30E-01	4.05E-01	2.71E-01	3.12E-01	2.32E-01	2.61E-01
3.28E+02	2 03E-01	3.85E-01	1 90E-01	3.57E-01	2.27E-01	2.76E-01	2.30E-01	4.08E-01	2.71E-01	3.13E-01	2.32E-01	2.63E-01
3.29E+02	2 03E-01	3.86E-01	1 90E-01	3.57E-01	2.27E-01	2.78E-01	2.30E-01	4.10E-01	2.71E-01	3.14E-01	2.32E-01	2.64E-01
3.30E+02	2 03E-01	3.87E-01	1 90E-01	3.56E-01	2.27E-01	2.80E-01	2.30E-01	4.10E-01	2.71E-01	3.14E-01	2.32E-01	2.65E-01
3.31E+02	2 03E-01	3.91E-01	1 89E-01	3.52E-01	2.27E-01	2.82E-01	2.30E-01	4.11E-01	2.71E-01	3.14E-01	2.32E-01	2.64E-01
3.32E+02	2 03E-01	3.98E-01	1 90E-01	3.50E-01	2.27E-01	2.85E-01	2.30E-01	4.11E-01	2.71E-01	3.14E-01	2.32E-01	2.62E-01
3.33E+02	2 03E-01	4.10E-01	1 90E-01	3.46E-01	2.27E-01	2.87E-01	2.30E-01	4.11E-01	2.71E-01	3.14E-01	2.32E-01	2.60E-01
3.34E+02	2 03E-01	4.22E-01	1 90E-01	3.45E-01	2.27E-01	2.89E-01	2.30E-01	4.10E-01	2.71E-01	3.14E-01	2.32E-01	2.60E-01
3.35E+02	2 03E-01	4.29E-01	1 90E-01	3.43E-01	2.27E-01	2.90E-01	2.30E-01	4.08E-01	2.71E-01	3.13E-01	2.32E-01	2.61E-01
3.36E+02	2 03E-01	4.39E-01	1 90E-01	3.40E-01	2.27E-01	2.90E-01	2.30E-01	4.06E-01	2.71E-01	3.13E-01	2.32E-01	2.60E-01
3.37E+02	2 03E-01	4.49E-01	1 90E-01	3.35E-01	2.27E-01	2.91E-01	2.30E-01	4.02E-01	2.71E-01	3.12E-01	2.32E-01	2.61E-01
3.38E+02	2 03E-01	4.56E-01	1 90E-01	3.30E-01	2.27E-01	2.91E-01	2.30E-01	3.97E-01	2.71E-01	3.12E-01	2.32E-01	2.64E-01
3.39E+02	2 04E-01	4.62E-01	1 90E-01	3.23E-01	2.27E-01	2.90E-01	2.30E-01	3.91E-01	2.71E-01	3.11E-01	2.32E-01	2.68E-01
3.40E+02	2 04E-01	4.69E-01	1 90E-01	3.20E-01	2.27E-01	2.90E-01	2.30E-01	3.82E-01	2.72E-01	3.10E-01	2.32E-01	2.72E-01
3.41E+02	2 04E-01	4.74E-01	1 90E-01	3.15E-01	2.27E-01	2.90E-01	2.30E-01	3.72E-01	2.72E-01	3 08E-01	2.32E-01	2.74E-01
3.42E+02	2 04E-01	4.79E-01	1 90E-01	3.08E-01	2.27E-01	2.90E-01	2.30E-01	3.61E-01	2.72E-01	3 06E-01	2.32E-01	2.76E-01
3.43E+02	2 04E-01	4.81E-01	1 89E-01	3.02E-01	2.27E-01	2.91E-01	2.30E-01	3.49E-01	2.72E-01	3 02E-01	2.32E-01	2.77E-01
3.44E+02	2 04E-01	4.81E-01	1 89E-01	2.96E-01	2.27E-01	2.92E-01	2.30E-01	3.38E-01	2.72E-01	2 97E-01	2.32E-01	2.78E-01
3.45E+02	2 04E-01	4.82E-01	1 90E-01	2.91E-01	2.27E-01	2.94E-01	2.30E-01	3.27E-01	2.72E-01	2 92E-01	2.32E-01	2.78E-01
3.46E+02	2 04E-01	4.83E-01	1 90E-01	2.86E-01	2.27E-01	2.97E-01	2.30E-01	3.13E-01	2.72E-01	2 86E-01	2.33E-01	2.78E-01
3.47E+02	2 04E-01	4.84E-01	1 90E-01	2.82E-01	2.27E-01	2.99E-01	2.30E-01	3.04E-01	2.72E-01	2 82E-01	2.33E-01	2.77E-01
3.48E+02	2 04E-01	4.82E-01	1 89E-01	2.76E-01	2.27E-01	3.02E-01	2.30E-01	2.97E-01	2.72E-01	2.79E-01	2.33E-01	2.76E-01
3.49E+02	2 04E-01	4.81E-01	1 90E-01	2.72E-01	2.27E-01	3.05E-01	2.30E-01	2.93E-01	2.72E-01	2.78E-01	2.33E-01	2.75E-01
3.50E+02	2 04E-01	4.78E-01	1 89E-01	2.67E-01	2.27E-01	3.07E-01	2.30E-01	2.91E-01	2.72E-01	2.78E-01	2.33E-01	2.75E-01
3.51E+02	2 04E-01	4.69E-01	1 89E-01	2.63E-01	2.27E-01	3.09E-01	2.30E-01	2.93E-01	2.72E-01	2.79E-01	2.33E-01	2.74E-01
3.52E+02	2 04E-01	4.71E-01	1 89E-01	2.61E-01	2.27E-01	3.10E-01	2.30E-01	2.98E-01	2.72E-01	2 82E-01	2.33E-01	2.74E-01
3.53E+02	2 04E-01	4.69E-01	1 89E-01	2.59E-01	2.27E-01	3.10E-01	2.30E-01	3.03E-01	2.72E-01	2 85E-01	2.33E-01	2.73E-01
3.54E+02	2 04E-01	4.69E-01	1 89E-01	2.56E-01	2.27E-01	3.08E-01	2.30E-01	3.08E-01	2.72E-01	2 88E-01	2.33E-01	2.73E-01
3.55E+02	2 04E-01	4.69E-01	1 90E-01	2.53E-01	2.27E-01	3.07E-01	2.30E-01	3.12E-01	2.72E-01	2 91E-01	2.33E-01	2.73E-01

Simulation	V01		V02		V03		V04		V05		V06	
Time (s)	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
3 56E+02	2 04E-01	4.68E-01	1.89E-01	2.49E-01	2.27E-01	3 04E-01	2.30E-01	3.15E-01	2.72E-01	2.94E-01	2 33E-01	2.73E-01
3 57E+02	2 04E-01	4.65E-01	1.89E-01	2.46E-01	2.27E-01	3 00E-01	2.30E-01	3.21E-01	2.72E-01	2.97E-01	2 33E-01	2.73E-01
3 58E+02	2 04E-01	4.68E-01	1.89E-01	2.43E-01	2.27E-01	2 95E-01	2.30E-01	3.28E-01	2.72E-01	2.99E-01	2 33E-01	2.74E-01
3 59E+02	2 04E-01	4.64E-01	1.89E-01	2.41E-01	2.27E-01	2 88E-01	2.30E-01	3.38E-01	2.72E-01	3.01E-01	2 33E-01	2.74E-01
3.60E+02	2 04E-01	4.63E-01	1.89E-01	2.39E-01	2.27E-01	2 80E-01	2.30E-01	3.48E-01	2.72E-01	3.03E-01	2 33E-01	2.75E-01
3.61E+02	2 04E-01	4.62E-01	1.89E-01	2.38E-01	2.27E-01	2.71E-01	2.30E-01	3.60E-01	2.72E-01	3.04E-01	2 33E-01	2.77E-01
3.62E+02	2 04E-01	4.57E-01	1.89E-01	2.38E-01	2.27E-01	2.62E-01	2.31E-01	3.72E-01	2.73E-01	3.06E-01	2 33E-01	2.78E-01
3.63E+02	2 04E-01	4.53E-01	1.89E-01	2.37E-01	2.27E-01	2 57E-01	2.31E-01	3.85E-01	2.73E-01	3.07E-01	2 33E-01	2.79E-01
3.64E+02	2 04E-01	4.47E-01	1.89E-01	2.36E-01	2.27E-01	2 58E-01	2.31E-01	3.97E-01	2.73E-01	3.07E-01	2 33E-01	2.80E-01
3.65E+02	2 04E-01	4.37E-01	1.89E-01	2.35E-01	2.27E-01	2 59E-01	2.31E-01	4.10E-01	2.73E-01	3.07E-01	2 33E-01	2.81E-01
3.66E+02	2 04E-01	4.28E-01	1.89E-01	2.34E-01	2.27E-01	2.61E-01	2.31E-01	4.22E-01	2.73E-01	3.05E-01	2 33E-01	2.82E-01
3.67E+02	2 04E-01	4.15E-01	1.89E-01	2.32E-01	2.27E-01	2.62E-01	2.31E-01	4.32E-01	2.73E-01	3.04E-01	2 33E-01	2.82E-01
3.68E+02	2 04E-01	4.01E-01	1.89E-01	2.30E-01	2.27E-01	2.64E-01	2.31E-01	4.42E-01	2.73E-01	3.01E-01	2 33E-01	2.81E-01
3.69E+02	2 04E-01	3.92E-01	1.90E-01	2.28E-01	2.27E-01	2.67E-01	2.31E-01	4.51E-01	2.73E-01	2.99E-01	2 33E-01	2.80E-01
3.70E+02	2 04E-01	3.90E-01	1.90E-01	2.26E-01	2.27E-01	2.69E-01	2.31E-01	4.60E-01	2.73E-01	2.95E-01	2 33E-01	2.78E-01
3.71E+02	2 04E-01	3.85E-01	1.89E-01	2.22E-01	2.27E-01	2.70E-01	2.31E-01	4.68E-01	2.73E-01	2.92E-01	2 33E-01	2.76E-01
3.72E+02	2 04E-01	3.83E-01	1.89E-01	2.19E-01	2.27E-01	2.71E-01	2.31E-01	4.75E-01	2.73E-01	2.88E-01	2 33E-01	2.76E-01
3.73E+02	2 04E-01	3.83E-01	1.89E-01	2.16E-01	2.27E-01	2.71E-01	2.31E-01	4.82E-01	2.73E-01	2.86E-01	2 33E-01	2.79E-01
3.74E+02	2 04E-01	3.81E-01	1.89E-01	2.13E-01	2.27E-01	2.71E-01	2.31E-01	4.90E-01	2.73E-01	2.85E-01	2 33E-01	2.83E-01
3.75E+02	2 04E-01	3.81E-01	1.89E-01	2.11E-01	2.27E-01	2.70E-01	2.31E-01	5.00E-01	2.73E-01	2.83E-01	2 33E-01	2.88E-01
3.76E+02	2 04E-01	3.83E-01	1.90E-01	2.09E-01	2.27E-01	2.70E-01	2.31E-01	5.09E-01	2.73E-01	2.82E-01	2 33E-01	2.93E-01
3.77E+02	2 04E-01	3.83E-01	1.89E-01	2.09E-01	2.27E-01	2.69E-01	2.31E-01	5.18E-01	2.73E-01	2.81E-01	2 33E-01	2.97E-01
3.78E+02	2 04E-01	3.82E-01	1.89E-01	2.08E-01	2.27E-01	2.68E-01	2.31E-01	5.26E-01	2.73E-01	2.80E-01	2 33E-01	3.00E-01
3.79E+02	2 04E-01	3.78E-01	1.89E-01	2.07E-01	2.27E-01	2.66E-01	2.31E-01	5.35E-01	2.73E-01	2.80E-01	2 33E-01	3.03E-01
3 80E+02	2 04E-01	3.76E-01	1.90E-01	2.08E-01	2.27E-01	2.64E-01	2.31E-01	5.43E-01	2.73E-01	2.79E-01	2 33E-01	3.04E-01
3 81E+02	2 04E-01	3.73E-01	1.90E-01	2.09E-01	2.27E-01	2.61E-01	2.31E-01	5.50E-01	2.73E-01	2.78E-01	2 34E-01	3.03E-01
3 82E+02	2 04E-01	3.69E-01	1.89E-01	2.10E-01	2.27E-01	2 57E-01	2.31E-01	5.55E-01	2.73E-01	2.77E-01	2 34E-01	3.01E-01
3 83E+02	2 04E-01	3.64E-01	1.89E-01	2.12E-01	2.27E-01	2 53E-01	2.31E-01	5.60E-01	2.73E-01	2.78E-01	2 34E-01	2.98E-01
3 84E+02	2 04E-01	3.60E-01	1.89E-01	2.14E-01	2.27E-01	2.49E-01	2.31E-01	5.64E-01	2.73E-01	2.79E-01	2 34E-01	2.92E-01
3 85E+02	2 04E-01	3.56E-01	1.89E-01	2.17E-01	2.27E-01	2.44E-01	2.31E-01	5.67E-01	2.73E-01	2.80E-01	2 34E-01	2.86E-01
3 86E+02	2 04E-01	3.53E-01	1.90E-01	2.20E-01	2.27E-01	2.41E-01	2.31E-01	5.69E-01	2.73E-01	2.81E-01	2 34E-01	2.79E-01
3 87E+02	2 04E-01	3.49E-01	1.90E-01	2.24E-01	2.27E-01	2 38E-01	2.31E-01	5.70E-01	2.73E-01	2.84E-01	2 34E-01	2.72E-01
3 88E+02	2 04E-01	3.45E-01	1.90E-01	2.27E-01	2.27E-01	2 35E-01	2.31E-01	5.71E-01	2.73E-01	2.90E-01	2 34E-01	2.65E-01
3 89E+02	2 04E-01	3.41E-01	1.90E-01	2.31E-01	2.27E-01	2 32E-01	2.31E-01	5.70E-01	2.73E-01	2.98E-01	2 34E-01	2.60E-01
3 90E+02	2 04E-01	3.37E-01	1.90E-01	2.35E-01	2.27E-01	2 29E-01	2.31E-01	5.66E-01	2.73E-01	3.09E-01	2 34E-01	2.55E-01
3 91E+02	2 04E-01	3.37E-01	1.90E-01	2.38E-01	2.28E-01	2 27E-01	2.31E-01	5.61E-01	2.73E-01	3.20E-01	2 34E-01	2.52E-01
3 92E+02	2 04E-01	3.39E-01	1.90E-01	2.42E-01	2.28E-01	2 26E-01	2.31E-01	5.58E-01	2.73E-01	3.34E-01	2 34E-01	2.50E-01
3 93E+02	2 04E-01	3.44E-01	1.90E-01	2.46E-01	2.28E-01	2 26E-01	2.31E-01	5.61E-01	2.73E-01	3.48E-01	2 34E-01	2.48E-01
3 94E+02	2 04E-01	3.52E-01	1.89E-01	2.49E-01	2.28E-01	2 27E-01	2.31E-01	5.62E-01	2.73E-01	3.63E-01	2 34E-01	2.46E-01
3 95E+02	2 04E-01	3.60E-01	1.90E-01	2.52E-01	2.28E-01	2 28E-01	2.31E-01	5.61E-01	2.73E-01	3.79E-01	2 34E-01	2.45E-01
3 96E+02	2 04E-01	3.68E-01	1.90E-01	2.55E-01	2.28E-01	2 28E-01	2.31E-01	5.65E-01	2.73E-01	3.96E-01	2 34E-01	2.43E-01
3 97E+02	2 04E-01	3.78E-01	1.90E-01	2.58E-01	2.28E-01	2 28E-01	2.31E-01	5.71E-01	2.73E-01	4.13E-01	2 34E-01	2.41E-01
3 98E+02	2 04E-01	3.88E-01	1.90E-01	2.61E-01	2.28E-01	2 28E-01	2.31E-01	5.81E-01	2.73E-01	4.30E-01	2 34E-01	2.40E-01
3 99E+02	2 04E-01	3.95E-01	1.90E-01	2.63E-01	2.28E-01	2 27E-01	2.31E-01	5.88E-01	2.73E-01	4.47E-01	2 34E-01	2.40E-01
4 00E+02	2 04E-01	4.01E-01	1.89E-01	2.67E-01	2.28E-01	2 27E-01	2.31E-01	5.95E-01	2.73E-01	4.65E-01	2 34E-01	2.39E-01
4 01E+02	2 04E-01	4.04E-01	1.90E-01	2.71E-01	2.28E-01	2 28E-01	2.32E-01	6.00E-01	2.73E-01	4.82E-01	2 34E-01	2.39E-01
4 02E+02	2 04E-01	4.06E-01	1.90E-01	2.76E-01	2.28E-01	2 28E-01	2.32E-01	6.04E-01	2.73E-01	4.98E-01	2 34E-01	2.39E-01
4 03E+02	2 04E-01	4.09E-01	1.90E-01	2.81E-01	2.28E-01	2 28E-01	2.32E-01	6.08E-01	2.73E-01	5.13E-01	2 34E-01	2.39E-01
4 04E+02	2 04E-01	4.13E-01	1.89E-01	2.86E-01	2.28E-01	2 27E-01	2.32E-01	6.11E-01	2.73E-01	5.29E-01	2 34E-01	2.39E-01
4 05E+02	2 04E-01	4.16E-01	1.89E-01	2.91E-01	2.28E-01	2 27E-01	2.32E-01	6.12E-01	2.73E-01	5.43E-01	2 34E-01	2.40E-01
4 06E+02	2 04E-01	4.20E-01	1.90E-01	2.95E-01	2.28E-01	2 27E-01	2.32E-01	6.15E-01	2.73E-01	5.55E-01	2 34E-01	2.40E-01
4 07E+02	2 04E-01	4.24E-01	1.90E-01	2.99E-01	2.28E-01	2 28E-01	2.32E-01	6.17E-01	2.73E-01	5.67E-01	2 34E-01	2.41E-01
4 08E+02	2 04E-01	4.24E-01	1.90E-01	3.03E-01	2.28E-01	2 28E-01	2.32E-01	6.19E-01	2.73E-01	5.77E-01	2 34E-01	2.42E-01
4 09E+02	2 05E-01	4.26E-01	1.90E-01	3.06E-01	2.28E-01	2 28E-01	2.32E-01	6.21E-01	2.73E-01	5.87E-01	2 34E-01	2.44E-01
4.10E+02	2 05E-01	4.26E-01	1.90E-01	3.09E-01	2.28E-01	2 28E-01	2.32E-01	6.20E-01	2.73E-01	5.95E-01	2 34E-01	2.46E-01
4.11E+02	2 05E-01	4.23E-01	1.90E-01	3.12E-01	2.28E-01	2 28E-01	2.32E-01	6.19E-01	2.73E-01	6.02E-01	2 34E-01	2.49E-01
