Thomas K Fagerholm

Technical Director, Drafter, and Production Manager
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Teaching Portfolio

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Table of Contents:

Thomas K Fagerholm

Teaching Philosophy

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Theater is a collaborative artform employing a diverse group of artists and artisans to create the world of a play. Early in the process, before rehearsals with actors begin, the director guides a team of designers towards a unified vision for the production, from costume, projection, scenery, to lighting and sound. As engineer and master artisan, the technical director (TD) collaborates with the scenic designer to help shape and realize their artistic vision by providing labor and material estimates, as well as solutions to design challenges. The ephemeral nature of live entertainment and theater designs often present unique engineering, structural, mechanical, and other challenges beyond typical residential/commercial construction that require the TD to be an active researcher, engineer, and innovator to provide solutions. Once the design process moves into production, the TD steps into a role similar to a general contractor: the TD creates construction drawings, build schedules, and manages the implementation of the scenic elements to realize the design. Additionally, the TD must have a broad knowledge of construction techniques and materials to achieve an artistic aesthetic within the constraints of time and money.

In my technical direction and advanced design courses we discuss the characteristics that make good technical directors and managers: critical thinking, interpretation, creativity, communication professionalism, and a desire to learn. I believe education in technical theater begins with a base knowledge of the craft but flourishes with the ability of the student to extrapolate and understand abstract concepts. I feel that this is not only a vital part of an individual's intellectual development but also crucial to the future of theater and entertainment. The duties and responsibilities of a technical director are often dependent on the organization they serve, the staffing and technical needs, equipment available, and resources at hand, both material and financial. My classes include references to many different fields of study to cultivate a broader understanding of our craft and to prepare technical directors for the wide variety of responsibilities they may face. Using a variety of kinesthetic, visual, reading, and auditory activities, I strive in my teaching to emphasize the aforementioned characteristics and a balance of the areas of the discipline. To illustrate these ideas, I will speak to three principal areas of learning for the technical director: artistic, scholarly, and technical.

Artistic: It can be easy in theater to look past the artistry of a technical director, seeing them only as a facilitator or manager. While the paradigms for technical design can be very strict, there is artistry in the collaboration, selection, manipulation, and implementation of technical designs. Costing materials and bidding labor are a creative endeavor in finding the appropriate balance to bringing the designer's vision to fruition. Having an artistic awareness and sensitivity allows the technical director to speak intelligently when collaborating with other design areas. Even better for the technical direction student is to have varied experience in the design areas (scenery, costumes, lighting, etc.). Not only does this help them communicate and collaborate with peers, but also prepares them for the variety of technical direction positions that often include design responsibilities in one design area or another. For this, I encourage our students to take other design courses and to take advantage of production design opportunities.

Technical directors are often presented with production challenges that impact their ability to realize a designer's vision. It is critical for the technical director to utilize their creativity and keep an artistic eye when looking for solutions to these scenarios. Experience in the other design areas of theater such as drawing and rendering, lighting design, sound design, and areas not directly related to theater help the

Back to CONTENTS

technical director think outside the box and come up with innovative solutions while preserving the designer's intent. I encourage our undergrads and graduates to take our other design courses in lighting, costumes, scenic, props, and sound while also seeking electives outside the school in communication, art, design, or engineering to name a few.

The artistic and design courses I instruct provide students with applied theory and hands-on projects with a focus on critical thinking, building confidence, creativity, and constructive criticism. To help build these skills I combine class projects and presentations with role-playing activities followed by feedback from the students and/or me. My favorite questions to ask students are: "What worked?" and "What are areas for improvement?" In developing these soft skills, there is no better training than practice. Students further develop these skills through realized projects on School of Theater and Dance (SoTD) productions. In this manner, they not only receive feedback from their peers and me, but other faculty and guest artists.

I believe it is important for the technical director to be an active participant in the design process. Using their experiences from class projects and other design areas, I encourage student technical directors to share their artistic inspirations and ideas related to the script during early design meetings. When production challenges arise, I let students make their own design and technical decisions and learn from their successes and failures. I make sure to give critiques and offer resources for information throughout the process and only step in with solutions when necessary to prevent detrimental production changes. There is much to learn for the technical director through experimentation, successes, and failures as they often lead to elegant or innovative solutions outside the box.

