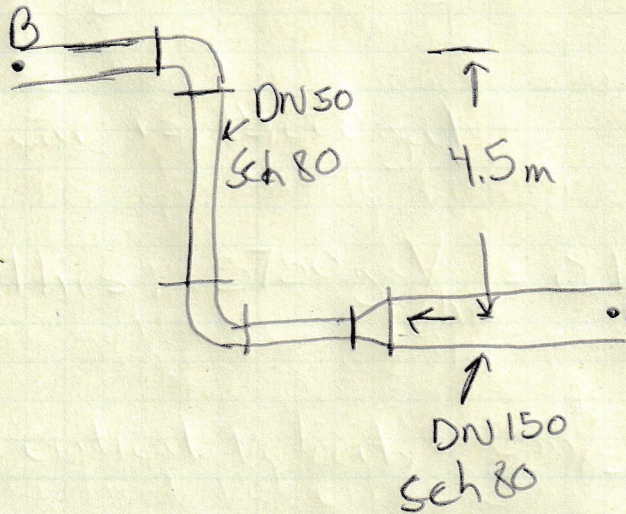


5.



$$\text{Oil } \gamma = 8.80 \text{ kN/m}^3$$

$$\text{Oil Kinematic Viscosity} = 2.12 \times 10^{-5} \text{ m}^2/\text{s}$$

$$L_{DN 50} = 180 \text{ m}$$

$$L_{DN 150} = 8 \text{ m}$$

$$Q = 0.015 \text{ m}^3/\text{s}$$

$$P_B = 12.5 \text{ MPa} = 12,500 \text{ kN/m}^2$$

$$D_A = 146.3 \text{ mm}$$

$$A_A = 1.682 \times 10^{-2} \text{ m}^2$$

$$D_B = 49.3 \text{ mm}$$

$$A_B = 1.905 \times 10^{-3} \text{ m}^2$$

$$\frac{P_A}{\gamma} + \frac{V_A^2}{2g} + Z_A = \frac{P_B}{\gamma} + \frac{V_B^2}{2g} + Z_B + h_L$$

$$P_A = \gamma \left[\frac{V_B^2 - V_A^2}{2g} + Z_B + h_L + \frac{P_B}{\gamma} \right]$$

$$P_A = 8.80 \text{ kN/m}^3 \left[\frac{7.874^2 - 0.8918^2}{2(9.81) \text{ m/s}^2} + 4.5 \text{ m} + 19.74 \text{ m} \right]$$

$$V_A = Q/A_A = \frac{0.015 \text{ m}^3/\text{s}}{1.682 \times 10^{-2} \text{ m}^2}$$

$$V_A = 0.8918 \text{ m/s}$$

$$\frac{12,500 \text{ kN/m}^2}{8.80 \text{ kN/m}^3} V_B = Q/A_B = \frac{0.015 \text{ m}^3/\text{s}}{1.905 \times 10^{-3} \text{ m}^2}$$

$$V_B = 7.874 \text{ m/s}$$

$$P_A = 12,740.6 \text{ kN/m}^2$$

$$P_A = 12.7 \text{ MPa}$$

5. cont.

$$h_{L \text{ pipe } A} = f \cdot \frac{L_A}{D_A} \cdot \frac{V_A^2}{2g}$$

$$= .036 \left(\frac{180 \text{ m}}{.1463} \right) \cdot \frac{.8918 \text{ m/s}^2}{2(9.81 \text{ m/s}^2)}$$

$$h_{L \text{ pipe } A} = 1.795 \text{ m}$$

$$Re_A = \frac{V_A D_A}{\nu}$$

$$= \frac{(.8918 \text{ m/s})(.1463 \text{ m})}{2.12 \times 10^{-5} \text{ m}^2/\text{s}}$$

$$Re_A = 6154.26$$

$$h_{L \text{ pipe } B} = .028 \left(\frac{8 \text{ m}}{.0493 \text{ m}} \right) \cdot \frac{7.874 \text{ m/s}^2}{2(9.81 \text{ m/s}^2)}$$

$$h_{L \text{ pipe } B} = 14.358 \text{ m}$$

$$\frac{D_A}{\epsilon} = \frac{.1463 \text{ m}}{4.6 \times 10^{-5} \text{ m}} = 3180.43$$

$$f_A = .036$$

$$f_{TA} = .019$$

$$h_{L \text{ elbows}} = 2 \left(20(.019) \right) \left(\frac{7.874 \text{ m/s}^2}{2(9.81 \text{ m/s}^2)} \right)$$

$$h_{L \text{ elbows}} = 2.402 \text{ m}$$

$$Re_B = \frac{V_B D_B}{\nu}$$

$$= \frac{(7.874 \text{ m/s})(.0493 \text{ m})}{2.12 \times 10^{-5} \text{ m}^2/\text{s}}$$