4.12E+02	2 05E-01	4.21E-01	1.90E-01	3.15E-01	2.28E-01	2 29E-01	2.32E-01	6.13E-01	2.73E-01	6.09E-01	2 34E-01	2.51E-01
4.13E+02	2 05E-01	4.16E-01	1.90E-01	3.17E-01	2.28E-01	2 30E-01	2.32E-01	6.10E-01	2.73E-01	6.13E-01	2 34E-01	2.54E-01
4.14E+02	2 05E-01	4.09E-01	1.90E-01	3.19E-01	2.28E-01	2 32E-01	2.32E-01	6.05E-01	2.73E-01	6.19E-01	2 34E-01	2.56E-01
4.15E+02	2 05E-01	4.02E-01	1.90E-01	3.21E-01	2.28E-01	2 33E-01	2.32E-01	6.02E-01	2.73E-01	6.23E-01	2 34E-01	2.58E-01
4.16E+02	2 05E-01	3.97E-01	1.90E-01	3.23E-01	2.28E-01	2 33E-01	2.32E-01	5.96E-01	2.73E-01	6.25E-01	2 34E-01	2.60E-01
4.17E+02	2 05E-01	3.90E-01	1.90E-01	3.26E-01	2.28E-01	2 34E-01	2.32E-01	5.94E-01	2.73E-01	6.26E-01	2 34E-01	2.61E-01
4.18E+02	2 05E-01	3.86E-01	1.90E-01	3.27E-01	2.28E-01	2 35E-01	2.32E-01	5.90E-01	2.73E-01	6.24E-01	2 34E-01	2.63E-01
4.19E+02	2 05E-01	3.84E-01	1.90E-01	3.29E-01	2.28E-01	2 35E-01	2.32E-01	5.84E-01	2.73E-01	6.22E-01	2 34E-01	2.64E-01
4 20E+02	2 05E-01	3.84E-01	1.90E-01	3.31E-01	2.28E-01	2 36E-01	2.32E-01	5.75E-01	2.73E-01	6.16E-01	2 34E-01	2.66E-01
4 21E+02	2 05E-01	3.81E-01	1.90E-01	3.33E-01	2.28E-01	2 37E-01	2.32E-01	5.68E-01	2.73E-01	6.09E-01	2 34E-01	2.69E-01
4 22E+02	2 05E-01	3.81E-01	1.90E-01	3.35E-01	2.28E-01	2 38E-01	2.32E-01	5.55E-01	2.73E-01	6.00E-01	2 34E-01	2.73E-01
4 23E+02	2 05E-01	3.84E-01	1.90E-01	3.36E-01	2.28E-01	2 39E-01	2.32E-01	5.53E-01	2.73E-01	5.86E-01	2 34E-01	2.77E-01
4 24E+02	2 05E-01	3.91E-01	1.90E-01	3.37E-01	2.28E-01	2.40E-01	2.32E-01	5.55E-01	2.73E-01	5.72E-01	2 34E-01	2.81E-01
4 25E+02	2 05E-01	3.98E-01	1.89E-01	3.37E-01	2.28E-01	2.41E-01	2.32E-01	5.58E-01	2.73E-01	5.59E-01	2 34E-01	2.86E-01
4 26E+02	2 05E-01	4.03E-01	1.90E-01	3.38E-01	2.28E-01	2.42E-01	2.32E-01	5.57E-01	2.73E-01	5.43E-01	2 34E-01	2.91E-01
4 27E+02	2 05E-01	4.08E-01	1.90E-01	3.40E-01	2.28E-01	2.43E-01	2.32E-01	5.57E-01	2.73E-01	5.25E-01	2 34E-01	2.96E-01
4 28E+02	2 05E-01	4.12E-01	1.90E-01	3.40E-01	2.28E-01	2.44E-01	2.32E-01	5.57E-01	2.73E-01	5.11E-01	2 34E-01	3.01E-01

Simulation	V01		V02		V03		V04		V05		V06	
Time (s)	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
4.29E+02	2 05E-01	4.14E-01	1 89E-01	3.41E-01	2.28E-01	2.45E-01	2.32E-01	5.55E-01	2.73E-01	5 00E-01	2.34E-01	3 05E-01
4.30E+02	2 05E-01	4.17E-01	1 91E-01	3.42E-01	2.28E-01	2.47E-01	2.32E-01	5.52E-01	2.73E-01	4 93E-01	2.34E-01	3 09E-01
4.31E+02	2 05E-01	4.17E-01	1 90E-01	3.43E-01	2.28E-01	2.48E-01	2.32E-01	5.49E-01	2.73E-01	4 90E-01	2.34E-01	3.12E-01
4.32E+02	2 05E-01	4.15E-01	1 90E-01	3.45E-01	2.28E-01	2.50E-01	2.32E-01	5.47E-01	2.73E-01	4 90E-01	2.34E-01	3.16E-01
4.33E+02	2 05E-01	4.16E-01	1 90E-01	3.46E-01	2.28E-01	2.51E-01	2.32E-01	5.45E-01	2.73E-01	4 93E-01	2.34E-01	3.19E-01
4.34E+02	2 05E-01	4.18E-01	1 90E-01	3.48E-01	2.28E-01	2.53E-01	2.32E-01	5.42E-01	2.73E-01	5 00E-01	2.34E-01	3 22E-01
4.35E+02	2 05E-01	4.18E-01	1 90E-01	3.50E-01	2.28E-01	2.55E-01	2.32E-01	5.39E-01	2.73E-01	5 04E-01	2.34E-01	3 25E-01
4.36E+02	2 05E-01	4.19E-01	1 90E-01	3.52E-01	2.28E-01	2.58E-01	2.32E-01	5.35E-01	2.73E-01	5 08E-01	2.34E-01	3 28E-01
4.37E+02	2 05E-01	4.26E-01	1 90E-01	3.55E-01	2.28E-01	2.61E-01	2.32E-01	5.32E-01	2.73E-01	5.15E-01	2.34E-01	3 30E-01
4.38E+02	2 05E-01	4.34E-01	1 90E-01	3.57E-01	2.28E-01	2.64E-01	2.32E-01	5.29E-01	2.73E-01	5 23E-01	2.34E-01	3 31E-01
4.39E+02	2 05E-01	4.40E-01	1 90E-01	3.58E-01	2.28E-01	2.67E-01	2.32E-01	5.26E-01	2.73E-01	5 27E-01	2.34E-01	3 33E-01
4.40E+02	2 05E-01	4.50E-01	1 90E-01	3.58E-01	2.28E-01	2.70E-01	2.32E-01	5.22E-01	2.73E-01	5 31E-01	2.34E-01	3 34E-01
4.41E+02	2 05E-01	4.54E-01	1 90E-01	3.56E-01	2.28E-01	2.72E-01	2.32E-01	5.19E-01	2.74E-01	5 33E-01	2.34E-01	3 34E-01
4.42E+02	2 05E-01	4.59E-01	1 90E-01	3.52E-01	2.28E-01	2.75E-01	2.32E-01	5.16E-01	2.74E-01	5 32E-01	2.34E-01	3 33E-01
4.43E+02	2 05E-01	4.67E-01	1 91E-01	3.48E-01	2.28E-01	2.77E-01	2.32E-01	5.12E-01	2.74E-01	5 32E-01	2.34E-01	3 32E-01
4.44E+02	2 05E-01	4.72E-01	1 91E-01	3.41E-01	2.28E-01	2.79E-01	2.32E-01	5.06E-01	2.74E-01	5 35E-01	2.34E-01	3 30E-01
4.45E+02	2 05E-01	4.77E-01	1 90E-01	3.34E-01	2.28E-01	2.81E-01	2.32E-01	5.01E-01	2.74E-01	5 36E-01	2.34E-01	3 28E-01
4.46E+02	2 05E-01	4.85E-01	1 90E-01	3.25E-01	2.28E-01	2.82E-01	2.32E-01	4.97E-01	2.74E-01	5.40E-01	2.34E-01	3 25E-01
4.47E+02	2 05E-01	4.89E-01	1 90E-01	3.17E-01	2.29E-01	2.84E-01	2.32E-01	4.96E-01	2.74E-01	5.43E-01	2.34E-01	3 21E-01
4.48E+02	2 05E-01	4.91E-01	1 90E-01	3.09E-01	2.29E-01	2.86E-01	2.32E-01	4.96E-01	2.74E-01	5.47E-01	2.34E-01	3.15E-01
4.49E+02	2 05E-01	4.94E-01	1 91E-01	3.01E-01	2.29E-01	2.88E-01	2.32E-01	4.97E-01	2.74E-01	5 51E-01	2.34E-01	3 09E-01
4.50E+02	2 05E-01	4.93E-01	1 90E-01	2.97E-01	2.29E-01	2.90E-01	2.32E-01	4.98E-01	2.74E-01	5 53E-01	2.34E-01	3 02E-01
4.51E+02	2 05E-01	4.97E-01	1 91E-01	2.96E-01	2.29E-01	2.92E-01	2.32E-01	4.98E-01	2.74E-01	5 56E-01	2.34E-01	2 95E-01
4.52E+02	2 05E-01	4.97E-01	1 90E-01	2.99E-01	2.29E-01	2.94E-01	2.32E-01	4.99E-01	2.74E-01	5 59E-01	2.34E-01	2 87E-01
4.53E+02	2 05E-01	4.95E-01	1 90E-01	3.04E-01	2.29E-01	2.98E-01	2.32E-01	5.02E-01	2.74E-01	5.60E-01	2.34E-01	2.79E-01
4.54E+02	2 05E-01	5.00E-01	1 90E-01	3.10E-01	2.29E-01	3.05E-01	2.32E-01	5.03E-01	2.74E-01	5 59E-01	2.34E-01	2.72E-01
4.55E+02	2 05E-01	5.02E-01	1 91E-01	3.18E-01	2.29E-01	3.13E-01	2.32E-01	5.02E-01	2.74E-01	5 55E-01	2.34E-01	2.64E-01
4.56E+02	2 05E-01	5.01E-01	1 90E-01	3.29E-01	2.29E-01	3.20E-01	2.32E-01	5.00E-01	2.74E-01	5 50E-01	2.34E-01	2 56E-01
4.57E+02	2 05E-01	4.97E-01	1 90E-01	3.40E-01	2.29E-01	3.29E-01	2.32E-01	4.95E-01	2.74E-01	5.40E-01	2.34E-01	2.48E-01
4.58E+02	2 05E-01	4.98E-01	1 90E-01	3.51E-01	2.29E-01	3.36E-01	2.32E-01	4.93E-01	2.74E-01	5 34E-01	2.34E-01	2.42E-01
4.59E+02	2 05E-01	4.96E-01	1 91E-01	3.60E-01	2.29E-01	3.42E-01	2.32E-01	4.86E-01	2.74E-01	5 30E-01	2.34E-01	2 37E-01
4.60E+02	2 05E-01	4.95E-01	1 90E-01	3.69E-01	2.29E-01	3.47E-01	2.32E-01	4.76E-01	2.74E-01	5 27E-01	2.34E-01	2 35E-01
4.61E+02	2 05E-01	4.96E-01	1 90E-01	3.78E-01	2.29E-01	3.50E-01	2.32E-01	4.67E-01	2.74E-01	5 28E-01	2.34E-01	2 34E-01
4.62E+02	2 05E-01	4.98E-01	1 90E-01	3.86E-01	2.29E-01	3.53E-01	2.32E-01	4.54E-01	2.74E-01	5 29E-01	2.34E-01	2 34E-01
4.63E+02	2 05E-01	4.97E-01	1 90E-01	3.94E-01	2.29E-01	3.54E-01	2.32E-01	4.40E-01	2.74E-01	5 26E-01	2.34E-01	2 34E-01
4.64E+02	2 05E-01	4.95E-01	1 91E-01	4.01E-01	2.29E-01	3.54E-01	2.32E-01	4.24E-01	2.74E-01	5 23E-01	2.34E-01	2 34E-01
4.65E+02	2 05E-01	4.89E-01	1 90E-01	4.08E-01	2.29E-01	3.52E-01	2.32E-01	4.12E-01	2.74E-01	5.17E-01	2.34E-01	2 34E-01
4.66E+02	2 05E-01	4.81E-01	1 90E-01	4.15E-01	2.29E-01	3.48E-01	2.32E-01	3.96E-01	2.74E-01	5.12E-01	2.34E-01	2 34E-01
4.67E+02	2 05E-01	4.71E-01	1 90E-01	4.21E-01	2.29E-01	3.43E-01	2.32E-01	3.81E-01	2.74E-01	5.13E-01	2.34E-01	2 33E-01
4.68E+02	2 05E-01	4.59E-01	1 91E-01	4.27E-01	2.29E-01	3.36E-01	2.32E-01	3.64E-01	2.74E-01	5.13E-01	2.34E-01	2 33E-01
4.69E+02	2 05E-01	4.47E-01	1 90E-01	4.33E-01	2.29E-01	3.28E-01	2.32E-01	3.50E-01	2.73E-01	5.12E-01	2.34E-01	2 34E-01
4.70E+02	2 05E-01	4.36E-01	1 91E-01	4.38E-01	2.29E-01	3.19E-01	2.32E-01	3.35E-01	2.73E-01	5.11E-01	2.34E-01	2 34E-01
4.71E+02	2 05E-01	4.29E-01	1 90E-01	4.44E-01	2.29E-01	3.07E-01	2.32E-01	3.26E-01	2.73E-01	5.12E-01	2.34E-01	2 34E-01
4.72E+02	2 05E-01	4.23E-01	1 90E-01	4.51E-01	2.29E-01	2.97E-01	2.32E-01	3.20E-01	2.73E-01	5 09E-01	2.34E-01	2 34E-01
4.73E+02	2 05E-01	4.15E-01	1 90E-01	4.56E-01	2.29E-01	2.88E-01	2.32E-01	3.14E-01	2.73E-01	5 07E-01	2.34E-01	2 35E-01
4.74E+02	2 05E-01	4.08E-01	1 91E-01	4.62E-01	2.29E-01	2.79E-01	2.32E-01	3.13E-01	2.73E-01	5 05E-01	2.34E-01	2 35E-01
4.75E+02	2 05E-01	4.03E-01	1 90E-01	4.66E-01	2.29E-01	2.73E-01	2.32E-01	3.10E-01	2.73E-01	5 02E-01	2.34E-01	2 35E-01
4.76E+02	2 05E-01	3.92E-01	1 91E-01	4.69E-01	2.29E-01	2.69E-01	2.32E-01	3.10E-01	2.73E-01	4 99E-01	2.34E-01	2 36E-01
4.77E+02	2 05E-01	3.84E-01	1 90E-01	4.69E-01	2.29E-01	2.67E-01	2.32E-01	3.11E-01	2.73E-01	4 96E-01	2.34E-01	2 37E-01
4.78E+02	2 05E-01	3.76E-01	1 91E-01	4.68E-01	2.29E-01	2.67E-01	2.32E-01	3.14E-01	2.73E-01	4 92E-01	2.35E-01	2 39E-01
4.79E+02	2 05E-01	3.66E-01	1 90E-01	4.66E-01	2.29E-01	2.68E-01	2.32E-01	3.15E-01	2.73E-01	4 88E-01	2.35E-01	2.41E-01
4.80E+02	2 05E-01	3.56E-01	1 91E-01	4.63E-01	2.29E-01	2.70E-01	2.32E-01	3.17E-01	2.73E-01	4 88E-01	2.35E-01	2.44E-01
4.81E+02	2 05E-01	3.45E-01	1 91E-01	4.62E-01	2.29E-01	2.72E-01	2.32E-01	3.19E-01	2.73E-01	4 87E-01	2.35E-01	2.47E-01
4.82E+02	2 05E-01	3.33E-01	1 91E-01	4.61E-01	2.29E-01	2.75E-01	2.32E-01	3.21E-01	2.73E-01	4 85E-01	2.35E-01	2 50E-01
4.83E+02	2 05E-01	3.21E-01	1 91E-01	4.60E-01	2.29E-01	2.78E-01	2.32E-01	3.24E-01	2.73E-01	4 83E-01	2.35E-01	2 53E-01
4.84E+02	2 05E-01	3.11E-01	1 91E-01	4.58E-01	2.29E-01	2.82E-01	2.32E-01	3.28E-01	2.73E-01	4 81E-01	2.35E-01	2 55E-01
4.85E+02	2 05E-01	3.01E-01	1 91E-01	4.55E-01	2.29E-01	2.85E-01	2.32E-01	3.33E-01	2.73E-01	4 83E-01	2.35E-01	2 58E-01
4.86E+02	2 05E-01	2.93E-01	1 91E-01	4.52E-01	2.29E-01	2.89E-01	2.32E-01	3.38E-01	2.73E-01	4 81E-01	2.35E-01	2.60E-01
4.87E+02	2 05E-01	2.87E-01	1 91E-01	4.48E-01	2.29E-01	2.93E-01	2.32E-01	3.42E-01	2.73E-01	4 84E-01	2.35E-01	2.62E-01
4.88E+02	2 05E-01	2.83E-01	1 91E-01	4.45E-01	2.29E-01	2.98E-01	2.32E-01	3.48E-01	2.73E-01	4 87E-01	2.35E-01	2.63E-01
4.89E+02	2 05E-01	2.80E-01	1 91E-01	4.39E-01	2.29E-01	3.04E-01	2.32E-01	3.53E-01	2.73E-01	4 89E-01	2.35E-01	2.63E-01
4.90E+02	2 05E-01	2.77E-01	1 91E-01	4.33E-01	2.29E-01	3.11E-01	2.32E-01	3.58E-01	2.73E-01	4 92E-01	2.35E-01	2.63E-01
4.91E+02	2 05E-01	2.75E-01	1 90E-01	4.36E-01	2.29E-01	3.19E-01	2.32E-01	3.64E-01	2.73E-01	4 97E-01	2.35E-01	2.62E-01
4.92E+02	2 05E-01	2.72E-01	1 90E-01	4.38E-01	2.29E-01	3.28E-01	2.32E-01	3.71E-01	2.73E-01	5 01E-01	2.35E-01	2.60E-01
4.93E+02	2 05E-01	2.70E-01	1 91E-01	4.40E-01	2.29E-01	3.38E-01	2.32E-01	3.79E-01	2.73E-01	5 08E-01	2.35E-01	2 58E-01
4.94E+02	2 05E-01	2.69E-01	1 91E-01	4.47E-01	2.29E-01	3.47E-01	2.32E-01	3.91E-01	2.73E-01	5.11E-01	2.35E-01	2 57E-01
4.95E+02	2 05E-01	2.68E-01	1 91E-01	4.55E-01	2.29E-01	3.56E-01	2.32E-01	4.04E-01	2.73E-01	5.18E-01	2.35E-01	2 55E-01
