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Eportfolio Reflective Letter
MET 330 Fall

The first and most basic equation we learned in this course is p = gamma*h, meaning pressure is equal to the specific weight of a fluid multiplied by the height the point is located. This equation alone is the steppingstone into gathering the information needed to be successful in the remainder of the course. The entire course highlighted pressures and pressure drops, with elevation being a major deciding factor in obtaining the correct outcome. We were taught early on that pressure does not change in the horizontal plane and that it remains constant if 2 points are located on the same plane with same elevations. In fluid, when an object travels deeper into the fluid away from atmospheric pressure, the gamma increases, but when the fluid travels up and towards atmospheric pressure, gamma is considered negative. Small details as such will make or break an entire project because simply going one direction or the other within the fluid will change the sign of its value from positive to negative. Early on in the semester, I made that mistake on more than one occasion, not changing the sign to negative as the object goes up, causing my entire problem to be incorrect, deducting points from assignments, so on and so forth. Attention to details is major in this field and the slightest mistake will end in major rework, which includes more time and more money being spent. After spending vigorous hours, DAILY, on the work for this course, I have seen great improvement from day 1. I am able to sit and describe to my wife in detail certain aspects of fluid mechanics, my favorite being conservation of energy and formulating the equations to obtain total energy losses in the system, which will then give me the numbers needed to obtain a specific pump that can be used in the system to override these energy losses in the system, ensuring the steadiness of the fluid throughout. Another area of this course that I feel strongly about now than I did initially, is calculating flow rate. Flow rate is the product of the velocity of a fluid and the area of ducting in which the fluid is traveling through. The flow rate equation opens a variety of advantages to us, as we can find unknown velocities or specify ducting sizes if the flow rate is already known. For example, if we have the flow rate in a system and also have the exact pipe dimensions, we could use q=va, obtain the velocity, and then that obtained velocity value could be used along with the diameter of the pipe and the viscosity of the fluid to find Reynolds Number. This continues to have a trickle effect, because knowing Reynolds as well as the D/E will give the engineer all the information needed to find the friction factor. Knowing friction factor is key to finding total energy losses in the system, because friction slows down the speed of a fluid and/or object that tries to move across it. There are so many key details needed to fall in place to obtain a major goal, but complete understanding of the equations, the system, and the topic itself will allow these projects to seem much more reasonable.

My learning is demonstrated in the group project. Tasks were distributed evenly between everyone in the group, but one of the main roles I had was task 7 which was to determine the energy losses due to friction and minor losses of each piping system. Our system consisted of 6” Schedule 40 pipe, 4 ball valves, 3 90-degree elbows, and 4 pumps. In order to fulfill this task, I first had to acknowledge each item within the system that will cause an energy loss. There was

a total of 9 energy loss factors when the calculations were complete. The first was the square edged inlet entrance loss, followed by the ball valves, elbows, and pipings (suction and discharge lines). Once I computed the K's, Le/D's and the V^2/2g's along with the friction factors, I was able to add them all together to obtain an overall total head loss. My ability to compute these numbers correctly gave us the information needed to figure out what power is needed by a pump to override these energy losses. This happens to be the area I feel the most improvement on my part has taken place. When I was first introduced to this portion, just like all the other areas in this course I was confused and intimidated, but after asking various questions to my professor, my group mates, and watching videos posted in the module folder of canvas, I was able to sharpen my skills and be an asset to my group. There is a company in Princeton, NJ I've been looking at, and their career opportunities seem to focus on piping systems and managing it to work accurately at all times. Measuring precise pressure drops throughout building ducts and piping. This course's content will be a direct intersect with that job. I am certain that if hired, they will teach me even more about the way they go about things, but with the knowledge from this course, I should be able to gradually transfer my learnings to their way of structure. As of now, I have not been able to apply what I have learned in this course to anything else outside of this class. My job now I am a F/A-18 Mechanic, so I basically turn wrenches and troubleshoot flight issues, but once I receive my degree and apply to jobs in this field, I have no doubt I will be utilizing these concepts on a near daily basis. I am scheduled to graduate this fall. After a short time of recuperating and spending some time with family, I will begin my career search, and at that time I truly believe I will land at a spot in which I will need to apply this content. As stated earlier, I have looked into a potential job which focuses on fluid mechanics, and it could be as soon as spring that I am in full effect of utilizing this content. If I was starting this class again, my only advice would be to work on the eportfolio from the beginning of the semester til the end, in order to receive more points towards my grade. Other than that, with this being my 2nd time taking this class, I can assure you that I spent countless hours on the work and attended each and every class faithfully. Due to the fact that I still struggled, only difference I would make is having this be the ONLY course I am taking during the semester. Juggling 2 other courses on top of this has been very difficult since this course requires so much of my time. I am also a full-time employee working 40+ hours a week, so my time and focus is stretched pretty thin, but I have no doubt that I left it all on the table this semester and although my grade isn't the greatest, I personally feel proud of how far I have come since when I first took this course in Summer 22.