$$Re_B = 18,310.76$$

$$h_{L \text{ sc}} = K \left(\frac{V_m^2}{2g} \right) \quad K \approx .37$$

$$= .37 \left(\frac{7.874 \text{ m/s}^2}{2(9.81 \text{ m/s}^2)} \right)$$

$$h_{L \text{ sc}} = 1.169 \text{ m}$$

$$\frac{D_B}{\epsilon} = \frac{.0493 \text{ m}}{4.6 \times 10^{-5} \text{ m}} = 1071.74$$

$$f_B = .028$$

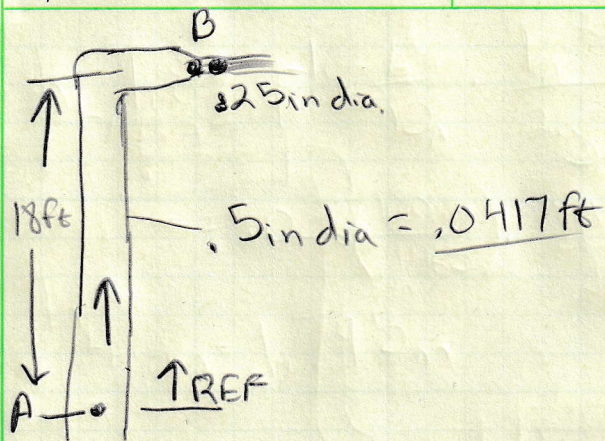
$$f_{TB} = .015$$

$$h_L = 1.795 \text{ m} + 14.358 \text{ m} + 2.402 \text{ m} + 1.169 \text{ m}$$

$$h_L = 19.724 \text{ m}$$

Method II-A

13.



$$K = 0.15 \quad \gamma = 62.4 \text{ lb/ft}^3$$

Water @ 100°F

$$A = \frac{\pi D^2}{4} = \frac{\pi (.0417 \text{ ft})^2}{4}$$

$$A = 0.00136 \text{ ft}^2$$

$V =$

- a) 20 psig
2880 lb/ft²
- b) 80 psig
11,520 lb/ft²

Eg 11-3

$$Q = -2.22 D^2 \sqrt{\frac{g D h_L}{L}} \log \left(\frac{1}{3.7 \frac{D}{\epsilon}} + \frac{1.784 \nu}{D \sqrt{g D h_L / L}} \right)$$

$$\frac{P_A}{\gamma} + \frac{V_A^2}{2g} + Z_A = \frac{P_B}{\gamma} + \frac{V_B^2}{2g} + Z_B + h_L$$

$$\frac{D}{\epsilon} = \frac{.0417 \text{ ft}}{5 \times 10^{-6} \text{ ft}}$$

$$\frac{D}{\epsilon} = 8340$$

$$h_{L_a} = \frac{P_A}{\gamma} + Z_m$$

$$= \frac{2880 \text{ lb/ft}^2}{62.4 \text{ lb/ft}^3} - 18 \text{ ft}$$

$$h_{L_a} = 28.154 \text{ ft}$$

$$Q_a = -2.22(.0417^2) \sqrt{\frac{(32.2)(.0417)(28.154)}{20}} \log \left(\frac{1}{3.7(8340)} + \frac{(1.784)(8.23 \times 10^{-8})}{(.0417) \sqrt{\frac{(32.2)(.0417)(28.154)}{20}}} \right)$$

$$Q_a = 0.01879 \text{ ft}^3/\text{s}$$

$$V_a = \frac{0.01879}{.00136} = \boxed{13.81 \text{ ft/s}}$$

$$h_{L_b} = \frac{P_A}{f} - Z_B$$

$$= \frac{11,520}{62.4} - 18$$

$$h_{L_b} = 166.615 \text{ ft}$$

$$Q_b = -2.22(.0417^2) \sqrt{\frac{(32.2)(.0417)(166.615)}{20}} \log \left(\frac{1}{3.7(8340)} + \frac{(1.784)(8.23 \times 10^{-8})}{(.0417) \sqrt{\frac{(32.2)(.0417)(166.615)}{20}}} \right)$$

$$Q_b = .051356$$

$$V_b = \frac{.051356}{.00136} = \boxed{37.76 \text{ ft/s}}$$

I know this isn't right but wanted to work through something different

CONSENT FORM OLD DOMINION UNIVERSITY

PROJECT TITLE: A Service-Learning Partnership to Enhance Engineering Education for Undergraduate Students

INTRODUCTION

The purposes of this form are to give you information that may affect your decision whether to say YES or NO to participation in this research, and to record the consent of those who say YES. This project will be conducted during your class (MAE 111, MAE 340, MET 330, TLED 301, TLED 430, or TLED 434). This research will be based on required class assignments.