Scholarly: The scholarly side of technical direction is just as important as design as it often informs decisions regarding design implementation. I feel it is extremely important that our student technical directors be actively involved in presentation and research to the field in addition to production research. There are very few texts related directly to technical direction; therefore, it is important for the next generation of technical directors to share their work and experiences. My technical direction and advanced design courses offer numerous opportunities for research and technical writing. This often culminates in student submissions to technical expos, journal publications, and workshop presentations at national conferences.

Technical research is perhaps the most important to the work of a technical director. This research typically stems from production needs or challenges that the technical director must solve. While a solid background and education in technology helps provide some quick solutions, it more often guides the technical director on where to look for potential solutions. Since each production in theater is unique, design solutions must often be researched and engineered to meet the specific needs. In each of my classes I search for opportunities to share new innovations in stage technology, books, technical briefs, product releases, and encourage them to do the same. It is important for a successful technical director to keep a finger on the pulse of current technical trends in theater, entertainment, and beyond.

One of my favorite courses to teach is Advanced Theater Design and Production. This affords the graduate students and me the opportunity to research and explore topics ranging from conventional and non-traditional material sciences to automation in theater. Each semester I make an effort to balance written and oral assignments with hands-on activities and field research. This course also serves as a sounding board for our student technical directors to bounce ideas off their peers for technical and design challenges that arise through School of Theater and Dance production assignments. This is another way I help the students solve challenges before they become problems.

Teaching Philosophy

While technical research is the primary concern of the technical director, so must research into the social-political-economic-religious ideas of the setting of the play as it informs the technical director on design decisions. Scholarly research also allows the technical director to write and speak intelligently on these matters when communicating with the rest of the design and production team. This is important for the TD to be an equal at the design table in offering solutions to challenges in design, budget, and other production matters.

Technical: The role of the technical director can vary widely from job to job. Because of this, it is important to not only impart information regarding the implementation of scenic designs, but also delve into other theatrical design and technology areas such as lighting, projection, special effects, graphic design, and more. Additionally, the maker movement has introduced affordable and accessible computer prototyping technology that were once beyond the grasp of many smaller theater companies and programs. The maker movement is a technology-based culture of do-it-yourselfers, individually or peer-led, inventors and creators. I encourage my students to take courses or conduct research in these areas as they will help them think critically and creatively when interpreting designs to determine solutions and construction techniques.

I teach a variety of skills, including but not limited to: entertainment automation, rigging, computer numerical controlled technology, digital fabrication, health and safety for theater, micro-controller programming and prototyping, structural design for the stage, advanced carpentry, metal fabrication and welding, sound technology, tool maintenance and repair, construction materials, technical drafting, three-dimensional modeling, fluid power, mechanical design, physics for theater, and advanced Excel. In teaching each of these skills I demonstrate proper tools and techniques while also discussing applications for which they might be utilized. Once skills have been demonstrated, hands-on projects, exercises, or realized production applications are assigned to develop these skills while I observe and give constructive feedback. I also encourage students to self-evaluate by asking what worked well and what are areas for improvement during project presentations. One of the few texts on technical direction is titled The Technical Director's ToolKit. Not only do I use this text in coursework, but it serves as a good idiom for the importance of these skills to a technical director: the more you know how to use, the better you can choose the correct one for the job at hand.

In each of my classes I emphasize those characteristics which make successful students in technical theater: critical thinking, interpretation, creativity, communication, professionalism, and a desire to learn. At every opportunity possible, I share my passion for the art, research, and craft while simultaneously challenging my students to find what motivates them about theater and technical direction. I find that challenging students with class and production projects helps push them outside the box to think creatively while simultaneously encouraging them to think about balancing the areas of technical direction: artistic, scholarly, and technical. Because so much of theater and art is subject to interpretation, it is important for students of theater to understand constructive feedback and how to apply and give it in a professional manner. My class and production projects involve critiques not only from me, but from also the class, to help the student understand what worked well and what are areas in which they can improve for next time. I take pride in mentoring students, both academically and artistically. I am inspired by the aspirations of my students and colleagues and take great delight in their discoveries, successes, creations, and ideas.