4.96E+02	2 05E-01	2.67E-01	1 90E-01	4.68E-01	2.29E-01	3.65E-01	2.32E-01	4.17E-01	2.73E-01	5 20E-01	2.35E-01	2 53E-01
4.97E+02	2 05E-01	2.66E-01	1 90E-01	4.78E-01	2.29E-01	3.73E-01	2.32E-01	4.29E-01	2.73E-01	5 24E-01	2.35E-01	2 51E-01
4.98E+02	2 05E-01	2.65E-01	1 90E-01	4.84E-01	2.29E-01	3.81E-01	2.32E-01	4.39E-01	2.73E-01	5 28E-01	2.35E-01	2.49E-01
4.99E+02	2 06E-01	2.63E-01	1 91E-01	4.91E-01	2.28E-01	3.88E-01	2.32E-01	4.47E-01	2.73E-01	5 29E-01	2.35E-01	2.48E-01
5.00E+02	2 06E-01	2.62E-01	1 91E-01	4.96E-01	2.28E-01	3.95E-01	2.32E-01	4.53E-01	2.73E-01	5 28E-01	2.35E-01	2.46E-01
5.01E+02	2 06E-01	2.60E-01	1 91E-01	4.97E-01	2.28E-01	4.01E-01	2.32E-01	4.58E-01	2.73E-01	5 28E-01	2.35E-01	2.45E-01

Simulation	V01		V02		V03		V04		V05		V06	
Time (s)	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
5 02E+02	2 06E-01	2.62E-01	1.90E-01	4.98E-01	2.28E-01	4 06E-01	2.32E-01	4.60E-01	2.73E-01	5.27E-01	2 35E-01	2.43E-01
5 03E+02	2 06E-01	2.68E-01	1.90E-01	4.97E-01	2.28E-01	4.11E-01	2.32E-01	4.60E-01	2.73E-01	5.27E-01	2 35E-01	2.42E-01
5 04E+02	2 06E-01	2.83E-01	1.91E-01	4.95E-01	2.28E-01	4.14E-01	2.32E-01	4.58E-01	2.73E-01	5.23E-01	2 35E-01	2.42E-01
5 05E+02	2 06E-01	3.03E-01	1.91E-01	4.91E-01	2.28E-01	4.17E-01	2.32E-01	4.60E-01	2.73E-01	5.17E-01	2 35E-01	2.41E-01
5 06E+02	2 06E-01	3.26E-01	1.91E-01	4.85E-01	2.28E-01	4.19E-01	2.32E-01	4.64E-01	2.73E-01	5.12E-01	2 35E-01	2.40E-01
5 07E+02	2 06E-01	3.49E-01	1.90E-01	4.81E-01	2.28E-01	4 20E-01	2.32E-01	4.72E-01	2.73E-01	5.06E-01	2 35E-01	2.39E-01
5 08E+02	2 06E-01	3.69E-01	1.91E-01	4.82E-01	2.28E-01	4 21E-01	2.32E-01	4.80E-01	2.73E-01	5.00E-01	2 35E-01	2.39E-01
5 09E+02	2 06E-01	3.87E-01	1.91E-01	4.82E-01	2.28E-01	4 23E-01	2.32E-01	4.89E-01	2.73E-01	4.97E-01	2 35E-01	2.38E-01
5.10E+02	2 06E-01	4.02E-01	1.91E-01	4.88E-01	2.28E-01	4 24E-01	2.32E-01	4.98E-01	2.73E-01	4.92E-01	2 35E-01	2.38E-01
5.11E+02	2 06E-01	4.15E-01	1.91E-01	4.94E-01	2.28E-01	4 25E-01	2.32E-01	5.12E-01	2.73E-01	4.84E-01	2 35E-01	2.37E-01
5.12E+02	2 06E-01	4.24E-01	1.91E-01	4.99E-01	2.28E-01	4 26E-01	2.32E-01	5.28E-01	2.73E-01	4.75E-01	2 35E-01	2.36E-01
5.13E+02	2 06E-01	4.32E-01	1.91E-01	5.05E-01	2.28E-01	4 26E-01	2.32E-01	5.45E-01	2.73E-01	4.63E-01	2 35E-01	2.36E-01
5.14E+02	2 06E-01	4.45E-01	1.91E-01	5.12E-01	2.28E-01	4 26E-01	2.32E-01	5.61E-01	2.73E-01	4.50E-01	2 35E-01	2.35E-01
5.15E+02	2 06E-01	4.55E-01	1.91E-01	5.17E-01	2.28E-01	4 24E-01	2.32E-01	5.74E-01	2.73E-01	4.35E-01	2 35E-01	2.35E-01
5.16E+02	2 06E-01	4.65E-01	1.91E-01	5.18E-01	2.28E-01	4 24E-01	2.32E-01	5.88E-01	2.73E-01	4.20E-01	2 35E-01	2.35E-01
5.17E+02	2 06E-01	4.74E-01	1.90E-01	5.17E-01	2.28E-01	4 24E-01	2.32E-01	5.99E-01	2.73E-01	4.11E-01	2 34E-01	2.35E-01
5.18E+02	2 06E-01	4.79E-01	1.90E-01	5.16E-01	2.28E-01	4 23E-01	2.32E-01	6.08E-01	2.73E-01	4.05E-01	2 34E-01	2.36E-01
5.19E+02	2 06E-01	4.85E-01	1.91E-01	5.09E-01	2.28E-01	4 23E-01	2.32E-01	6.15E-01	2.73E-01	4.06E-01	2 34E-01	2.36E-01
5 20E+02	2 06E-01	4.88E-01	1.90E-01	5.02E-01	2.28E-01	4 25E-01	2.32E-01	6.18E-01	2.73E-01	4.06E-01	2 34E-01	2.36E-01
5 21E+02	2 06E-01	4.89E-01	1.90E-01	4.95E-01	2.28E-01	4 25E-01	2.32E-01	6.23E-01	2.73E-01	4.07E-01	2 34E-01	2.37E-01
5 22E+02	2 06E-01	4.86E-01	1.90E-01	4.90E-01	2.28E-01	4 26E-01	2.32E-01	6.26E-01	2.73E-01	4.07E-01	2 34E-01	2.38E-01
5 23E+02	2 06E-01	4.84E-01	1.90E-01	4.81E-01	2.28E-01	4 27E-01	2.32E-01	6.27E-01	2.73E-01	4.08E-01	2 34E-01	2.39E-01
5 24E+02	2 06E-01	4.83E-01	1.90E-01	4.71E-01	2.28E-01	4 26E-01	2.32E-01	6.26E-01	2.73E-01	4.12E-01	2 34E-01	2.41E-01
5 25E+02	2 06E-01	4.80E-01	1.90E-01	4.62E-01	2.28E-01	4 25E-01	2.32E-01	6.28E-01	2.72E-01	4.16E-01	2 34E-01	2.43E-01
5 26E+02	2 06E-01	4.74E-01	1.91E-01	4.52E-01	2.28E-01	4 28E-01	2.32E-01	6.30E-01	2.72E-01	4.20E-01	2 34E-01	2.45E-01
5 27E+02	2 06E-01	4.69E-01	1.90E-01	4.40E-01	2.28E-01	4 31E-01	2.32E-01	6.30E-01	2.72E-01	4.27E-01	2 34E-01	2.48E-01
5 28E+02	2 06E-01	4.62E-01	1.90E-01	4.32E-01	2.28E-01	4 34E-01	2.32E-01	6.25E-01	2.72E-01	4.33E-01	2 34E-01	2.50E-01
5 29E+02	2 06E-01	4.54E-01	1.90E-01	4.22E-01	2.28E-01	4 38E-01	2.32E-01	6.20E-01	2.72E-01	4.41E-01	2 34E-01	2.52E-01
5 30E+02	2 06E-01	4.42E-01	1.90E-01	4.09E-01	2.28E-01	4.43E-01	2.32E-01	6.17E-01	2.72E-01	4.46E-01	2 34E-01	2.55E-01
5 31E+02	2 06E-01	4.33E-01	1.90E-01	3.96E-01	2.28E-01	4.47E-01	2.32E-01	6.18E-01	2.72E-01	4.52E-01	2 34E-01	2.57E-01
5 32E+02	2 06E-01	4.24E-01	1.90E-01	3.84E-01	2.28E-01	4.49E-01	2.32E-01	6.19E-01	2.72E-01	4.59E-01	2 34E-01	2.59E-01
5 33E+02	2 06E-01	4.18E-01	1.90E-01	3.73E-01	2.28E-01	4 51E-01	2.32E-01	6.21E-01	2.72E-01	4.62E-01	2 34E-01	2.60E-01
5 34E+02	2 06E-01	4.15E-01	1.90E-01	3.61E-01	2.28E-01	4 52E-01	2.32E-01	6.21E-01	2.72E-01	4.65E-01	2 34E-01	2.62E-01
5 35E+02	2 06E-01	4.13E-01	1.90E-01	3.46E-01	2.28E-01	4 53E-01	2.32E-01	6.20E-01	2.72E-01	4.67E-01	2 34E-01	2.63E-01
5 36E+02	2 06E-01	4.10E-01	1.90E-01	3.35E-01	2.28E-01	4 51E-01	2.32E-01	6.18E-01	2.72E-01	4.68E-01	2 34E-01	2.63E-01
5 37E+02	2 06E-01	4.08E-01	1.90E-01	3.22E-01	2.28E-01	4.48E-01	2.32E-01	6.17E-01	2.72E-01	4.68E-01	2 34E-01	2.64E-01
5 38E+02	2 06E-01	4.09E-01	1.90E-01	3.06E-01	2.28E-01	4.43E-01	2.32E-01	6.16E-01	2.72E-01	4.68E-01	2 34E-01	2.64E-01
5 39E+02	2 06E-01	4.14E-01	1.90E-01	2.95E-01	2.28E-01	4.42E-01	2.32E-01	6.15E-01	2.72E-01	4.64E-01	2 34E-01	2.64E-01
5.40E+02	2 06E-01	4.21E-01	1.90E-01	2.85E-01	2.28E-01	4 39E-01	2.32E-01	6.13E-01	2.72E-01	4.61E-01	2 34E-01	2.65E-01
5.41E+02	2 06E-01	4.29E-01	1.89E-01	2.79E-01	2.28E-01	4 37E-01	2.32E-01	6.12E-01	2.72E-01	4.60E-01	2 34E-01	2.66E-01
5.42E+02	2 06E-01	4.40E-01	1.90E-01	2.73E-01	2.28E-01	4 35E-01	2.32E-01	6.12E-01	2.72E-01	4.56E-01	2 34E-01	2.67E-01
5.43E+02	2 06E-01	4.51E-01	1.90E-01	2.67E-01	2.28E-01	4 30E-01	2.32E-01	6.15E-01	2.72E-01	4.50E-01	2 34E-01	2.67E-01
5.44E+02	2 06E-01	4.62E-01	1.90E-01	2.63E-01	2.28E-01	4 30E-01	2.32E-01	6.21E-01	2.72E-01	4.46E-01	2 34E-01	2.67E-01
5.45E+02	2 06E-01	4.72E-01	1.90E-01	2.62E-01	2.28E-01	4 27E-01	2.32E-01	6.27E-01	2.72E-01	4.40E-01	2 34E-01	2.66E-01
5.46E+02	2 06E-01	4.81E-01	1.90E-01	2.66E-01	2.28E-01	4 24E-01	2.32E-01	6.33E-01	2.72E-01	4.35E-01	2 34E-01	2.64E-01
5.47E+02	2 06E-01	4.91E-01	1.90E-01	2.74E-01	2.28E-01	4 22E-01	2.32E-01	6.37E-01	2.72E-01	4.29E-01	2 34E-01	2.62E-01
5.48E+02	2 06E-01	5.01E-01	1.90E-01	2.82E-01	2.28E-01	4 23E-01	2.32E-01	6.40E-01	2.72E-01	4.20E-01	2 34E-01	2.60E-01
5.49E+02	2 06E-01	5.07E-01	1.90E-01	2.87E-01	2.28E-01	4 21E-01	2.32E-01	6.42E-01	2.72E-01	4.13E-01	2 34E-01	2.58E-01
5 50E+02	2 06E-01	5.17E-01	1.90E-01	2.90E-01	2.28E-01	4 20E-01	2.32E-01	6.41E-01	2.72E-01	4.06E-01	2 34E-01	2.55E-01
5 51E+02	2 06E-01	5.26E-01	1.90E-01	2.93E-01	2.28E-01	4.16E-01	2.32E-01	6.37E-01	2.72E-01	3.97E-01	2 34E-01	2.52E-01
5 52E+02	2 06E-01	5.35E-01	1.90E-01	2.97E-01	2.28E-01	4.13E-01	2.32E-01	6.33E-01	2.72E-01	3.87E-01	2 34E-01	2.49E-01
5 53E+02	2 06E-01	5.42E-01	1.89E-01	3.00E-01	2.28E-01	4.10E-01	2.32E-01	6.26E-01	2.72E-01	3.76E-01	2 34E-01	2.46E-01
5 54E+02	2 06E-01	5.48E-01	1.90E-01	3.02E-01	2.28E-01	4 06E-01	2.32E-01	6.20E-01	2.72E-01	3.66E-01	2 34E-01	2.44E-01
5 55E+02	2 06E-01	5.54E-01	1.90E-01	3.03E-01	2.28E-01	4 00E-01	2.32E-01	6.13E-01	2.72E-01	3.59E-01	2 34E-01	2.44E-01
5 56E+02	2 06E-01	5.57E-01	1.90E-01	3.04E-01	2.28E-01	3 93E-01	2.32E-01	6.03E-01	2.72E-01	3.54E-01	2 34E-01	2.43E-01
5 57E+02	2 06E-01	5.59E-01	1.90E-01	3.05E-01	2.28E-01	3 86E-01	2.32E-01	5.92E-01	2.72E-01	3.51E-01	2 34E-01	2.43E-01
5 58E+02	2 06E-01	5.62E-01	1.90E-01	3.07E-01	2.28E-01	3.78E-01	2.32E-01	5.80E-01	2.72E-01	3.49E-01	2 34E-01	2.43E-01
5 59E+02	2 06E-01	5.62E-01	1.89E-01	3.07E-01	2.28E-01	3.70E-01	2.32E-01	5.68E-01	2.72E-01	3.48E-01	2 35E-01	2.42E-01
5.60E+02	2 06E-01	5.62E-01	1.90E-01	3.06E-01	2.28E-01	3.65E-01	2.32E-01	5.54E-01	2.72E-01	3.46E-01	2 35E-01	2.42E-01
5.61E+02	2 06E-01	5.58E-01	1.90E-01	3.04E-01	2.28E-01	3 58E-01	2.32E-01	5.38E-01	2.72E-01	3.44E-01	2 35E-01	2.42E-01
5.62E+02	2 06E-01	5.52E-01	1.90E-01	3.04E-01	2.28E-01	3 51E-01	2.32E-01	5.22E-01	2.72E-01	3.42E-01	2 35E-01	2.42E-01
5.63E+02	2 06E-01	5.47E-01	1.89E-01	3.03E-01	2.28E-01	3.47E-01	2.32E-01	5.13E-01	2.72E-01	3.39E-01	2 35E-01	2.43E-01
5.64E+02	2 06E-01	5.39E-01	1.90E-01	3.03E-01	2.28E-01	3.45E-01	2.32E-01	5.05E-01	2.72E-01	3.36E-01	2 35E-01	2.43E-01
5.65E+02	2 06E-01	5.26E-01	1.90E-01	3.02E-01	2.28E-01	3.47E-01	2.32E-01	5.00E-01	2.72E-01	3.32E-01	2 35E-01	2.43E-01
5.66E+02	2 06E-01	5.13E-01	1.90E-01	3.02E-01	2.28E-01	3 50E-01	2.32E-01	4.98E-01	2.72E-01	3.30E-01	2 35E-01	2.43E-01
5.67E+02	2 06E-01	5.04E-01	1.90E-01	3.03E-01	2.28E-01	3 52E-01	2.32E-01	5.01E-01	2.72E-01	3.28E-01	2 35E-01	2.42E-01
5.68E+02	2 06E-01	4.99E-01	1.90E-01	3.03E-01	2.28E-01	3 50E-01	2.32E-01	5.06E-01	2.72E-01	3.27E-01	2 35E-01	2.42E-01
5.69E+02	2 06E-01	4.93E-01	1.90E-01	3.04E-01	2.28E-01	3 51E-01	2.32E-01	5.09E-01	2.72E-01	3.26E-01	2 35E-01	2.42E-01
5.70E+02	2 06E-01	4.85E-01	1.90E-01	3.02E-01	2.28E-01	3 52E-01	2.32E-01	5.13E-01	2.72E-01	3.25E-01	2 35E-01	2.41E-01
5.71E+02	2 06E-01	4.78E-01	1.90E-01	2.99E-01	2.28E-01	3 53E-01	2.32E-01	5.19E-01	2.72E-01	3.25E-01	2 35E-01	2.41E-01
5.72E+02	2 06E-01	4.73E-01	1.90E-01	2.96E-01	2.28E-01	3 53E-01	2.32E-01	5.29E-01	2.72E-01	3.25E-01	2 35E-01	2.40E-01
5.73E+02	2 06E-01	4.74E-01	1.90E-01	2.92E-01	2.28E-01	3 53E-01	2.32E-01	5.41E-01	2.72E-01	3.25E-01	2 35E-01	2.39E-01
5.74E+02	2 06E-01	4.73E-01	1.90E-01	2.89E-01	2.28E-01	3 51E-01	2.32E-01	5.51E-01	2.72E-01	3.25E-01	2 35E-01	2.39E-01

Simulation	V01		V02		V03		V04		V05		V06	
Time (s)	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
5.75E+02	2 06E-01	4.76E-01	1.89E-01	2.91E-01	2.28E-01	3.49E-01	2.32E-01	5.63E-01	2.72E-01	3.25E-01	2 35E-01	2.38E-01
5.76E+02	2 06E-01	4.77E-01	1.90E-01	2.93E-01	2.28E-01	3.48E-01	2.32E-01	5.74E-01	2.72E-01	3.26E-01	2 35E-01	2.38E-01
5.77E+02	2 06E-01	4.79E-01	1.90E-01	2.94E-01	2.28E-01	3.46E-01	2.32E-01	5.85E-01	2.72E-01	3.26E-01	2 35E-01	2.37E-01
5.78E+02	2 06E-01	4.77E-01	1.90E-01	2.93E-01	2.28E-01	3.44E-01	2.32E-01	5.97E-01	2.72E-01	3.26E-01	2 35E-01	2.37E-01
5.79E+02	2 06E-01	4.73E-01	1.89E-01	2.92E-01	2.28E-01	3.40E-01	2.32E-01	6.06E-01	2.72E-01	3.27E-01	2 35E-01	2.36E-01