RESEARCHERS

Responsible Project Investigator: Stacie I Ringleb, PhD, Mechanical and Aerospace Engineering

Co-Investigators: Orlando Ayala, Ph.D., Mechanical Engineering Technology

Kristie Gutierrez, Ph.D., Teaching and Learning

Krishnanand Kaipa, Ph.D., Mechanical and Aerospace Engineering

Jennifer Kidd, Ph.D., Teaching and Learning

Pilar Pazos, Ph.D., Engineering Management and Systems Engineering

DESCRIPTION OF RESEARCH STUDY

The purpose of this study is to understand how collaborations between engineering and education students improves the engineering knowledge of both groups of students, and how it affects their collaboration and communication skills. You may be taking a class where the collaboration is taking place and you may be taking a class without the collaboration.

If you decide to participate, some of your required class assignments will be analyzed to help the researchers. All participants will be completing some surveys and answering sample standardized test questions, which will be assessed in this research study. If you are taking a class with the collaboration with engineering and education students, all assignments required for the collaboration will also be evaluated for this project. Additionally, if you are taking MAE 111, we will collect what major you declare at ODU. If you say YES, then your participation will last for the duration of this course, and only required assignments will be used in the study. Additionally, if you sign a photo/video release, pictures and/or videos taken during this class may be used for presentations. Approximately 2000 of engineering, engineering technology, and education will be participating in this study.

EXCLUSIONARY CRITERIA

If you are not enrolled in MAE 111, MAE 340, MET 330, TLED 301, TLED 430, or TLED 434, you may not participate in this study.

RISKS AND BENEFITS

RISKS: If you decide to participate in this study, there is a risk of release of confidential information. In order to minimize this risk, your name will be replaced on your assignments with an identifier. A password protected spreadsheet will be maintained to minimize the risk of release of confidential information, and your consent forms will be kept in a locked cabinet.

BENEFITS: There are no direct benefits to participating in this study.

COSTS AND PAYMENTS

The researchers are unable to give you any payment for participating in this study.

NEW INFORMATION

If the researchers find new information during this study that would reasonably change your decision about participating, then they will give it to you.

CONFIDENTIALITY

Your name will be removed from any class assignments and replaced with a unique identifier. A password protected spreadsheet will be used to link the identifier to your name. Only investigators on this study will have access to that spreadsheet. The results of this study may be used in reports, presentations, and publications. However, your name won't appear directly in any report, presentation, or publication.

WITHDRAWAL PRIVILEGE

It is OK for you to say NO. Even if you say YES now, you are free to say NO later, and walk away or withdraw from the study -- at any time. Your decision will not affect your relationship with Old Dominion University or affect your grade in this class.

VOLUNTARY CONSENT

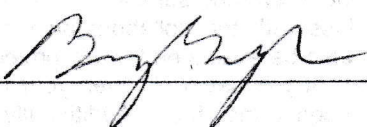
By signing this form, you are saying several things. You are saying that you have read this form or have had it read to you, that you are satisfied that you understand this form, the research study, and its risks and benefits. The researchers should have answered any questions you may have had about the research. If you have any questions later on, then the researchers should be able to answer them: Dr. Stacie Ringleb at 757-683-5934 or sringleb@odu.edu. If at any time you feel pressured to participate, or if you have any questions about your rights or this form, then you should call Dr. Tancy Vandecar-Burdin, the current IRB chair, at 757-683-3802, or the Old Dominion University Office of Research, at 757-683-3460.

Please select one of the options below. By selecting yes, you are telling the researcher YES, that you agree to participate in this study.

X yes, I would like my class assignments to be used in this research study.

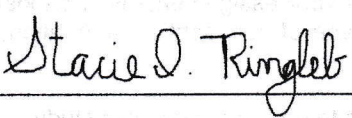
_____ no, I would not like my class assignments to be used in the research study.

Please print and sign your name below, so the researchers know who to include or exclude in the study.

Bryant Teagle Subject's Printed Name & Signature		9-23-18 Date
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INVESTIGATOR'S STATEMENT

I certify that I have explained to this subject the nature and purpose of this research, including benefits, risks, costs, and any experimental procedures. I have described the rights and protections afforded to human subjects and have done nothing to pressure, coerce, or falsely entice this subject into participating. I am aware of my obligations under state and federal laws, and promise compliance. I have answered the subject's questions and have encouraged him/her to ask additional questions at any time during the course of this study. I have witnessed the above signature(s) on this consent form.

Stacie I Ringleb Investigator's Printed Name & Signature		9/20/18 Date
---	--	-----------------

BRYANT TEAGLE <gteag001@odu.edu>
to SFringleb

...

Thank You,

George "Bryant" Teagle
UIN:00763293



OLD DOMINION
UNIVERSITY
IDEA FUSION

 Consent Form
Teagle.pdf
1.5 MB