Back to CONTENTS

Thomas K Fagerholm
Research and Creative Activity Statement

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[11]We are artistic individuals, large-scale sculptors of environments, but our endeavors are grounded in a pragmatic knowledge of material sciences, tried and true construction methodologies, organized behaviors, and physics.[11] - Zachary Stribling & Richard Girtain, *The Technical Director's Toolkit*.

Theater is a collaborative artform employing a diverse group of artists and artisans to create the world of a play. The director guides a team of designers towards a unified vision of all areas of the production, from costume, lighting, projection, scenery, to sound. As engineer and master artisan, the technical director collaborates with the scenic designer to help shape their artistic vision by utilizing a variety of tools and expertise to ultimately realize that artistic vision. Technical direction is also a service position and will be addressed as such in the relevant section of this dossier. The technical director collaborates with the scenic designer by providing bid estimates for the cost of labor and materials to construct the scenic design, as well as solutions to design challenges. Designs often present unique engineering, structural, mechanical, or other challenges that require the technical director to be an active researcher, engineer, and innovator to provide solutions. Not only does the technical director contribute to research through creative activity, but often that creative activity leads to more traditional research to the field as resources specific to technical direction are limited (See CV and Research/Creative Activity chart for list of creative activity, presentations, and publication). It is important for a technical director to share both their creative work and more traditional research through presentations or publications to the field. This sharing helps broaden the knowledge repository available for future technical directors from which to draw. Additionally, as a technical director, I must have a broad knowledge of construction techniques and materials to achieve an artistic aesthetic within constraints of time and money.

Before a technical director (TD) can contribute or give feedback to the design team, the TD must be informed. For me, that process begins with a thorough analysis of the script, first reading it for fun and to be influenced by the emotional content, as J. Michael Gillette, noted theater author and educator, suggests in *Theatrical Design and Production*. Further readings are necessary to scrutinize for content, structure of the play, and technical information. What are the settings? Do they change and if so, how and when? How might this impact movement and flow of scenic units, cast, and crew? What special effects might be needed? Understanding the script and where dramatic or comedic emphasis may be placed, impact requirements in the physical structure of the set, such as door slams, sliding down banisters, dancing on a second story set, and more. Script analysis leads to efficient and informed communication and collaboration with the design team. Furthermore, it can lead to design challenges that excite the imagination and curiosity for learning something new. As technical director, I often ask "How can I help tell the story, support the design, and yet not stand in the way of artistic intent?" Understanding the text enables the technical director to determine, in consultation with the designer, the best allocation of time and money for the design.

The next step in the creative process for the technical director is to give feedback to the scenic designer and director regarding design ideas and potential technical challenges. This may include providing feedback on such things as construction methods, desired materials, and usage and movement of scenery to realize the design intent. Is the idea feasible as presented or how else might we be able to achieve it? A well-researched and detailed bid analysis of materials and labor allows the technical director to have an informed conversation with the designer and director on construction methods, materials, and where money or labor is being spent. I believe the more detailed the analysis is, the more

Back to CONTENTS

stress it relieves from the conversation and collaboration between the director and design team to create a production within a projected (feasible) budget.

For the technical director to give an accurate and detailed bid analysis, they must also be a master artisan; understanding how scenery is engineered, fabricated, and constructed. Expertise in areas such as carpentry, joinery, welding, rigging, and metal fabrication allow the technical director to come up with solutions quickly and communicate them to their team. In many ways, a technical director needs to be a jack of all trades. I find that a background in more traditional trades such as tool maintenance and repair, automobile mechanics, machine design, and industrial automation is also valuable. While the technical director may not always be the master carpenter building the show, they must fully understand the practices, tools, and methods in order to communicate to their team of carpenters and artisans how realize a design. When design challenges arise that cannot be solved using traditional theatrical practices, the technical director must become an active researcher, finding solutions outside the discipline that might offer a solution. This may require information from other industries or art forms from industrial automation to construction management. For the TD, there are many fields and bodies of knowledge from which to draw, you can never 'know' it all, it is better to 'know' how to research each challenge as it is presented: who you can ask or where to look for the information you need.