5 80E+02	2 06E-01	4.67E-01	1.90E-01	2.91E-01	2.28E-01	3 36E-01	2.32E-01	6.14E-01	2.72E-01	3.27E-01	2 35E-01	2.36E-01
5 81E+02	2 06E-01	4.66E-01	1.90E-01	2.92E-01	2.28E-01	3 32E-01	2.32E-01	6.21E-01	2.72E-01	3.27E-01	2 35E-01	2.35E-01
5 82E+02	2 06E-01	4.64E-01	1.90E-01	2.92E-01	2.28E-01	3 26E-01	2.32E-01	6.27E-01	2.72E-01	3.27E-01	2 35E-01	2.35E-01
5 83E+02	2 06E-01	4.60E-01	1.90E-01	2.95E-01	2.28E-01	3 20E-01	2.32E-01	6.33E-01	2.72E-01	3.26E-01	2 35E-01	2.34E-01
5 84E+02	2 06E-01	4.57E-01	1.90E-01	2.98E-01	2.28E-01	3.14E-01	2.32E-01	6.40E-01	2.72E-01	3.26E-01	2 35E-01	2.35E-01
5 85E+02	2 06E-01	4.52E-01	1.90E-01	3.02E-01	2.28E-01	3 07E-01	2.32E-01	6.46E-01	2.72E-01	3.24E-01	2 35E-01	2.35E-01
5 86E+02	2 06E-01	4.49E-01	1.89E-01	3.07E-01	2.28E-01	3 01E-01	2.32E-01	6.54E-01	2.72E-01	3.22E-01	2 35E-01	2.35E-01
5 87E+02	2 06E-01	4.47E-01	1.90E-01	3.11E-01	2.28E-01	2 95E-01	2.32E-01	6.67E-01	2.72E-01	3.19E-01	2 35E-01	2.35E-01
5 88E+02	2 06E-01	4.45E-01	1.90E-01	3.16E-01	2.28E-01	2 89E-01	2.32E-01	6.79E-01	2.72E-01	3.16E-01	2 35E-01	2.35E-01
5 89E+02	2 06E-01	4.43E-01	1.90E-01	3.24E-01	2.28E-01	2 83E-01	2.32E-01	6.92E-01	2.72E-01	3.13E-01	2 35E-01	2.34E-01
5 90E+02	2 06E-01	4.40E-01	1.89E-01	3.37E-01	2.28E-01	2.79E-01	2.32E-01	7.05E-01	2.72E-01	3.09E-01	2 35E-01	2.34E-01
5 91E+02	2 06E-01	4.37E-01	1.90E-01	3.50E-01	2.28E-01	2.76E-01	2.32E-01	7.21E-01	2.72E-01	3.06E-01	2 35E-01	2.34E-01
5 92E+02	2 06E-01	4.33E-01	1.90E-01	3.65E-01	2.28E-01	2.76E-01	2.32E-01	7.36E-01	2.72E-01	3.03E-01	2 35E-01	2.34E-01
5 93E+02	2 06E-01	4.26E-01	1.90E-01	3.74E-01	2.28E-01	2.75E-01	2.32E-01	7.46E-01	2.72E-01	3.01E-01	2 35E-01	2.34E-01
5 94E+02	2 06E-01	4.18E-01	1.90E-01	3.80E-01	2.28E-01	2.76E-01	2.32E-01	7.55E-01	2.72E-01	2.99E-01	2 35E-01	2.34E-01
5 95E+02	2 06E-01	4.11E-01	1.89E-01	3.86E-01	2.28E-01	2.78E-01	2.32E-01	7.60E-01	2.72E-01	2.97E-01	2 34E-01	2.34E-01
5 96E+02	2 06E-01	4.01E-01	1.90E-01	3.87E-01	2.28E-01	2 81E-01	2.32E-01	7.65E-01	2.72E-01	2.96E-01	2 34E-01	2.34E-01
5 97E+02	2 06E-01	3.91E-01	1.90E-01	3.84E-01	2.28E-01	2 85E-01	2.32E-01	7.65E-01	2.72E-01	2.94E-01	2 34E-01	2.34E-01
5 98E+02	2 06E-01	3.81E-01	1.89E-01	3.81E-01	2.28E-01	2 89E-01	2.32E-01	7.57E-01	2.72E-01	2.93E-01	2 34E-01	2.34E-01
5 99E+02	2 06E-01	3.71E-01	1.89E-01	3.77E-01	2.28E-01	2 94E-01	2.32E-01	7.45E-01	2.72E-01	2.93E-01	2 34E-01	2.34E-01
6 00E+02	2 06E-01	3.62E-01	1.90E-01	3.71E-01	2.28E-01	2 98E-01	2.32E-01	7.29E-01	2.72E-01	2.93E-01	2 34E-01	2.34E-01
6 01E+02	2 06E-01	3.53E-01	1.90E-01	3.64E-01	2.28E-01	3 04E-01	2.32E-01	7.13E-01	2.72E-01	2.93E-01	2 34E-01	2.34E-01
6 02E+02	2 06E-01	3.43E-01	1.90E-01	3.57E-01	2.28E-01	3.10E-01	2.32E-01	6.96E-01	2.72E-01	2.94E-01	2 34E-01	2.35E-01
6 03E+02	2 06E-01	3.32E-01	1.89E-01	3.47E-01	2.28E-01	3.16E-01	2.32E-01	6.75E-01	2.72E-01	2.94E-01	2 34E-01	2.35E-01
6 04E+02	2 06E-01	3.23E-01	1.90E-01	3.37E-01	2.28E-01	3 24E-01	2.32E-01	6.54E-01	2.72E-01	2.95E-01	2 34E-01	2.35E-01
6 05E+02	2 06E-01	3.12E-01	1.90E-01	3.28E-01	2.28E-01	3 31E-01	2.32E-01	6.35E-01	2.72E-01	2.97E-01	2 34E-01	2.35E-01
6 06E+02	2 06E-01	3.02E-01	1.90E-01	3.19E-01	2.28E-01	3.40E-01	2.32E-01	6.16E-01	2.72E-01	3.00E-01	2 34E-01	2.35E-01
6 07E+02	2 06E-01	2.94E-01	1.90E-01	3.09E-01	2.28E-01	3.47E-01	2.32E-01	5.96E-01	2.72E-01	3.04E-01	2 34E-01	2.35E-01
6 08E+02	2 06E-01	2.87E-01	1.90E-01	2.99E-01	2.28E-01	3 54E-01	2.32E-01	5.96E-01	2.72E-01	3.09E-01	2 34E-01	2.35E-01
6 09E+02	2 06E-01	2.84E-01	1.90E-01	2.90E-01	2.28E-01	3.63E-01	2.32E-01	6.01E-01	2.72E-01	3.15E-01	2 34E-01	2.35E-01
6.10E+02	2 06E-01	2.82E-01	1.90E-01	2.81E-01	2.28E-01	3.71E-01	2.32E-01	6.02E-01	2.72E-01	3.22E-01	2 34E-01	2.35E-01
6.11E+02	2 06E-01	2.83E-01	1.89E-01	2.72E-01	2.28E-01	3.78E-01	2.32E-01	6.03E-01	2.72E-01	3.28E-01	2 34E-01	2.35E-01
6.12E+02	2 06E-01	2.83E-01	1.89E-01	2.66E-01	2.28E-01	3 85E-01	2.32E-01	6.04E-01	2.72E-01	3.36E-01	2 34E-01	2.35E-01
6.13E+02	2 06E-01	2.85E-01	1.89E-01	2.62E-01	2.28E-01	3 90E-01	2.32E-01	6.09E-01	2.72E-01	3.44E-01	2 34E-01	2.35E-01
6.14E+02	2 06E-01	2.86E-01	1.90E-01	2.58E-01	2.28E-01	3 94E-01	2.32E-01	6.13E-01	2.72E-01	3.53E-01	2 34E-01	2.35E-01
6.15E+02	2 06E-01	2.88E-01	1.90E-01	2.55E-01	2.28E-01	3 98E-01	2.32E-01	6.14E-01	2.72E-01	3.63E-01	2 34E-01	2.35E-01
6.16E+02	2 06E-01	2.93E-01	1.89E-01	2.52E-01	2.28E-01	4 03E-01	2.32E-01	6.15E-01	2.72E-01	3.71E-01	2 34E-01	2.36E-01
6.17E+02	2 06E-01	2.98E-01	1.89E-01	2.50E-01	2.28E-01	4 09E-01	2.32E-01	6.15E-01	2.72E-01	3.79E-01	2 34E-01	2.36E-01
6.18E+02	2 06E-01	3.04E-01	1.89E-01	2.48E-01	2.28E-01	4.14E-01	2.32E-01	6.15E-01	2.72E-01	3.86E-01	2 34E-01	2.36E-01
6.19E+02	2 06E-01	3.11E-01	1.89E-01	2.48E-01	2.28E-01	4 20E-01	2.32E-01	6.16E-01	2.72E-01	3.91E-01	2 34E-01	2.36E-01
6 20E+02	2 06E-01	3.17E-01	1.89E-01	2.48E-01	2.28E-01	4 29E-01	2.32E-01	6.17E-01	2.72E-01	3.96E-01	2 34E-01	2.36E-01
6 21E+02	2 06E-01	3.24E-01	1.89E-01	2.49E-01	2.28E-01	4 38E-01	2.32E-01	6.16E-01	2.72E-01	3.98E-01	2 34E-01	2.36E-01
6 22E+02	2 06E-01	3.32E-01	1.90E-01	2.50E-01	2.28E-01	4.47E-01	2.32E-01	6.17E-01	2.72E-01	4.02E-01	2 34E-01	2.35E-01
6 23E+02	2 06E-01	3.40E-01	1.89E-01	2.52E-01	2.28E-01	4 57E-01	2.32E-01	6.15E-01	2.72E-01	4.04E-01	2 34E-01	2.35E-01
6 24E+02	2 06E-01	3.48E-01	1.89E-01	2.53E-01	2.28E-01	4.66E-01	2.32E-01	6.12E-01	2.72E-01	4.03E-01	2 34E-01	2.35E-01
6 25E+02	2 06E-01	3.55E-01	1.89E-01	2.55E-01	2.28E-01	4.77E-01	2.32E-01	6.12E-01	2.72E-01	4.05E-01	2 34E-01	2.34E-01
6 26E+02	2 06E-01	3.63E-01	1.89E-01	2.57E-01	2.28E-01	4 89E-01	2.32E-01	6.10E-01	2.72E-01	4.09E-01	2 34E-01	2.34E-01
6 27E+02	2 06E-01	3.69E-01	1.89E-01	2.58E-01	2.28E-01	4 98E-01	2.32E-01	6.10E-01	2.72E-01	4.12E-01	2 34E-01	2.33E-01
6 28E+02	2 06E-01	3.76E-01	1.89E-01	2.60E-01	2.28E-01	5 05E-01	2.32E-01	6.05E-01	2.72E-01	4.13E-01	2 34E-01	2.33E-01
6 29E+02	2 06E-01	3.82E-01	1.89E-01	2.63E-01	2.28E-01	5.14E-01	2.32E-01	6.02E-01	2.72E-01	4.13E-01	2 34E-01	2.33E-01
6 30E+02	2 06E-01	3.88E-01	1.89E-01	2.66E-01	2.28E-01	5.19E-01	2.32E-01	6.05E-01	2.72E-01	4.15E-01	2 34E-01	2.33E-01
6 31E+02	2 06E-01	3.94E-01	1.90E-01	2.70E-01	2.28E-01	5 23E-01	2.32E-01	6.10E-01	2.72E-01	4.19E-01	2 34E-01	2.33E-01
6 32E+02	2 06E-01	4.00E-01	1.89E-01	2.75E-01	2.28E-01	5 26E-01	2.32E-01	6.17E-01	2.72E-01	4.22E-01	2 34E-01	2.33E-01
6 33E+02	2 06E-01	4.07E-01	1.89E-01	2.80E-01	2.28E-01	5 27E-01	2.32E-01	6.23E-01	2.72E-01	4.24E-01	2 34E-01	2.33E-01
6 34E+02	2 06E-01	4.13E-01	1.88E-01	2.86E-01	2.28E-01	5 24E-01	2.32E-01	6.30E-01	2.72E-01	4.27E-01	2 34E-01	2.33E-01
6 35E+02	2 06E-01	4.19E-01	1.89E-01	2.92E-01	2.28E-01	5 23E-01	2.32E-01	6.38E-01	2.72E-01	4.30E-01	2 34E-01	2.33E-01
6 36E+02	2 06E-01	4.23E-01	1.89E-01	3.02E-01	2.28E-01	5.17E-01	2.32E-01	6.44E-01	2.72E-01	4.31E-01	2 34E-01	2.33E-01
6 37E+02	2 06E-01	4.24E-01	1.89E-01	3.14E-01	2.28E-01	5.10E-01	2.32E-01	6.50E-01	2.72E-01	4.32E-01	2 34E-01	2.33E-01
6 38E+02	2 06E-01	4.24E-01	1.89E-01	3.27E-01	2.28E-01	5 06E-01	2.32E-01	6.54E-01	2.72E-01	4.31E-01	2 34E-01	2.33E-01
6 39E+02	2 06E-01	4.22E-01	1.90E-01	3.40E-01	2.28E-01	5 01E-01	2.32E-01	6.57E-01	2.72E-01	4.30E-01	2 34E-01	2.33E-01
6.40E+02	2 06E-01	4.20E-01	1.89E-01	3.53E-01	2.28E-01	4 96E-01	2.32E-01	6.61E-01	2.72E-01	4.28E-01	2 34E-01	2.33E-01
6.41E+02	2 06E-01	4.20E-01	1.89E-01	3.65E-01	2.28E-01	4 90E-01	2.32E-01	6.67E-01	2.72E-01	4.24E-01	2 34E-01	2.33E-01
6.42E+02	2 06E-01	4.19E-01	1.89E-01	3.76E-01	2.28E-01	4 83E-01	2.32E-01	6.70E-01	2.72E-01	4.20E-01	2 34E-01	2.33E-01
6.43E+02	2 06E-01	4.17E-01	1.90E-01	3.88E-01	2.28E-01	4.76E-01	2.32E-01	6.73E-01	2.72E-01	4.15E-01	2 34E-01	2.33E-01
6.44E+02	2 06E-01	4.17E-01	1.90E-01	3.99E-01	2.28E-01	4.71E-01	2.32E-01	6.74E-01	2.72E-01	4.09E-01	2 34E-01	2.34E-01
6.45E+02	2 06E-01	4.15E-01	1.90E-01	4.09E-01	2.28E-01	4.64E-01	2.32E-01	6.75E-01	2.72E-01	4.03E-01	2 34E-01	2.34E-01
6.46E+02	2 06E-01	4.15E-01	1.90E-01	4.19E-01	2.28E-01	4 59E-01	2.32E-01	6.76E-01	2.72E-01	3.97E-01	2 34E-01	2.34E-01
6.47E+02	2 06E-01	4.14E-01	1.89E-01	4.27E-01	2.28E-01	4 53E-01	2.32E-01	6.78E-01	2.72E-01	3.88E-01	2 34E-01	2.34E-01

Simulation	V01		V02		V03		V04		V05		V06	
Time (s)	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
6.48E+02	2 06E-01	4.13E-01	1.90E-01	4.34E-01	2.28E-01	4.48E-01	2.32E-01	6.80E-01	2.72E-01	3.81E-01	2 34E-01	2.34E-01
6.49E+02	2 06E-01	4.11E-01	1.90E-01	4.41E-01	2.28E-01	4.46E-01	2.32E-01	6.80E-01	2.72E-01	3.72E-01	2 34E-01	2.34E-01
6 50E+02	2 06E-01	4.12E-01	1.89E-01	4.47E-01	2.28E-01	4.46E-01	2.32E-01	6.80E-01	2.72E-01	3.62E-01	2 34E-01	2.34E-01
6 51E+02	2 06E-01	4.09E-01	1.89E-01	4.50E-01	2.28E-01	4.49E-01	2.32E-01	6.77E-01	2.72E-01	3.51E-01	2 34E-01	2.34E-01
6 52E+02	2 06E-01	4.06E-01	1.90E-01	4.54E-01	2.28E-01	4 52E-01	2.32E-01	6.75E-01	2.72E-01	3.45E-01	2 34E-01	2.34E-01
6 53E+02	2 06E-01	4.02E-01	1.90E-01	4.55E-01	2.28E-01	4 55E-01	2.32E-01	6.72E-01	2.72E-01	3.41E-01	2 34E-01	2.34E-01
6 54E+02	2 06E-01	3.96E-01	1.90E-01	4.55E-01	2.28E-01	4 59E-01	2.32E-01	6.68E-01	2.72E-01	3.37E-01	2 34E-01	2.34E-01
6 55E+02	2 06E-01	3.91E-01	1.90E-01	4.53E-01	2.28E-01	4.62E-01	2.32E-01	6.61E-01	2.72E-01	3.35E-01	2 34E-01	2.34E-01
6 56E+02	2 05E-01	3.84E-01	1.90E-01	4.52E-01	2.28E-01	4.65E-01	2.32E-01	6.54E-01	2.72E-01	3.34E-01	2 34E-01	2.34E-01
6 57E+02	2 05E-01	3.79E-01	1.89E-01	4.52E-01	2.28E-01	4.66E-01	2.32E-01	6.46E-01	2.71E-01	3.33E-01	2 34E-01	2.34E-01
6 58E+02	2 06E-01	3.73E-01	1.90E-01	4.53E-01	2.28E-01	4.66E-01	2.32E-01	6.37E-01	2.71E-01	3.34E-01	2 34E-01	2.34E-01
6 59E+02	2 05E-01	3.66E-01	1.90E-01	4.52E-01	2.28E-01	4.64E-01	2.32E-01	6.30E-01	2.71E-01	3.34E-01	2 34E-01	2.33E-01
6.60E+02	2 06E-01	3.56E-01	1.90E-01	4.49E-01	2.28E-01	4.62E-01	2.32E-01	6.21E-01	2.71E-01	3.36E-01	2 34E-01	2.33E-01
6.61E+02	2 06E-01	3.45E-01	1.90E-01	4.45E-01	2.28E-01	4 59E-01	2.32E-01	6.08E-01	2.71E-01	3.42E-01	2 34E-01	2.33E-01
6.62E+02	2 05E-01	3.36E-01	1.89E-01	4.39E-01	2.28E-01	4 54E-01	2.32E-01	5.96E-01	2.71E-01	3.48E-01	2 34E-01	2.33E-01
6.63E+02	2 05E-01	3.29E-01	1.90E-01	4.32E-01	2.28E-01	4.48E-01	2.32E-01	5.84E-01	2.71E-01	3.54E-01	2 34E-01	2.34E-01