After taking this course, I have improved as an engineer by getting a better grasp of what seems to be common knowledge amongst all fluid mechanics in areas such as buoyancy, water hammer, and cavitation. Understanding how an object being submerged into water by an external force suddenly having an upward thrust and shooting out of the water because the weight of the object is less than that of water. Examples like that are things most of us have done all our lives as a kid enjoying toys in the swimming pool, not realizing that we are creating buoyant forces. We spent time learning how to understand the concept of buoyancy and how to make calculations to determine the net forces exerted on objects immersed in fluids, or the position of objects as it floats. Typically, when a body is floating freely, that means it displaces a sufficient volume of fluid to simply balance its own weight. We calculate these forces by using

the equation Fb(buoyant force) = specific weight of fluid * Vd(Displaced volume of fluid). Water hammer is the result of a valve suddenly closing, making the fluid, which is supposed to have constant flow, stop automatically. The sudden stoppage could potentially cause serious damage to pipelines, gaskets, flowmeters, and pressure gauges. There are ways to prevent these catastrophes from happening by simply using equations and putting things in place to prepare for the worst. As we turn a water faucet on, water is constantly flowing from the pipes and into the sink, but the moment we turn the water off, the valve closes and water hammer does occur, but good engineers will create the system with that in mind to create a safe and damage free system. My biggest accomplishment in this course was completing my tasks for the project. Although I struggled on the independent aspects of the course, I made it my duty to not have my group mates come up short due to my own struggles. I was able to complete each one of my tasks in the project accurately, with minor help from my team and many hours studying to perfect these tasks over studying for the tests as often as I should've, I am pleased to say that I assisted in the success of our project. I feel my strengths are following the steps of the problem slowly and steadily and gathering all the information needed from tables in the book, notes, and calculated data. My weaknesses are knowing which direction to start solving the problem in the beginning. Majority of my short comings in this class came from me starting the problem in the wrong direction, while carrying out those wrong steps properly. If I am pointed in the right direction of a problem, I have full confidence that I can follow the steps, equations, and format and obtain a favorable response. For example, in test 3, I chose to work on problem 2 for grading. I wrote my purpose, had my drawings, and included my sources, while writing out all given data and variables. I also made sure to convert all units to match throughout the problem, which is a mistake I made early on in the semester on more than one occasion. I used the correct equations, and correctly worked those equations from start to finish, but my issue was that I did not have equations for energy losses of branch flow rates AND total flow rates. Had I incorporated both rather than just the branch flow rates, I would have been on the correct path. The numbers and values I did come up with were worked properly, but the original set up was incorrect, causing my performance on this specific test to be subpar. To me, I feel this shows I understand how to work with formulas and locate in the book specific variables that are given, I just need to better direct my focus initially. Before taking this course, I felt it would be extremely difficult and doubted my ability to obtain the knowledge within it. Now, I still feel the course was very difficult, but now as I look through notes and old HW assignments and Tests, I can pinpoint certain areas in which mistakes were made and feel more confident and comfortable carrying out problems in the correct format. I have come to this newfound realization because of the work I put in and the determination I have had all semester to excel in this course and pass it for my 2nd time coming.