As technical direction is inextricably linked to scenic design, communication is incredibly important. Additionally, the technical director often serves as a manager, therefore, skills in interpersonal communication and conflict resolution are critical for effective execution of designs. With a background in creative drama and education, I believe it is important for the technical director to be an effective written and oral communicator. Beyond collaborating with the director and scenic designer, the technical director must communicate and collaborate with their carpenters and artisans. Detailed technical and construction drafting packages are key. Drafting is only as good as the notation and specificity of the drawing itself. Details are important, as specific as to what type of screws or glue to use. Build schedules, calendars, and other project management tools allow for collaboration with other departments such as lighting, sound, properties, and paints. Perhaps the greatest test of our collaboration and communication is what we see on stage. Does it stand up? Will it work? How does it look? Did we meet the designer's vision? These are all questions I find useful in evaluating my work.

Theater often presents engineering, structural, mechanical, special effects, or other challenges that require the technical director to be an active researcher and innovator to create solutions. I feel it is important for a technical director to share both their creative work and more traditional research through presentations at conferences or publications to the field. This allows for greater resources of information for other technical directors. I think it is also important for the academic technical director to work professionally when possible. This has benefits three-fold. One, it keeps a TD abreast of current and coming trends in technical design, production, and fabrication. It then allows faculty to share their experiences with their students, thus strengthening academic programing. Further, it brings prestige to the university and more opportunities to place students within the industry.

One growing area of technical production is of specific interest to me, that is entertainment automation. In the past twenty years this area has been growing rapidly and is becoming more accessible financially to smaller professional theaters and academic institutions. It is important to not only teach to the skills required to integrate and operate automated systems, but to also look at new and affordable ways to access and integrate automated systems into theatrical designs and production.

Research and Creative Activity Statement

While research is partially inherent to the creative work of a technical director, it is equally important. It informs communication, eases collaboration, provides solutions to challenges, can enhance the discipline, and strengthens academic programs. The technical director must be flexible and versatile, finding creative solutions for technical or design challenges. There are often adjustments that must be made to meet deadlines and budgets, being a good communicator and collaborator makes that easier. I work with my students to develop their skills in each of these areas: research, analysis, communication, collaboration, and artisanship. Finding new solutions to old challenges can be exciting and it breathes new life into an ancient art form.

Back to CONTENTS

Thomas K Fagerholm
Summary of Courses Taught

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Fall 2014

- THEA 300 Theater Practicum — 1 credit
- THEA 401A&B Stage Management & Lab — 3 credits
- THEA 419 Technical Direction — 3 credits
- THEA 510 Production Design Seminar — 1 credit, team taught
- THEA 516 Advanced Design and Production — 2 credits, team taught
- Technical Direction & Sound Design *Curtains*
- Sound Design *Dr. Jekyll and Mr. Hyde*

Spring 2015

- THEA 218A Stagecraft Scenery — 3 credits
- THEA 300 Theater Practicum — 1 credit
- THEA 416 Structural Design for the Stage — 3 credits, co-taught
- THEA 510 Production Design Seminar — 1 credit, team taught
- THEA 516 Advanced Design and Production — 2 credits, team taught
- Technical Direction *Last Seen Alice*

Fall 2015

- THEA 218A Stagecraft Scenery — 3 credits
- THEA 300 Theater Practicum — 1 credit
- THEA 401A&B Stage Management & Lab — 3 credits
- THEA 413 Drafting for Theater — 3 credits, co-taught
- THEA 419 Technical Direction — 3 credits
- THEA 510 Production Design Seminar — 1 credit, team taught
- THEA 516 Advanced Design and Production — 2 credits, team taught
- Technical Direction *The Addams Family*