6.64E+02	2 05E-01	3.23E-01	1.90E-01	4.27E-01	2.28E-01	4.41E-01	2.32E-01	5.72E-01	2.71E-01	3.59E-01	2 34E-01	2.34E-01
6.65E+02	2 05E-01	3.21E-01	1.90E-01	4.23E-01	2.28E-01	4 33E-01	2.32E-01	5.62E-01	2.71E-01	3.62E-01	2 34E-01	2.34E-01
6.66E+02	2 05E-01	3.19E-01	1.90E-01	4.15E-01	2.28E-01	4 23E-01	2.32E-01	5.55E-01	2.71E-01	3.65E-01	2 34E-01	2.34E-01
6.67E+02	2 05E-01	3.17E-01	1.90E-01	4.07E-01	2.28E-01	4.14E-01	2.32E-01	5.46E-01	2.71E-01	3.67E-01	2 34E-01	2.34E-01
6.68E+02	2 05E-01	3.15E-01	1.90E-01	4.02E-01	2.28E-01	4 06E-01	2.32E-01	5.36E-01	2.71E-01	3.69E-01	2 34E-01	2.33E-01
6.69E+02	2 05E-01	3.13E-01	1.90E-01	3.94E-01	2.28E-01	3 97E-01	2.32E-01	5.23E-01	2.72E-01	3.68E-01	2 34E-01	2.33E-01
6.70E+02	2 05E-01	3.12E-01	1.90E-01	3.84E-01	2.28E-01	3 88E-01	2.32E-01	5.11E-01	2.71E-01	3.67E-01	2 34E-01	2.34E-01
6.71E+02	2 05E-01	3.11E-01	1.90E-01	3.75E-01	2.28E-01	3.78E-01	2.31E-01	5.12E-01	2.71E-01	3.65E-01	2 34E-01	2.34E-01
6.72E+02	2 05E-01	3.10E-01	1.90E-01	3.67E-01	2.28E-01	3.67E-01	2.31E-01	5.16E-01	2.72E-01	3.65E-01	2 34E-01	2.34E-01
6.73E+02	2 05E-01	3.09E-01	1.90E-01	3.57E-01	2.28E-01	3 57E-01	2.31E-01	5.22E-01	2.71E-01	3.63E-01	2 34E-01	2.34E-01
6.74E+02	2 05E-01	3.07E-01	1.91E-01	3.52E-01	2.28E-01	3.48E-01	2.31E-01	5.32E-01	2.71E-01	3.64E-01	2 34E-01	2.34E-01
6.75E+02	2 05E-01	3.04E-01	1.90E-01	3.48E-01	2.28E-01	3 39E-01	2.31E-01	5.45E-01	2.72E-01	3.61E-01	2 34E-01	2.34E-01
6.76E+02	2 05E-01	3.02E-01	1.90E-01	3.45E-01	2.28E-01	3 33E-01	2.31E-01	5.58E-01	2.71E-01	3.58E-01	2 34E-01	2.34E-01
6.77E+02	2 05E-01	2.99E-01	1.90E-01	3.43E-01	2.28E-01	3 29E-01	2.31E-01	5.69E-01	2.71E-01	3.55E-01	2 34E-01	2.34E-01
6.78E+02	2 05E-01	2.96E-01	1.90E-01	3.41E-01	2.28E-01	3 24E-01	2.31E-01	5.79E-01	2.72E-01	3.54E-01	2 34E-01	2.34E-01
6.79E+02	2 05E-01	2.93E-01	1.90E-01	3.38E-01	2.28E-01	3 21E-01	2.31E-01	5.88E-01	2.72E-01	3.50E-01	2 34E-01	2.34E-01
6 80E+02	2 05E-01	2.89E-01	1.90E-01	3.35E-01	2.28E-01	3.17E-01	2.31E-01	5.97E-01	2.72E-01	3.48E-01	2 34E-01	2.34E-01
6 81E+02	2 05E-01	2.87E-01	1.91E-01	3.34E-01	2.28E-01	3.13E-01	2.31E-01	6.06E-01	2.72E-01	3.46E-01	2 34E-01	2.34E-01
6 82E+02	2 05E-01	2.84E-01	1.90E-01	3.34E-01	2.28E-01	3 09E-01	2.31E-01	6.13E-01	2.72E-01	3.43E-01	2 34E-01	2.34E-01
6 83E+02	2 05E-01	2.81E-01	1.90E-01	3.31E-01	2.28E-01	3 06E-01	2.31E-01	6.20E-01	2.72E-01	3.43E-01	2 34E-01	2.34E-01
6 84E+02	2 05E-01	2.78E-01	1.90E-01	3.30E-01	2.28E-01	3 02E-01	2.31E-01	6.25E-01	2.72E-01	3.43E-01	2 34E-01	2.35E-01
6 85E+02	2 05E-01	2.74E-01	1.90E-01	3.27E-01	2.28E-01	2 99E-01	2.31E-01	6.29E-01	2.72E-01	3.43E-01	2 34E-01	2.35E-01
6 86E+02	2 05E-01	2.71E-01	1.90E-01	3.26E-01	2.28E-01	2 98E-01	2.31E-01	6.33E-01	2.72E-01	3.44E-01	2 34E-01	2.35E-01
6 87E+02	2 05E-01	2.69E-01	1.91E-01	3.25E-01	2.28E-01	2 97E-01	2.31E-01	6.36E-01	2.72E-01	3.45E-01	2 34E-01	2.36E-01
6 88E+02	2 05E-01	2.66E-01	1.91E-01	3.20E-01	2.28E-01	2 97E-01	2.31E-01	6.37E-01	2.72E-01	3.48E-01	2 34E-01	2.37E-01
6 89E+02	2 05E-01	2.63E-01	1.90E-01	3.15E-01	2.28E-01	2 96E-01	2.31E-01	6.36E-01	2.72E-01	3.52E-01	2 34E-01	2.37E-01
6 90E+02	2 05E-01	2.60E-01	1.91E-01	3.09E-01	2.28E-01	2 96E-01	2.31E-01	6.35E-01	2.72E-01	3.56E-01	2 34E-01	2.38E-01
6 91E+02	2 05E-01	2.58E-01	1.91E-01	3.03E-01	2.28E-01	2 95E-01	2.31E-01	6.31E-01	2.72E-01	3.60E-01	2 34E-01	2.39E-01
6 92E+02	2 05E-01	2.56E-01	1.91E-01	2.99E-01	2.28E-01	2 94E-01	2.31E-01	6.28E-01	2.72E-01	3.64E-01	2 34E-01	2.39E-01
6 93E+02	2 05E-01	2.55E-01	1.91E-01	2.94E-01	2.28E-01	2 93E-01	2.31E-01	6.23E-01	2.72E-01	3.67E-01	2 34E-01	2.39E-01
6 94E+02	2 05E-01	2.53E-01	1.91E-01	2.88E-01	2.28E-01	2 92E-01	2.31E-01	6.17E-01	2.72E-01	3.69E-01	2 34E-01	2.39E-01
6 95E+02	2 05E-01	2.52E-01	1.91E-01	2.81E-01	2.28E-01	2 93E-01	2.31E-01	6.10E-01	2.72E-01	3.70E-01	2 34E-01	2.40E-01
6 96E+02	2 05E-01	2.52E-01	1.91E-01	2.74E-01	2.28E-01	2 93E-01	2.31E-01	6.02E-01	2.72E-01	3.71E-01	2 34E-01	2.40E-01
6 97E+02	2 05E-01	2.52E-01	1.91E-01	2.69E-01	2.28E-01	2 93E-01	2.31E-01	5.93E-01	2.72E-01	3.71E-01	2 34E-01	2.39E-01
6 98E+02	2 05E-01	2.53E-01	1.91E-01	2.66E-01	2.28E-01	2 96E-01	2.31E-01	5.85E-01	2.72E-01	3.69E-01	2 34E-01	2.39E-01
6 99E+02	2 05E-01	2.53E-01	1.91E-01	2.62E-01	2.28E-01	2 98E-01	2.31E-01	5.78E-01	2.72E-01	3.69E-01	2 34E-01	2.38E-01
7 00E+02	2 05E-01	2.54E-01	1.91E-01	2.58E-01	2.28E-01	3 01E-01	2.31E-01	5.69E-01	2.72E-01	3.70E-01	2 34E-01	2.38E-01
7 01E+02	2 05E-01	2.55E-01	1.91E-01	2.55E-01	2.28E-01	3 05E-01	2.31E-01	5.60E-01	2.72E-01	3.70E-01	2 34E-01	2.37E-01
7 02E+02	2 05E-01	2.56E-01	1.91E-01	2.51E-01	2.28E-01	3 09E-01	2.31E-01	5.51E-01	2.72E-01	3.70E-01	2 33E-01	2.36E-01
7 03E+02	2 05E-01	2.58E-01	1.91E-01	2.50E-01	2.28E-01	3.14E-01	2.31E-01	5.43E-01	2.72E-01	3.71E-01	2 33E-01	2.35E-01
7 04E+02	2 05E-01	2.59E-01	1.90E-01	2.48E-01	2.28E-01	3.19E-01	2.31E-01	5.36E-01	2.72E-01	3.68E-01	2 33E-01	2.35E-01
7 05E+02	2 05E-01	2.60E-01	1.91E-01	2.46E-01	2.28E-01	3 25E-01	2.31E-01	5.30E-01	2.72E-01	3.71E-01	2 33E-01	2.34E-01
7 06E+02	2 05E-01	2.61E-01	1.91E-01	2.43E-01	2.28E-01	3 32E-01	2.31E-01	5.25E-01	2.72E-01	3.74E-01	2 33E-01	2.34E-01
7 07E+02	2 05E-01	2.61E-01	1.91E-01	2.41E-01	2.28E-01	3 39E-01	2.31E-01	5.20E-01	2.72E-01	3.78E-01	2 33E-01	2.34E-01
7 08E+02	2 05E-01	2.61E-01	1.90E-01	2.39E-01	2.28E-01	3.46E-01	2.31E-01	5.15E-01	2.72E-01	3.78E-01	2 33E-01	2.34E-01
7 09E+02	2 05E-01	2.60E-01	1.90E-01	2.39E-01	2.28E-01	3 53E-01	2.31E-01	5.11E-01	2.72E-01	3.78E-01	2 33E-01	2.34E-01
7.10E+02	2 05E-01	2.59E-01	1.91E-01	2.38E-01	2.28E-01	3.60E-01	2.31E-01	5.10E-01	2.72E-01	3.79E-01	2 33E-01	2.34E-01
7.11E+02	2 05E-01	2.58E-01	1.91E-01	2.39E-01	2.28E-01	3.67E-01	2.31E-01	5.10E-01	2.72E-01	3.84E-01	2 33E-01	2.34E-01
7.12E+02	2 05E-01	2.57E-01	1.91E-01	2.39E-01	2.28E-01	3.74E-01	2.31E-01	5.11E-01	2.72E-01	3.93E-01	2 33E-01	2.34E-01
7.13E+02	2 05E-01	2.55E-01	1.91E-01	2.39E-01	2.28E-01	3 80E-01	2.31E-01	5.12E-01	2.72E-01	4.04E-01	2 33E-01	2.34E-01
7.14E+02	2 05E-01	2.53E-01	1.91E-01	2.41E-01	2.28E-01	3 87E-01	2.31E-01	5.14E-01	2.72E-01	4.16E-01	2 33E-01	2.34E-01
7.15E+02	2 05E-01	2.51E-01	1.91E-01	2.42E-01	2.28E-01	3 93E-01	2.31E-01	5.18E-01	2.72E-01	4.29E-01	2 33E-01	2.35E-01
7.16E+02	2 05E-01	2.49E-01	1.91E-01	2.43E-01	2.28E-01	4 00E-01	2.31E-01	5.21E-01	2.72E-01	4.44E-01	2 33E-01	2.35E-01
7.17E+02	2 05E-01	2.47E-01	1.91E-01	2.45E-01	2.28E-01	4 07E-01	2.31E-01	5.25E-01	2.72E-01	4.60E-01	2 33E-01	2.36E-01
7.18E+02	2 05E-01	2.44E-01	1.91E-01	2.48E-01	2.28E-01	4.16E-01	2.31E-01	5.29E-01	2.72E-01	4.77E-01	2 33E-01	2.36E-01
7.19E+02	2 05E-01	2.41E-01	1.91E-01	2.51E-01	2.28E-01	4 25E-01	2.31E-01	5.33E-01	2.72E-01	4.97E-01	2 33E-01	2.36E-01
7 20E+02	2 05E-01	2.38E-01	1.90E-01	2.54E-01	2.28E-01	4 34E-01	2.31E-01	5.37E-01	2.72E-01	5.15E-01	2 33E-01	2.37E-01

Simulation	V01		V02		V03		V04		V05		V06	
Time (s)	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
7 21E+02	2 05E-01	2.35E-01	1.91E-01	2.57E-01	2.28E-01	4.41E-01	2.31E-01	5.42E-01	2.72E-01	5.29E-01	2 33E-01	2.37E-01
7 22E+02	2 05E-01	2.32E-01	1.91E-01	2.61E-01	2.28E-01	4 51E-01	2.31E-01	5.46E-01	2.72E-01	5.41E-01	2 33E-01	2.37E-01
7 23E+02	2 05E-01	2.29E-01	1.91E-01	2.65E-01	2.28E-01	4 58E-01	2.31E-01	5.51E-01	2.72E-01	5.50E-01	2 33E-01	2.38E-01
7 24E+02	2 05E-01	2.25E-01	1.91E-01	2.69E-01	2.28E-01	4.62E-01	2.31E-01	5.56E-01	2.72E-01	5.57E-01	2 33E-01	2.38E-01
7 25E+02	2 05E-01	2.22E-01	1.91E-01	2.73E-01	2.28E-01	4.67E-01	2.31E-01	5.60E-01	2.72E-01	5.64E-01	2 33E-01	2.39E-01
7 26E+02	2 05E-01	2.19E-01	1.91E-01	2.78E-01	2.28E-01	4.73E-01	2.31E-01	5.64E-01	2.72E-01	5.69E-01	2 33E-01	2.40E-01
7 27E+02	2 05E-01	2.15E-01	1.91E-01	2.82E-01	2.28E-01	4.79E-01	2.31E-01	5.67E-01	2.72E-01	5.75E-01	2 33E-01	2.40E-01
7 28E+02	2 05E-01	2.12E-01	1.90E-01	2.87E-01	2.28E-01	4 83E-01	2.31E-01	5.71E-01	2.72E-01	5.83E-01	2 33E-01	2.41E-01
7 29E+02	2 05E-01	2.09E-01	1.91E-01	2.90E-01	2.28E-01	4 83E-01	2.31E-01	5.73E-01	2.72E-01	5.90E-01	2 33E-01	2.41E-01
7 30E+02	2 05E-01	2.07E-01	1.91E-01	2.93E-01	2.28E-01	4.79E-01	2.31E-01	5.74E-01	2.72E-01	5.95E-01	2 33E-01	2.41E-01
7 31E+02	2 05E-01	2.05E-01	1.91E-01	2.96E-01	2.28E-01	4.72E-01	2.31E-01	5.76E-01	2.72E-01	6.00E-01	2 33E-01	2.41E-01
7 32E+02	2 05E-01	2.04E-01	1.91E-01	2.98E-01	2.28E-01	4.63E-01	2.31E-01	5.76E-01	2.72E-01	6.02E-01	2 33E-01	2.40E-01
7 33E+02	2 05E-01	2.04E-01	1.91E-01	2.99E-01	2.28E-01	4 56E-01	2.31E-01	5.77E-01	2.72E-01	6.04E-01	2 33E-01	2.39E-01
7 34E+02	2 05E-01	2.04E-01	1.90E-01	3.00E-01	2.28E-01	4 57E-01	2.31E-01	5.77E-01	2.72E-01	6.04E-01	2 33E-01	2.38E-01
7 35E+02	2 05E-01	2.04E-01	1.91E-01	3.00E-01	2.28E-01	4 58E-01	2.31E-01	5.77E-01	2.72E-01	6.04E-01	2 33E-01	2.36E-01
7 36E+02	2 05E-01	2.04E-01	1.90E-01	2.99E-01	2.28E-01	4 55E-01	2.31E-01	5.77E-01	2.72E-01	6.03E-01	2 33E-01	2.35E-01
7 37E+02	2 05E-01	2.05E-01	1.90E-01	2.98E-01	2.28E-01	4.48E-01	2.32E-01	5.76E-01	2.72E-01	6.01E-01	2 33E-01	2.34E-01
7 38E+02	2 05E-01	2.05E-01	1.91E-01	2.96E-01	2.28E-01	4.48E-01	2.32E-01	5.76E-01	2.72E-01	5.95E-01	2 33E-01	2.33E-01
7 39E+02	2 05E-01	2.05E-01	1.90E-01	2.94E-01	2.28E-01	4.48E-01	2.32E-01	5.76E-01	2.72E-01	5.89E-01	2 33E-01	2.33E-01
7.40E+02	2 05E-01	2.05E-01	1.90E-01	2.91E-01	2.28E-01	4 52E-01	2.32E-01	5.76E-01	2.72E-01	5.82E-01	2 33E-01	2.33E-01
7.41E+02	2 05E-01	2.06E-01	1.91E-01	2.87E-01	2.28E-01	4 58E-01	2.32E-01	5.77E-01	2.72E-01	5.74E-01	2 33E-01	2.34E-01
7.42E+02	2 05E-01	2.07E-01	1.91E-01	2.83E-01	2.28E-01	4.64E-01	2.32E-01	5.79E-01	2.72E-01	5.65E-01	2 33E-01	2.34E-01
7.43E+02	2 05E-01	2.07E-01	1.91E-01	2.78E-01	2.28E-01	4.67E-01	2.32E-01	5.82E-01	2.72E-01	5.58E-01	2 33E-01	2.34E-01
7.44E+02	2 05E-01	2.09E-01	1.90E-01	2.72E-01	2.28E-01	4.72E-01	2.32E-01	5.86E-01	2.72E-01	5.53E-01	2 33E-01	2.33E-01
7.45E+02	2 04E-01	2.10E-01	1.90E-01	2.66E-01	2.28E-01	4.75E-01	2.32E-01	5.90E-01	2.72E-01	5.47E-01	2 33E-01	2.33E-01
7.46E+02	2 04E-01	2.13E-01	1.91E-01	2.62E-01	2.28E-01	4.79E-01	2.32E-01	5.94E-01	2.72E-01	5.44E-01	2 33E-01	2.34E-01
7.47E+02	2 04E-01	2.15E-01	1.90E-01	2.57E-01	2.28E-01	4 81E-01	2.32E-01	5.99E-01	2.72E-01	5.40E-01	2 33E-01	2.34E-01
7.48E+02	2 04E-01	2.19E-01	1.91E-01	2.52E-01	2.28E-01	4 85E-01	2.32E-01	6.04E-01	2.72E-01	5.37E-01	2 33E-01	2.34E-01
7.49E+02	2 04E-01	2.23E-01	1.90E-01	2.48E-01	2.28E-01	4 90E-01	2.32E-01	6.09E-01	2.72E-01	5.35E-01	2 33E-01	2.35E-01
7 50E+02	2 04E-01	2.28E-01	1.91E-01	2.45E-01	2.28E-01	4 97E-01	2.32E-01	6.14E-01	2.72E-01	5.31E-01	2 33E-01	2.35E-01
7 51E+02	2 04E-01	2.34E-01	1.91E-01	2.43E-01	2.28E-01	5 00E-01	2.32E-01	6.19E-01	2.72E-01	5.27E-01	2 33E-01	2.36E-01
7 52E+02	2 04E-01	2.41E-01	1.91E-01	2.41E-01	2.28E-01	5 05E-01	2.32E-01	6.24E-01	2.72E-01	5.21E-01	2 33E-01	2.36E-01
7 53E+02	2 04E-01	2.49E-01	1.90E-01	2.40E-01	2.28E-01	5 05E-01	2.32E-01	6.28E-01	2.72E-01	5.16E-01	2 33E-01	2.37E-01
7 54E+02	2 04E-01	2.56E-01	1.90E-01	2.41E-01	2.28E-01	5 03E-01	2.32E-01	6.32E-01	2.72E-01	5.07E-01	2 33E-01	2.38E-01
7 55E+02	2 04E-01	2.65E-01	1.90E-01	2.43E-01	2.28E-01	4 99E-01	2.32E-01	6.35E-01	2.72E-01	4.96E-01	2 33E-01	2.38E-01
7 56E+02	2 04E-01	2.74E-01	1.90E-01	2.45E-01	2.28E-01	4 92E-01	2.32E-01	6.37E-01	2.72E-01	4.88E-01	2 33E-01	2.39E-01
7 57E+02	2 04E-01	2.83E-01	1.90E-01	2.48E-01	2.28E-01	4 83E-01	2.32E-01	6.38E-01	2.72E-01	4.80E-01	2 33E-01	2.39E-01
7 58E+02	2 04E-01	2.93E-01	1.90E-01	2.50E-01	2.28E-01	4.72E-01	2.32E-01	6.39E-01	2.73E-01	4.73E-01	2 33E-01	2.39E-01
7 59E+02	2 04E-01	3.03E-01	1.90E-01	2.53E-01	2.28E-01	4.60E-01	2.32E-01	6.38E-01	2.73E-01	4.65E-01	2 33E-01	2.39E-01
7.60E+02	2 04E-01	3.12E-01	1.90E-01	2.57E-01	2.28E-01	4.49E-01	2.32E-01	6.36E-01	2.73E-01	4.54E-01	2 33E-01	2.39E-01
7.61E+02	2 04E-01	3.21E-01	1.90E-01	2.60E-01	2.28E-01	4 35E-01	2.32E-01	6.34E-01	2.73E-01	4.45E-01	2 33E-01	2.39E-01
7.62E+02	2 04E-01	3.28E-01	1.90E-01	2.64E-01	2.28E-01	4.19E-01	2.32E-01	6.31E-01	2.73E-01	4.36E-01	2 33E-01	2.39E-01
7.63E+02	2 04E-01	3.32E-01	1.90E-01	2.67E-01	2.28E-01	4 07E-01	2.32E-01	6.27E-01	2.73E-01	4.26E-01	2 33E-01	2.39E-01
7.64E+02	2 04E-01	3.36E-01	1.90E-01	2.70E-01	2.28E-01	3 95E-01	2.32E-01	6.23E-01	2.73E-01	4.19E-01	2 33E-01	2.39E-01
7.65E+02	2 04E-01	3.36E-01	1.90E-01	2.73E-01	2.28E-01	3 85E-01	2.32E-01	6.20E-01	2.73E-01	4.09E-01	2 33E-01	2.39E-01
7.66E+02	2 04E-01	3.34E-01	1.90E-01	2.75E-01	2.28E-01	3.76E-01	2.32E-01	6.16E-01	2.73E-01	4.07E-01	2 33E-01	2.39E-01
7.67E+02	2 04E-01	3.29E-01	1.90E-01	2.79E-01	2.28E-01	3.68E-01	2.32E-01	6.12E-01	2.73E-01	4.06E-01	2 33E-01	2.39E-01
7.68E+02	2 04E-01	3.25E-01	1.90E-01	2.84E-01	2.28E-01	3.61E-01	2.32E-01	6.08E-01	2.73E-01	4.05E-01	2 33E-01	2.39E-01
7.69E+02	2 04E-01	3.21E-01	1.91E-01	2.89E-01	2.28E-01	3 55E-01	2.32E-01	6.05E-01	2.73E-01	4.04E-01	2 33E-01	2.39E-01
7.70E+02	2 04E-01	3.20E-01	1.90E-01	2.95E-01	2.28E-01	3.49E-01	2.32E-01	6.03E-01	2.73E-01	4.05E-01	2 33E-01	2.39E-01
7.71E+02	2 04E-01	3.18E-01	1.90E-01	3.01E-01	2.28E-01	3.45E-01	2.32E-01	6.01E-01	2.73E-01	4.07E-01	2 33E-01	2.38E-01
7.72E+02	2 04E-01	3.15E-01	1.90E-01	3.06E-01	2.28E-01	3 39E-01	2.32E-01	6.00E-01	2.73E-01	4.08E-01	2 33E-01	2.38E-01
7.73E+02	2 04E-01	3.14E-01	1.90E-01	3.10E-01	2.28E-01	3 34E-01	2.32E-01	6.00E-01	2.73E-01	4.12E-01	2 33E-01	2.38E-01
7.74E+02	2 04E-01	3.13E-01	1.90E-01	3.14E-01	2.28E-01	3 29E-01	2.32E-01	6.00E-01	2.73E-01	4.15E-01	2 34E-01	2.38E-01
7.75E+02	2 04E-01	3.15E-01	1.90E-01	3.16E-01	2.28E-01	3 24E-01	2.32E-01	6.00E-01	2.73E-01	4.19E-01	2 34E-01	2.37E-01
7.76E+02	2 04E-01	3.15E-01	1.90E-01	3.19E-01	2.28E-01	3 20E-01	2.32E-01	6.01E-01	2.73E-01	4.24E-01	2 34E-01	2.37E-01
7.77E+02	2 04E-01	3.19E-01	1.90E-01	3.20E-01	2.28E-01	3.17E-01	2.32E-01	6.00E-01	2.73E-01	4.29E-01	2 34E-01	2.37E-01
7.78E+02	2 04E-01	3.21E-01	1.90E-01	3.22E-01	2.28E-01	3.15E-01	2.32E-01	6.00E-01	2.73E-01	4.34E-01	2 34E-01	2.36E-01
7.79E+02	2 04E-01	3.24E-01	1.90E-01	3.23E-01	2.28E-01	3.14E-01	2.32E-01	5.98E-01	2.73E-01	4.39E-01	2 34E-01	2.36E-01
7 80E+02	2 04E-01	3.27E-01	1.89E-01	3.24E-01	2.28E-01	3.13E-01	2.32E-01	5.96E-01	2.73E-01	4.42E-01	2 34E-01	2.36E-01
7 81E+02	2 04E-01	3.30E-01	1.90E-01	3.24E-01	2.28E-01	3.13E-01	2.32E-01	5.92E-01	2.73E-01	4.48E-01	2 34E-01	2.35E-01
7 82E+02	2 04E-01	3.30E-01	1.90E-01	3.24E-01	2.28E-01	3.14E-01	2.32E-01	5.87E-01	2.73E-01	4.53E-01	2 34E-01	2.35E-01
7 83E+02	2 04E-01	3.29E-01	1.90E-01	3.24E-01	2.28E-01	3.14E-01	2.32E-01	5.81E-01	2.73E-01	4.57E-01	2 34E-01	2.35E-01
7 84E+02	2 04E-01	3.26E-01	1.90E-01	3.23E-01	2.28E-01	3.15E-01	2.32E-01	5.74E-01	2.73E-01	4.64E-01	2 34E-01	2.34E-01
7 85E+02	2 04E-01	3.23E-01	1.90E-01	3.23E-01	2.28E-01	3.16E-01	2.32E-01	5.65E-01	2.73E-01	4.72E-01	2 34E-01	2.35E-01
7 86E+02	2 04E-01	3.19E-01	1.90E-01	3.24E-01	2.28E-01	3.15E-01	2.32E-01	5.56E-01	2.73E-01	4.81E-01	2 34E-01	2.35E-01
7 87E+02	2 04E-01	3.15E-01	1.90E-01	3.24E-01	2.28E-01	3.15E-01	2.32E-01	5.46E-01	2.73E-01	4.90E-01	2 34E-01	2.35E-01
7 88E+02	2 04E-01	3.12E-01	1.90E-01	3.25E-01	2.28E-01	3.16E-01	2.32E-01	5.35E-01	2.73E-01	4.98E-01	2 34E-01	2.35E-01
7 89E+02	2 04E-01	3.08E-01	1.90E-01	3.25E-01	2.28E-01	3.16E-01	2.32E-01	5.23E-01	2.73E-01	5.04E-01	2 34E-01	2.35E-01
7 90E+02	2 04E-01	3.03E-01	1.90E-01	3.26E-01	2.28E-01	3.15E-01	2.32E-01	5.11E-01	2.73E-01	5.08E-01	2 34E-01	2.35E-01
7 91E+02	2 04E-01	2.97E-01	1.90E-01	3.28E-01	2.28E-01	3.14E-01	2.32E-01	5.00E-01	2.73E-01	5.10E-01	2 34E-01	2.35E-01
7 92E+02	2 04E-01	2.90E-01	1.90E-01	3.29E-01	2.28E-01	3.14E-01	2.32E-01	4.88E-01	2.73E-01	5.13E-01	2 34E-01	2.35E-01
7 93E+02	2 04E-01	2.87E-01	1.90E-01	3.30E-01	2.28E-01	3.14E-01	2.32E-01	4.78E-01	2.73E-01	5.19E-01	2 34E-01	2.35E-01

Simulation	V01		V02		V03		V04		V05		V06	
Time (s)	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
7 94E+02	2 04E-01	2.86E-01	1.90E-01	3.31E-01	2.28E-01	3.13E-01	2.32E-01	4.73E-01	2.73E-01	5.26E-01	2 34E-01	2.35E-01
7 95E+02	2 04E-01	2.87E-01	1.90E-01	3.31E-01	2.28E-01	3.11E-01	2.32E-01	4.69E-01	2.73E-01	5.34E-01	2 34E-01	2.35E-01
7 96E+02	2 04E-01	2.91E-01	1.90E-01	3.30E-01	2.28E-01	3.10E-01	2.32E-01	4.68E-01	2.73E-01	5.43E-01	2 34E-01	2.35E-01
7 97E+02	2 04E-01	2.96E-01	1.90E-01	3.30E-01	2.28E-01	3 08E-01	2.32E-01	4.68E-01	2.73E-01	5.51E-01	2 34E-01	2.35E-01
7 98E+02	2 04E-01	3.02E-01	1.90E-01	3.28E-01	2.28E-01	3 06E-01	2.32E-01	4.71E-01	2.73E-01	5.62E-01	2 34E-01	2.35E-01
7 99E+02	2 04E-01	3.07E-01	1.90E-01	3.26E-01	2.28E-01	3 04E-01	2.32E-01	4.76E-01	2.73E-01	5.73E-01	2 34E-01	2.35E-01
8 00E+02	2 04E-01	3.11E-01	1.90E-01	3.24E-01	2.28E-01	3 03E-01	2.32E-01	4.83E-01	2.73E-01	5.81E-01	2 34E-01	2.34E-01
8 01E+02	2 04E-01	3.15E-01	1.90E-01	3.22E-01	2.28E-01	3 01E-01	2.31E-01	4.91E-01	2.73E-01	5.89E-01	2 34E-01	2.34E-01
8 02E+02	2 04E-01	3.18E-01	1.90E-01	3.19E-01	2.28E-01	2 99E-01	2.31E-01	5.01E-01	2.73E-01	5.96E-01	2 34E-01	2.34E-01
8 03E+02	2 04E-01	3.20E-01	1.90E-01	3.15E-01	2.28E-01	2 96E-01	2.31E-01	5.11E-01	2.73E-01	6.00E-01	2 34E-01	2.34E-01
8 04E+02	2 04E-01	3.22E-01	1.91E-01	3.09E-01	2.28E-01	2 92E-01	2.31E-01	5.23E-01	2.73E-01	6.02E-01	2 34E-01	2.34E-01
8 05E+02	2 04E-01	3.24E-01	1.90E-01	3.04E-01	2.28E-01	2 89E-01	2.31E-01	5.35E-01	2.73E-01	5.99E-01	2 34E-01	2.34E-01
8 06E+02	2 04E-01	3.25E-01	1.90E-01	2.99E-01	2.28E-01	2 87E-01	2.31E-01	5.48E-01	2.73E-01	5.95E-01	2 34E-01	2.34E-01
8 07E+02	2 04E-01	3.25E-01	1.90E-01	2.97E-01	2.28E-01	2 85E-01	2.31E-01	5.63E-01	2.72E-01	5.90E-01	2 34E-01	2.34E-01
8 08E+02	2 04E-01	3.25E-01	1.90E-01	2.93E-01	2.28E-01	2 83E-01	2.31E-01	5.78E-01	2.72E-01	5.85E-01	2 34E-01	2.34E-01
8 09E+02	2 04E-01	3.25E-01	1.90E-01	2.91E-01	2.28E-01	2 80E-01	2.31E-01	5.95E-01	2.72E-01	5.79E-01	2 34E-01	2.34E-01
8.10E+02	2 04E-01	3.23E-01	1.90E-01	2.92E-01	2.28E-01	2.78E-01	2.31E-01	6.12E-01	2.72E-01	5.75E-01	2 34E-01	2.34E-01
8.11E+02	2 04E-01	3.21E-01	1.90E-01	2.93E-01	2.28E-01	2.75E-01	2.31E-01	6.30E-01	2.72E-01	5.68E-01	2 34E-01	2.34E-01
8.12E+02	2 04E-01	3.18E-01	1.90E-01	2.96E-01	2.28E-01	2.72E-01	2.31E-01	6.48E-01	2.72E-01	5.59E-01	2 34E-01	2.34E-01
8.13E+02	2 04E-01	3.15E-01	1.90E-01	3.00E-01	2.28E-01	2.69E-01	2.31E-01	6.65E-01	2.72E-01	5.50E-01	2 34E-01	2.34E-01
8.14E+02	2 04E-01	3.11E-01	1.90E-01	3.06E-01	2.28E-01	2.67E-01	2.31E-01	6.82E-01	2.72E-01	5.43E-01	2 34E-01	2.34E-01
8.15E+02	2 04E-01	3.07E-01	1.91E-01	3.13E-01	2.28E-01	2.65E-01	2.31E-01	6.99E-01	2.72E-01	5.36E-01	2 34E-01	2.33E-01
8.16E+02	2 04E-01	3.03E-01	1.90E-01	3.20E-01	2.27E-01	2.62E-01	2.31E-01	7.15E-01	2.72E-01	5.30E-01	2 34E-01	2.33E-01
8.17E+02	2 04E-01	2.98E-01	1.90E-01	3.27E-01	2.27E-01	2.60E-01	2.31E-01	7.31E-01	2.72E-01	5.27E-01	2 34E-01	2.33E-01
8.18E+02	2 04E-01	2.94E-01	1.90E-01	3.34E-01	2.27E-01	2 58E-01	2.31E-01	7.46E-01	2.72E-01	5.22E-01	2 34E-01	2.33E-01
8.19E+02	2 04E-01	2.89E-01	1.90E-01	3.40E-01	2.27E-01	2 58E-01	2.31E-01	7.60E-01	2.72E-01	5.19E-01	2 34E-01	2.34E-01
8 20E+02	2 04E-01	2.84E-01	1.90E-01	3.44E-01	2.27E-01	2 59E-01	2.31E-01	7.71E-01	2.72E-01	5.17E-01	2 34E-01	2.34E-01
8 21E+02	2 04E-01	2.79E-01	1.90E-01	3.47E-01	2.27E-01	2.60E-01	2.31E-01	7.80E-01	2.72E-01	5.16E-01	2 34E-01	2.34E-01
8 22E+02	2 04E-01	2.73E-01	1.90E-01	3.50E-01	2.27E-01	2.62E-01	2.31E-01	7.84E-01	2.72E-01	5.18E-01	2 34E-01	2.34E-01
8 23E+02	2 05E-01	2.68E-01	1.90E-01	3.53E-01	2.27E-01	2.65E-01	2.31E-01	7.87E-01	2.72E-01	5.19E-01	2 34E-01	2.34E-01
8 24E+02	2 05E-01	2.65E-01	1.90E-01	3.55E-01	2.27E-01	2.68E-01	2.31E-01	7.89E-01	2.72E-01	5.22E-01	2 34E-01	2.34E-01
8 25E+02	2 05E-01	2.62E-01	1.90E-01	3.54E-01	2.27E-01	2.72E-01	2.31E-01	7.89E-01	2.72E-01	5.24E-01	2 34E-01	2.34E-01
8 26E+02	2 04E-01	2.60E-01	1.91E-01	3.51E-01	2.27E-01	2.76E-01	2.31E-01	7.87E-01	2.72E-01	5.25E-01	2 34E-01	2.34E-01
8 27E+02	2 04E-01	2.57E-01	1.91E-01	3.48E-01	2.27E-01	2 80E-01	2.31E-01	7.82E-01	2.72E-01	5.26E-01	2 34E-01	2.35E-01
8 28E+02	2 04E-01	2.55E-01	1.90E-01	3.43E-01	2.27E-01	2 86E-01	2.31E-01	7.74E-01	2.72E-01	5.28E-01	2 34E-01	2.35E-01
8 29E+02	2 04E-01	2.54E-01	1.90E-01	3.37E-01	2.27E-01	2 91E-01	2.31E-01	7.67E-01	2.72E-01	5.30E-01	2 34E-01	2.36E-01
8 30E+02	2 04E-01	2.55E-01	1.90E-01	3.30E-01	2.27E-01	2 98E-01	2.31E-01	7.58E-01	2.72E-01	5.31E-01	2 34E-01	2.36E-01
8 31E+02	2 04E-01	2.57E-01	1.90E-01	3.24E-01	2.27E-01	3 05E-01	2.31E-01	7.52E-01	2.72E-01	5.32E-01	2 34E-01	2.37E-01
8 32E+02	2 04E-01	2.60E-01	1.90E-01	3.18E-01	2.27E-01	3.14E-01	2.31E-01	7.44E-01	2.72E-01	5.32E-01	2 34E-01	2.38E-01
8 33E+02	2 04E-01	2.63E-01	1.90E-01	3.12E-01	2.27E-01	3 23E-01	2.31E-01	7.34E-01	2.72E-01	5.30E-01	2 34E-01	2.39E-01
8 34E+02	2 04E-01	2.65E-01	1.90E-01	3.04E-01	2.27E-01	3 32E-01	2.31E-01	7.24E-01	2.72E-01	5.27E-01	2 34E-01	2.40E-01
8 35E+02	2 04E-01	2.68E-01	1.90E-01	2.98E-01	2.27E-01	3.41E-01	2.31E-01	7.17E-01	2.72E-01	5.21E-01	2 34E-01	2.41E-01
8 36E+02	2 04E-01	2.72E-01	1.90E-01	2.91E-01	2.27E-01	3 50E-01	2.31E-01	7.10E-01	2.72E-01	5.16E-01	2 34E-01	2.43E-01
8 37E+02	2 04E-01	2.75E-01	1.90E-01	2.85E-01	2.27E-01	3.60E-01	2.31E-01	7.03E-01	2.72E-01	5.07E-01	2 34E-01	2.46E-01
8 38E+02	2 05E-01	2.78E-01	1.90E-01	2.78E-01	2.27E-01	3.69E-01	2.31E-01	6.97E-01	2.72E-01	4.99E-01	2 34E-01	2.49E-01
8 39E+02	2 05E-01	2.80E-01	1.91E-01	2.73E-01	2.27E-01	3.77E-01	2.31E-01	6.92E-01	2.72E-01	4.90E-01	2 34E-01	2.53E-01
8.40E+02	2 05E-01	2.83E-01	1.90E-01	2.69E-01	2.27E-01	3 84E-01	2.31E-01	6.87E-01	2.72E-01	4.83E-01	2 34E-01	2.57E-01
8.41E+02	2 05E-01	2.85E-01	1.90E-01	2.68E-01	2.27E-01	3 91E-01	2.31E-01	6.82E-01	2.72E-01	4.74E-01	2 34E-01	2.61E-01
8.42E+02	2 05E-01	2.88E-01	1.90E-01	2.68E-01	2.27E-01	3 99E-01	2.31E-01	6.78E-01	2.72E-01	4.64E-01	2 34E-01	2.65E-01
8.43E+02	2 05E-01	2.90E-01	1.90E-01	2.68E-01	2.27E-01	4 06E-01	2.31E-01	6.74E-01	2.72E-01	4.55E-01	2 34E-01	2.69E-01
8.44E+02	2 05E-01	2.93E-01	1.90E-01	2.71E-01	2.27E-01	4.13E-01	2.31E-01	6.68E-01	2.72E-01	4.46E-01	2 34E-01	2.73E-01
8.45E+02	2 05E-01	2.96E-01	1.90E-01	2.75E-01	2.27E-01	4 21E-01	2.31E-01	6.63E-01	2.72E-01	4.40E-01	2 34E-01	2.77E-01
8.46E+02	2 05E-01	2.99E-01	1.90E-01	2.79E-01	2.27E-01	4 28E-01	2.31E-01	6.58E-01	2.72E-01	4.34E-01	2 34E-01	2.81E-01
8.47E+02	2 05E-01	3.02E-01	1.90E-01	2.83E-01	2.27E-01	4 39E-01	2.31E-01	6.52E-01	2.72E-01	4.32E-01	2 34E-01	2.84E-01
8.48E+02	2 05E-01	3.06E-01	1.90E-01	2.86E-01	2.27E-01	4 51E-01	2.31E-01	6.46E-01	2.72E-01	4.28E-01	2 34E-01	2.87E-01
8.49E+02	2 05E-01	3.11E-01	1.90E-01	2.89E-01	2.27E-01	4.65E-01	2.31E-01	6.38E-01	2.72E-01	4.28E-01	2 34E-01	2.90E-01
8 50E+02	2 05E-01	3.17E-01	1.91E-01	2.92E-01	2.27E-01	4.79E-01	2.31E-01	6.34E-01	2.72E-01	4.30E-01	2 34E-01	2.92E-01
8 51E+02	2 05E-01	3.24E-01	1.90E-01	2.93E-01	2.27E-01	4 94E-01	2.31E-01	6.29E-01	2.72E-01	4.33E-01	2 34E-01	2.94E-01
8 52E+02	2 05E-01	3.31E-01	1.90E-01	2.96E-01	2.27E-01	5 07E-01	2.31E-01	6.25E-01	2.72E-01	4.35E-01	2 34E-01	2.96E-01
8 53E+02	2 05E-01	3.39E-01	1.90E-01	2.97E-01	2.27E-01	5.19E-01	2.31E-01	6.23E-01	2.72E-01	4.37E-01	2 34E-01	2.97E-01
8 54E+02	2 05E-01	3.48E-01	1.90E-01	2.97E-01	2.27E-01	5 27E-01	2.31E-01	6.20E-01	2.72E-01	4.38E-01	2 34E-01	2.98E-01
8 55E+02	2 05E-01	3.59E-01	1.90E-01	2.95E-01	2.27E-01	5 34E-01	2.31E-01	6.21E-01	2.72E-01	4.38E-01	2 34E-01	2.99E-01
8 56E+02	2 05E-01	3.70E-01	1.90E-01	2.93E-01	2.27E-01	5 39E-01	2.31E-01	6.25E-01	2.72E-01	4.39E-01	2 34E-01	2.99E-01
8 57E+02	2 05E-01	3.80E-01	1.90E-01	2.91E-01	2.27E-01	5.42E-01	2.31E-01	6.28E-01	2.72E-01	4.39E-01	2 34E-01	2.99E-01
8 58E+02	2 05E-01	3.89E-01	1.90E-01	2.89E-01	2.27E-01	5.44E-01	2.31E-01	6.31E-01	2.72E-01	4.40E-01	2 34E-01	2.99E-01
8 59E+02	2 05E-01	3.96E-01	1.90E-01	2.86E-01	2.27E-01	5.44E-01	2.31E-01	6.34E-01	2.73E-01	4.39E-01	2 34E-01	2.99E-01
8.60E+02	2 05E-01	4.04E-01	1.90E-01	2.84E-01	2.27E-01	5.40E-01	2.31E-01	6.37E-01	2.73E-01	4.39E-01	2 34E-01	2.98E-01
8.61E+02	2 05E-01	4.11E-01	1.90E-01	2.80E-01	2.27E-01	5 36E-01	2.31E-01	6.41E-01	2.73E-01	4.40E-01	2 34E-01	2.98E-01
8.62E+02	2 05E-01	4.16E-01	1.90E-01	2.75E-01	2.27E-01	5 30E-01	2.31E-01	6.44E-01	2.73E-01	4.41E-01	2 34E-01	2.96E-01
8.63E+02	2 05E-01	4.21E-01	1.90E-01	2.72E-01	2.27E-01	5 21E-01	2.31E-01	6.47E-01	2.73E-01	4.43E-01	2 34E-01	2.95E-01
8.64E+02	2 05E-01	4.23E-01	1.90E-01	2.69E-01	2.27E-01	5.13E-01	2.31E-01	6.49E-01	2.73E-01	4.46E-01	2 34E-01	2.93E-01
8.65E+02	2 05E-01	4.23E-01	1.90E-01	2.67E-01	2.27E-01	5 04E-01	2.31E-01	6.50E-01	2.73E-01	4.48E-01	2 34E-01	2.91E-01
8.66E+02	2 05E-01	4.22E-01	1.90E-01	2.63E-01	2.27E-01	4 99E-01	2.31E-01	6.52E-01	2.73E-01	4.50E-01	2 34E-01	2.89E-01

Simulation	V01		V02		V03		V04		V05		V06	
Time (s)	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
8.67E+02	2 05E-01	4.19E-01	1.90E-01	2.60E-01	2.27E-01	4 97E-01	2.31E-01	6.52E-01	2.73E-01	4.52E-01	2 34E-01	2.87E-01
8.68E+02	2 05E-01	4.18E-01	1.90E-01	2.56E-01	2.27E-01	4 95E-01	2.31E-01	6.53E-01	2.73E-01	4.55E-01	2 34E-01	2.84E-01
8.69E+02	2 05E-01	4.18E-01	1.90E-01	2.50E-01	2.27E-01	4 96E-01	2.31E-01	6.52E-01	2.73E-01	4.57E-01	2 34E-01	2.82E-01
8.70E+02	2 05E-01	4.19E-01	1.90E-01	2.45E-01	2.27E-01	4 99E-01	2.31E-01	6.52E-01	2.73E-01	4.58E-01	2 34E-01	2.79E-01
8.71E+02	2 05E-01	4.20E-01	1.90E-01	2.43E-01	2.27E-01	5 03E-01	2.31E-01	6.52E-01	2.73E-01	4.59E-01	2 34E-01	2.77E-01
8.72E+02	2 05E-01	4.21E-01	1.90E-01	2.43E-01	2.27E-01	5 07E-01	2.32E-01	6.50E-01	2.73E-01	4.61E-01	2 34E-01	2.74E-01
8.73E+02	2 05E-01	4.24E-01	1.89E-01	2.44E-01	2.27E-01	5.11E-01	2.32E-01	6.48E-01	2.73E-01	4.61E-01	2 34E-01	2.72E-01
8.74E+02	2 05E-01	4.25E-01	1.90E-01	2.45E-01	2.27E-01	5.13E-01	2.32E-01	6.46E-01	2.73E-01	4.61E-01	2 34E-01	2.69E-01
8.75E+02	2 05E-01	4.27E-01	1.90E-01	2.48E-01	2.27E-01	5.17E-01	2.32E-01	6.42E-01	2.73E-01	4.62E-01	2 34E-01	2.66E-01
8.76E+02	2 05E-01	4.31E-01	1.90E-01	2.50E-01	2.27E-01	5 20E-01	2.32E-01	6.38E-01	2.73E-01	4.62E-01	2 34E-01	2.64E-01
8.77E+02	2 05E-01	4.39E-01	1.90E-01	2.53E-01	2.27E-01	5 22E-01	2.32E-01	6.33E-01	2.73E-01	4.60E-01	2 34E-01	2.61E-01
8.78E+02	2 05E-01	4.48E-01	1.90E-01	2.55E-01	2.27E-01	5 22E-01	2.32E-01	6.29E-01	2.73E-01	4.59E-01	2 34E-01	2.59E-01
8.79E+02	2 05E-01	4.61E-01	1.90E-01	2.57E-01	2.27E-01	5 21E-01	2.32E-01	6.25E-01	2.73E-01	4.55E-01	2 34E-01	2.56E-01
8 80E+02	2 05E-01	4.78E-01	1.90E-01	2.58E-01	2.27E-01	5.19E-01	2.32E-01	6.21E-01	2.73E-01	4.52E-01	2 34E-01	2.55E-01
8 81E+02	2 05E-01	4.94E-01	1.90E-01	2.59E-01	2.27E-01	5.16E-01	2.32E-01	6.16E-01	2.73E-01	4.51E-01	2 34E-01	2.52E-01
8 82E+02	2 05E-01	5.11E-01	1.90E-01	2.61E-01	2.27E-01	5.12E-01	2.32E-01	6.10E-01	2.73E-01	4.51E-01	2 34E-01	2.50E-01
8 83E+02	2 05E-01	5.25E-01	1.90E-01	2.63E-01	2.27E-01	5 07E-01	2.32E-01	6.05E-01	2.73E-01	4.51E-01	2 34E-01	2.48E-01
8 84E+02	2 05E-01	5.40E-01	1.90E-01	2.65E-01	2.27E-01	5 01E-01	2.32E-01	6.00E-01	2.73E-01	4.51E-01	2 34E-01	2.46E-01
8 85E+02	2 05E-01	5.54E-01	1.89E-01	2.69E-01	2.27E-01	4 93E-01	2.32E-01	5.96E-01	2.73E-01	4.48E-01	2 34E-01	2.44E-01
8 86E+02	2 05E-01	5.66E-01	1.90E-01	2.76E-01	2.27E-01	4 84E-01	2.32E-01	5.93E-01	2.73E-01	4.45E-01	2 34E-01	2.43E-01
8 87E+02	2 05E-01	5.77E-01	1.90E-01	2.83E-01	2.27E-01	4.74E-01	2.32E-01	5.90E-01	2.73E-01	4.42E-01	2 34E-01	2.41E-01
8 88E+02	2 05E-01	5.86E-01	1.90E-01	2.90E-01	2.27E-01	4.63E-01	2.32E-01	5.87E-01	2.73E-01	4.39E-01	2 34E-01	2.40E-01
8 89E+02	2 05E-01	5.94E-01	1.90E-01	2.99E-01	2.27E-01	4 52E-01	2.32E-01	5.86E-01	2.73E-01	4.37E-01	2 34E-01	2.39E-01
8 90E+02	2 05E-01	5.98E-01	1.90E-01	3.07E-01	2.27E-01	4.41E-01	2.32E-01	5.86E-01	2.73E-01	4.32E-01	2 34E-01	2.37E-01
8 91E+02	2 05E-01	6.02E-01	1.90E-01	3.16E-01	2.27E-01	4 31E-01	2.32E-01	5.87E-01	2.73E-01	4.29E-01	2 34E-01	2.36E-01
8 92E+02	2 05E-01	6.02E-01	1.90E-01	3.24E-01	2.27E-01	4 21E-01	2.32E-01	5.89E-01	2.73E-01	4.26E-01	2 34E-01	2.36E-01
8 93E+02	2 05E-01	5.98E-01	1.90E-01	3.30E-01	2.27E-01	4 09E-01	2.32E-01	5.91E-01	2.73E-01	4.25E-01	2 34E-01	2.36E-01
8 94E+02	2 05E-01	5.94E-01	1.90E-01	3.35E-01	2.27E-01	4 02E-01	2.32E-01	5.94E-01	2.73E-01	4.26E-01	2 34E-01	2.35E-01
8 95E+02	2 05E-01	5.86E-01	1.90E-01	3.38E-01	2.27E-01	3 97E-01	2.32E-01	5.96E-01	2.73E-01	4.27E-01	2 34E-01	2.35E-01
8 96E+02	2 05E-01	5.80E-01	1.91E-01	3.40E-01	2.27E-01	3 91E-01	2.32E-01	5.98E-01	2.74E-01	4.28E-01	2 34E-01	2.35E-01
8 97E+02	2 05E-01	5.72E-01	1.90E-01	3.43E-01	2.27E-01	3 86E-01	2.32E-01	6.02E-01	2.74E-01	4.29E-01	2 34E-01	2.35E-01
8 98E+02	2 05E-01	5.63E-01	1.90E-01	3.45E-01	2.27E-01	3 80E-01	2.32E-01	6.05E-01	2.74E-01	4.32E-01	2 34E-01	2.35E-01
8 99E+02	2 05E-01	5.55E-01	1.90E-01	3.47E-01	2.27E-01	3.76E-01	2.32E-01	6.07E-01	2.74E-01	4.33E-01	2 34E-01	2.35E-01
9 00E+02	2 05E-01	5.49E-01	1.90E-01	3.47E-01	2.27E-01	3.76E-01	2.32E-01	6.09E-01	2.74E-01	4.36E-01	2 34E-01	2.35E-01
9 01E+02	2 05E-01	5.43E-01	1.90E-01	3.47E-01	2.27E-01	3.77E-01	2.32E-01	6.11E-01	2.74E-01	4.38E-01	2 34E-01	2.35E-01
9 02E+02	2 05E-01	5.40E-01	1.90E-01	3.46E-01	2.27E-01	3 80E-01	2.32E-01	6.12E-01	2.74E-01	4.40E-01	2 34E-01	2.35E-01
9 03E+02	2 05E-01	5.39E-01	1.90E-01	3.45E-01	2.27E-01	3 84E-01	2.32E-01	6.13E-01	2.74E-01	4.42E-01	2 34E-01	2.35E-01
9 04E+02	2 05E-01	5.38E-01	1.90E-01	3.44E-01	2.27E-01	3 87E-01	2.32E-01	6.14E-01	2.74E-01	4.43E-01	2 34E-01	2.35E-01
9 05E+02	2 05E-01	5.41E-01	1.90E-01	3.44E-01	2.27E-01	3 90E-01	2.32E-01	6.14E-01	2.74E-01	4.44E-01	2 34E-01	2.36E-01
9 06E+02	2 05E-01	5.44E-01	1.90E-01	3.45E-01	2.27E-01	3 94E-01	2.32E-01	6.13E-01	2.74E-01	4.45E-01	2 34E-01	2.36E-01
9 07E+02	2 05E-01	5.51E-01	1.90E-01	3.45E-01	2.27E-01	3 98E-01	2.32E-01	6.12E-01	2.74E-01	4.46E-01	2 34E-01	2.36E-01
9 08E+02	2 05E-01	5.58E-01	1.91E-01	3.45E-01	2.27E-01	4 02E-01	2.32E-01	6.10E-01	2.74E-01	4.47E-01	2 34E-01	2.36E-01
9 09E+02	2 05E-01	5.65E-01	1.90E-01	3.45E-01	2.27E-01	4 07E-01	2.32E-01	6.08E-01	2.74E-01	4.46E-01	2 34E-01	2.36E-01
9.10E+02	2 05E-01	5.71E-01	1.90E-01	3.45E-01	2.27E-01	4.11E-01	2.32E-01	6.05E-01	2.74E-01	4.46E-01	2 34E-01	2.36E-01
9.11E+02	2 05E-01	5.76E-01	1.90E-01	3.46E-01	2.27E-01	4.16E-01	2.32E-01	6.01E-01	2.74E-01	4.45E-01	2 34E-01	2.36E-01
9.12E+02	2 05E-01	5.78E-01	1.90E-01	3.46E-01	2.27E-01	4 20E-01	2.32E-01	5.97E-01	2.74E-01	4.44E-01	2 34E-01	2.37E-01
9.13E+02	2 05E-01	5.79E-01	1.90E-01	3.47E-01	2.27E-01	4 22E-01	2.32E-01	5.92E-01	2.74E-01	4.43E-01	2 34E-01	2.37E-01
9.14E+02	2 05E-01	5.81E-01	1.90E-01	3.46E-01	2.27E-01	4 24E-01	2.32E-01	5.84E-01	2.74E-01	4.41E-01	2 34E-01	2.37E-01
9.15E+02	2 05E-01	5.83E-01	1.90E-01	3.46E-01	2.27E-01	4 25E-01	2.32E-01	5.77E-01	2.74E-01	4.39E-01	2 34E-01	2.38E-01
9.16E+02	2 05E-01	5.84E-01	1.90E-01	3.44E-01	2.27E-01	4 25E-01	2.32E-01	5.69E-01	2.74E-01	4.36E-01	2 34E-01	2.38E-01
9.17E+02	2 05E-01	5.84E-01	1.90E-01	3.43E-01	2.27E-01	4 24E-01	2.32E-01	5.61E-01	2.74E-01	4.33E-01	2 34E-01	2.38E-01
9.18E+02	2 05E-01	5.82E-01	1.90E-01	3.41E-01	2.27E-01	4 23E-01	2.32E-01	5.54E-01	2.74E-01	4.30E-01	2 34E-01	2.39E-01
9.19E+02	2 05E-01	5.78E-01	1.90E-01	3.40E-01	2.27E-01	4 20E-01	2.32E-01	5.47E-01	2.74E-01	4.26E-01	2 34E-01	2.39E-01
9 20E+02	2 05E-01	5.75E-01	1.90E-01	3.39E-01	2.27E-01	4.16E-01	2.32E-01	5.42E-01	2.74E-01	4.22E-01	2 34E-01	2.40E-01
9 21E+02	2 05E-01	5.70E-01	1.90E-01	3.38E-01	2.27E-01	4 09E-01	2.32E-01	5.37E-01	2.74E-01	4.19E-01	2 34E-01	2.41E-01
9 22E+02	2 05E-01	5.64E-01	1.90E-01	3.38E-01	2.27E-01	4 03E-01	2.32E-01	5.34E-01	2.74E-01	4.15E-01	2 34E-01	2.42E-01
9 23E+02	2 05E-01	5.58E-01	1.90E-01	3.37E-01	2.27E-01	3 97E-01	2.32E-01	5.33E-01	2.74E-01	4.11E-01	2 34E-01	2.43E-01
9 24E+02	2 05E-01	5.60E-01	1.90E-01	3.36E-01	2.27E-01	3 91E-01	2.32E-01	5.34E-01	2.74E-01	4.07E-01	2 34E-01	2.44E-01
9 25E+02	2 05E-01	5.69E-01	1.90E-01	3.35E-01	2.27E-01	3 87E-01	2.32E-01	5.37E-01	2.74E-01	4.05E-01	2 34E-01	2.45E-01
9 26E+02	2 05E-01	5.73E-01	1.91E-01	3.38E-01	2.27E-01	3 84E-01	2.32E-01	5.40E-01	2.74E-01	4.04E-01	2 34E-01	2.45E-01
9 27E+02	2 05E-01	5.77E-01	1.90E-01	3.42E-01	2.27E-01	3 80E-01	2.32E-01	5.43E-01	2.74E-01	4.04E-01	2 34E-01	2.45E-01
9 28E+02	2 05E-01	5.82E-01	1.91E-01	3.45E-01	2.27E-01	3.74E-01	2.32E-01	5.46E-01	2.74E-01	4.05E-01	2 34E-01	2.45E-01
9 29E+02	2 05E-01	5.84E-01	1.90E-01	3.51E-01	2.27E-01	3.70E-01	2.32E-01	5.49E-01	2.74E-01	4.06E-01	2 34E-01	2.45E-01
9 30E+02	2 05E-01	5.83E-01	1.90E-01	3.57E-01	2.27E-01	3.67E-01	2.32E-01	5.51E-01	2.74E-01	4.08E-01	2 34E-01	2.45E-01
9 31E+02	2 05E-01	5.81E-01	1.91E-01	3.62E-01	2.27E-01	3.63E-01	2.32E-01	5.53E-01	2.74E-01	4.09E-01	2 34E-01	2.45E-01
9 32E+02	2 05E-01	5.78E-01	1.90E-01	3.67E-01	2.27E-01	3.60E-01	2.32E-01	5.55E-01	2.74E-01	4.11E-01	2 34E-01	2.44E-01
9 33E+02	2 05E-01	5.75E-01	1.90E-01	3.72E-01	2.27E-01	3 55E-01	2.32E-01	5.56E-01	2.74E-01	4.14E-01	2 34E-01	2.44E-01
9 34E+02	2 05E-01	5.69E-01	1.90E-01	3.77E-01	2.27E-01	3.49E-01	2.32E-01	5.56E-01	2.74E-01	4.16E-01	2 34E-01	2.43E-01
9 35E+02	2 05E-01	5.65E-01	1.90E-01	3.80E-01	2.27E-01	3.46E-01	2.32E-01	5.55E-01	2.74E-01	4.19E-01	2 34E-01	2.43E-01
9 36E+02	2 05E-01	5.59E-01	1.91E-01	3.83E-01	2.27E-01	3.43E-01	2.32E-01	5.52E-01	2.74E-01	4.22E-01	2 34E-01	2.43E-01
9 37E+02	2 05E-01	5.53E-01	1.91E-01	3.84E-01	2.27E-01	3.42E-01	2.32E-01	5.50E-01	2.74E-01	4.25E-01	2 34E-01	2.43E-01
9 38E+02	2 05E-01	5.47E-01	1.91E-01	3.85E-01	2.27E-01	3.43E-01	2.32E-01	5.49E-01	2.74E-01	4.28E-01	2 34E-01	2.42E-01
9 39E+02	2 05E-01	5.44E-01	1.90E-01	3.83E-01	2.27E-01	3.46E-01	2.32E-01	5.47E-01	2.74E-01	4.31E-01	2 34E-01	2.42E-01

Simulation	V01		V02		V03		V04		V05		V06	
Time (s)	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
9.40E+02	2 05E-01	5.38E-01	1.90E-01	3.83E-01	2.27E-01	3 52E-01	2.32E-01	5.43E-01	2.74E-01	4.34E-01	2 34E-01	2.42E-01
9.41E+02	2 05E-01	5.33E-01	1.90E-01	3.81E-01	2.27E-01	3 57E-01	2.32E-01	5.37E-01	2.74E-01	4.38E-01	2 34E-01	2.42E-01
9.42E+02	2 05E-01	5.28E-01	1.91E-01	3.79E-01	2.27E-01	3.62E-01	2.32E-01	5.32E-01	2.74E-01	4.41E-01	2 34E-01	2.42E-01
9.43E+02	2 05E-01	5.22E-01	1.91E-01	3.77E-01	2.27E-01	3.71E-01	2.32E-01	5.26E-01	2.74E-01	4.44E-01	2 34E-01	2.42E-01
9.44E+02	2 05E-01	5.15E-01	1.91E-01	3.75E-01	2.27E-01	3.79E-01	2.32E-01	5.20E-01	2.74E-01	4.47E-01	2 34E-01	2.42E-01
9.45E+02	2 05E-01	5.05E-01	1.90E-01	3.74E-01	2.27E-01	3 88E-01	2.32E-01	5.12E-01	2.74E-01	4.50E-01	2 34E-01	2.42E-01
9.46E+02	2 05E-01	4.95E-01	1.90E-01	3.72E-01	2.27E-01	3 96E-01	2.32E-01	5.05E-01	2.74E-01	4.52E-01	2 34E-01	2.42E-01
9.47E+02	2 05E-01	4.85E-01	1.90E-01	3.68E-01	2.27E-01	4 03E-01	2.32E-01	5.00E-01	2.74E-01	4.54E-01	2 34E-01	2.42E-01
9.48E+02	2 05E-01	4.73E-01	1.91E-01	3.65E-01	2.27E-01	4.10E-01	2.32E-01	4.94E-01	2.74E-01	4.56E-01	2 34E-01	2.42E-01
9.49E+02	2 05E-01	4.62E-01	1.90E-01	3.63E-01	2.27E-01	4.17E-01	2.32E-01	4.91E-01	2.74E-01	4.57E-01	2 34E-01	2.41E-01
9 50E+02	2 05E-01	4.53E-01	1.90E-01	3.61E-01	2.27E-01	4 23E-01	2.32E-01	4.91E-01	2.74E-01	4.58E-01	2 35E-01	2.41E-01
9 51E+02	2 05E-01	4.40E-01	1.91E-01	3.62E-01	2.27E-01	4 33E-01	2.32E-01	4.90E-01	2.74E-01	4.57E-01	2 35E-01	2.40E-01
9 52E+02	2 05E-01	4.28E-01	1.91E-01	3.59E-01	2.27E-01	4.44E-01	2.32E-01	4.89E-01	2.74E-01	4.57E-01	2 35E-01	2.39E-01
9 53E+02	2 05E-01	4.13E-01	1.91E-01	3.56E-01	2.27E-01	4 54E-01	2.32E-01	4.87E-01	2.74E-01	4.55E-01	2 35E-01	2.38E-01
9 54E+02	2 05E-01	3.99E-01	1.90E-01	3.52E-01	2.27E-01	4.62E-01	2.32E-01	4.87E-01	2.74E-01	4.53E-01	2 35E-01	2.38E-01
9 55E+02	2 05E-01	3.84E-01	1.90E-01	3.51E-01	2.27E-01	4.70E-01	2.32E-01	4.88E-01	2.74E-01	4.50E-01	2 35E-01	2.37E-01
9 56E+02	2 05E-01	3.72E-01	1.90E-01	3.48E-01	2.27E-01	4.77E-01	2.32E-01	4.89E-01	2.74E-01	4.47E-01	2 35E-01	2.36E-01
9 57E+02	2 05E-01	3.58E-01	1.91E-01	3.44E-01	2.27E-01	4 85E-01	2.32E-01	4.90E-01	2.74E-01	4.44E-01	2 35E-01	2.35E-01
9 58E+02	2 05E-01	3.47E-01	1.91E-01	3.40E-01	2.27E-01	4 92E-01	2.32E-01	4.94E-01	2.74E-01	4.41E-01	2 35E-01	2.35E-01
9 59E+02	2 05E-01	3.38E-01	1.91E-01	3.37E-01	2.27E-01	4 99E-01	2.32E-01	4.98E-01	2.74E-01	4.37E-01	2 35E-01	2.34E-01
9.60E+02	2 05E-01	3.25E-01	1.90E-01	3.35E-01	2.27E-01	5 07E-01	2.32E-01	5.02E-01	2.74E-01	4.34E-01	2 35E-01	2.35E-01
9.61E+02	2 05E-01	3.19E-01	1.91E-01	3.33E-01	2.27E-01	5.14E-01	2.32E-01	5.06E-01	2.74E-01	4.31E-01	2 35E-01	2.35E-01
9.62E+02	2 05E-01	3.14E-01	1.90E-01	3.30E-01	2.27E-01	5 22E-01	2.32E-01	5.11E-01	2.74E-01	4.28E-01	2 35E-01	2.35E-01
9.63E+02	2 05E-01	3.08E-01	1.90E-01	3.29E-01	2.27E-01	5 28E-01	2.32E-01	5.16E-01	2.74E-01	4.25E-01	2 35E-01	2.35E-01
9.64E+02	2 05E-01	3.03E-01	1.91E-01	3.28E-01	2.27E-01	5 34E-01	2.32E-01	5.22E-01	2.74E-01	4.23E-01	2 35E-01	2.35E-01
9.65E+02	2 05E-01	2.98E-01	1.91E-01	3.27E-01	2.27E-01	5.40E-01	2.32E-01	5.27E-01	2.74E-01	4.22E-01	2 35E-01	2.35E-01
9.66E+02	2 05E-01	2.95E-01	1.90E-01	3.26E-01	2.27E-01	5.46E-01	2.32E-01	5.33E-01	2.74E-01	4.23E-01	2 35E-01	2.35E-01
9.67E+02	2 05E-01	2.91E-01	1.90E-01	3.27E-01	2.27E-01	5 53E-01	2.32E-01	5.39E-01	2.74E-01	4.24E-01	2 35E-01	2.35E-01
9.68E+02	2 05E-01	2.89E-01	1.91E-01	3.27E-01	2.27E-01	5 58E-01	2.32E-01	5.44E-01	2.74E-01	4.27E-01	2 35E-01	2.35E-01
9.69E+02	2 05E-01	2.86E-01	1.91E-01	3.25E-01	2.27E-01	5.61E-01	2.32E-01	5.50E-01	2.74E-01	4.31E-01	2 35E-01	2.35E-01
9.70E+02	2 05E-01	2.84E-01	1.90E-01	3.24E-01	2.27E-01	5.66E-01	2.32E-01	5.54E-01	2.74E-01	4.36E-01	2 35E-01	2.35E-01
9.71E+02	2 05E-01	2.83E-01	1.91E-01	3.21E-01	2.27E-01	5.70E-01	2.32E-01	5.58E-01	2.74E-01	4.42E-01	2 35E-01	2.36E-01
9.72E+02	2 05E-01	2.82E-01	1.91E-01	3.16E-01	2.27E-01	5.72E-01	2.32E-01	5.62E-01	2.74E-01	4.49E-01	2 35E-01	2.36E-01
9.73E+02	2 05E-01	2.79E-01	1.91E-01	3.13E-01	2.27E-01	5.73E-01	2.32E-01	5.66E-01	2.74E-01	4.56E-01	2 35E-01	2.36E-01
9.74E+02	2 05E-01	2.78E-01	1.90E-01	3.08E-01	2.27E-01	5.74E-01	2.32E-01	5.71E-01	2.74E-01	4.63E-01	2 35E-01	2.36E-01
9.75E+02	2 05E-01	2.77E-01	1.91E-01	3.05E-01	2.27E-01	5.72E-01	2.32E-01	5.74E-01	2.74E-01	4.72E-01	2 35E-01	2.36E-01
9.76E+02	2 05E-01	2.77E-01	1.91E-01	3.01E-01	2.27E-01	5.67E-01	2.31E-01	5.75E-01	2.74E-01	4.80E-01	2 35E-01	2.36E-01
9.77E+02	2 05E-01	2.77E-01	1.91E-01	2.97E-01	2.27E-01	5.60E-01	2.31E-01	5.75E-01	2.74E-01	4.91E-01	2 35E-01	2.36E-01
9.78E+02	2 05E-01	2.77E-01	1.90E-01	2.94E-01	2.27E-01	5 53E-01	2.31E-01	5.77E-01	2.74E-01	5.01E-01	2 35E-01	2.36E-01
9.79E+02	2 05E-01	2.77E-01	1.90E-01	2.91E-01	2.27E-01	5.48E-01	2.31E-01	5.77E-01	2.74E-01	5.11E-01	2 35E-01	2.36E-01
9 80E+02	2 05E-01	2.79E-01	1.90E-01	2.88E-01	2.27E-01	5.40E-01	2.31E-01	5.77E-01	2.74E-01	5.22E-01	2 35E-01	2.35E-01
9 81E+02	2 05E-01	2.81E-01	1.91E-01	2.84E-01	2.27E-01	5 33E-01	2.31E-01	5.78E-01	2.74E-01	5.32E-01	2 35E-01	2.35E-01
9 82E+02	2 05E-01	2.85E-01	1.91E-01	2.81E-01	2.27E-01	5 22E-01	2.31E-01	5.76E-01	2.74E-01	5.41E-01	2 35E-01	2.35E-01
9 83E+02	2 05E-01	2.89E-01	1.90E-01	2.79E-01	2.27E-01	5.11E-01	2.31E-01	5.71E-01	2.74E-01	5.51E-01	2 35E-01	2.35E-01
9 84E+02	2 05E-01	2.94E-01	1.90E-01	2.78E-01	2.27E-01	4 92E-01	2.31E-01	5.66E-01	2.74E-01	5.60E-01	2 35E-01	2.35E-01
9 85E+02	2 05E-01	2.99E-01	1.90E-01	2.75E-01	2.27E-01	4 84E-01	2.31E-01	5.63E-01	2.74E-01	5.69E-01	2 35E-01	2.35E-01
9 86E+02	2 05E-01	3.06E-01	1.91E-01	2.73E-01	2.27E-01	4 87E-01	2.31E-01	5.60E-01	2.74E-01	5.76E-01	2 35E-01	2.36E-01
9 87E+02	2 05E-01	3.13E-01	1.91E-01	2.70E-01	2.27E-01	4 98E-01	2.31E-01	5.55E-01	2.74E-01	5.82E-01	2 35E-01	2.36E-01
9 88E+02	2 05E-01	3.20E-01	1.91E-01	2.67E-01	2.27E-01	5.11E-01	2.31E-01	5.51E-01	2.74E-01	5.87E-01	2 35E-01	2.36E-01
9 89E+02	2 05E-01	3.26E-01	1.90E-01	2.64E-01	2.27E-01	5 23E-01	2.31E-01	5.46E-01	2.74E-01	5.93E-01	2 35E-01	2.36E-01
9 90E+02	2 05E-01	3.33E-01	1.91E-01	2.61E-01	2.27E-01	5 37E-01	2.31E-01	5.42E-01	2.74E-01	5.97E-01	2 35E-01	2.36E-01
9 91E+02	2 05E-01	3.39E-01	1.91E-01	2.59E-01	2.27E-01	5.49E-01	2.31E-01	5.36E-01	2.74E-01	5.99E-01	2 34E-01	2.37E-01
9 92E+02	2 05E-01	3.43E-01	1.90E-01	2.55E-01	2.27E-01	5 59E-01	2.31E-01	5.30E-01	2.74E-01	6.00E-01	2 34E-01	2.37E-01
9 93E+02	2 05E-01	3.49E-01	1.91E-01	2.52E-01	2.27E-01	5.65E-01	2.31E-01	5.27E-01	2.74E-01	6.01E-01	2 34E-01	2.37E-01
9 94E+02	2 05E-01	3.55E-01	1.91E-01	2.48E-01	2.27E-01	5.69E-01	2.31E-01	5.23E-01	2.74E-01	6.00E-01	2 34E-01	2.38E-01
9 95E+02	2 05E-01	3.60E-01	1.91E-01	2.46E-01	2.27E-01	5.69E-01	2.31E-01	5.22E-01	2.74E-01	5.99E-01	2 34E-01	2.38E-01
9 96E+02	2 05E-01	3.63E-01	1.91E-01	2.43E-01	2.27E-01	5.69E-01	2.31E-01	5.20E-01	2.74E-01	5.98E-01	2 34E-01	2.39E-01
9 97E+02	2 05E-01	3.65E-01	1.90E-01	2.42E-01	2.27E-01	5.64E-01	2.31E-01	5.19E-01	2.73E-01	5.96E-01	2 34E-01	2.40E-01
9 98E+02	2 05E-01	3.67E-01	1.90E-01	2.40E-01	2.27E-01	5 59E-01	2.31E-01	5.18E-01	2.73E-01	5.92E-01	2 34E-01	2.41E-01
9 99E+02	2 05E-01	3.67E-01	1.91E-01	2.38E-01	2.27E-01	5 55E-01	2.31E-01	5.17E-01	2.73E-01	5.90E-01	2 34E-01	2.41E-01
1 00E+03	2 05E-01	3.64E-01	1.91E-01	2.36E-01	2.27E-01	5.48E-01	2.31E-01	5.16E-01	2.73E-01	5.85E-01	2 34E-01	2.42E-01
Efficiency	55%		53%		64%		48%		68%		90%	