Spring 2016

- THEA 218A Stagecraft Scenery — 3 credits
- THEA 300 Theater Practicum — 1 credit
- THEA 450 Special Topics-Metal Fabrication — 3 credits
- THEA 510 Production Design Seminar — 1 credit, team taught
- THEA 516 Advanced Design and Production — 2 credits, team taught
- Technical Direction *Tartuffe*

Fall 2016

- THEA 300 Theater Practicum — 1 credit
- THEA 413 Drafting for Theater — 3 credits, co-taught
- THEA 416A Structural Design for the Stage 1 — 3 credits, co-taught
- THEA 419 Technical Direction — 3 credits
- THEA 510 Production Design Seminar — 1 credit, team taught
- THEA 516 Advanced Design and Production — 2 credits, team taught

Back to CONTENTS

Summary of Courses Taught

- Technical Direction *Vigils*
- Technical Direction *Children of Eden*

Spring 2017

- THEA 300 Theater Practicum 1 credit
- THEA 416B Structural Design for the Stage 2 3 credits, co-taught
- THEA 450 Special Topics-Sound Design 3 credits
- THEA 510 Production Design Seminar 1 credit, team taught
- THEA 516 Advanced Design and Production 2 credits, team taught
- Technical Direction *A Nightingale for Dr. Du Bois*

Fall 2017

- THEA 300 Theater Practicum 1 credit
- THEA 413 Drafting for Theater 3 credits, co-taught
- THEA 419 Technical Direction 3 credits
- THEA 510 Production Design Seminar 1 credit, team taught
- THEA 516 Advanced Design and Production 2 credits, team taught
- Technical Direction *Boy Gets Girl*

Spring 2018

- THEA 300 Theater Practicum 1 credit
- THEA 425 Metal Fabrication 3 credits
- THEA 510 Production Design Seminar 1 credit, team taught
- THEA 516 Advanced Design and Production 2 credits, team taught

Fall 2018

- THEA 300 Theater Practicum 1 credit
- THEA 401A&B Stage Management & Lab 3 credits
- THEA 413 Drafting for Theater 3 credits, co-taught
- THEA 416A Structural Design for the Stage 1 3 credits, co-taught
- THEA 510 Production Design Seminar 1 credit, team taught
- THEA 516 Advanced Design and Production 2 credits, team taught

Spring 2019

- THEA 300 Theater Practicum 1 credit
- THEA 416B Structural Design for the Stage 2 3 credits, co-taught
- THEA 450 Special Topics-Sound Design 3 credits
- THEA 510 Production Design Seminar 1 credit, team taught
- THEA 516 Advanced Design and Production 2 credits, team taught

Summary of Courses Taught

Fall 2019

- THEA 300 Theater Practicum — 1 credit
- THEA 413 Drafting for Theater — 3 credits, co-taught
- THEA 419 Technical Direction — 3 credits
- THEA 510 Production Design Seminar — 1 credit, team taught
- THEA 516 Advanced Design and Production — 2 credits, team taught

Spring 2020

- THEA 300 Theater Practicum — 1 credit
- THEA 425 Metal Fabrication — 3 credits
- THEA 510 Production Design Seminar — 1 credit, team taught
- THEA 516 Advanced Design and Production — 2 credits, team taught

Fall 2020

- THEA 300 Theater Practicum — 1 credit
- THEA 413 Drafting for Theater — 3 credits, co-taught
- THEA 416A Structural Design for the Stage 1 — 3 credits, co-taught
- THEA 419 Technical Direction — 3 credits
- THEA 510 Production Design Seminar — 1 credit, team taught
- THEA 516 Advanced Design and Production — 2 credits, team taught

Spring 2021

- THEA 300 Theater Practicum — 1 credit
- THEA 416B Structural Design for the Stage 2 — 3 credits, co-taught
- THEA 450 Special Topics-Entertainment Automation — 3 credits
- THEA 510 Production Design Seminar — 1 credit, team taught
- THEA 516 Advanced Design and Production — 2 credits, team taught

Fall 2021

- ON DELAYED SABBATICAL

Spring 2022

- THEA 300 Theater Practicum — 1 credit
- THEA 425 Metal Fabrication — 3 credits
- THEA 510 Production Design Seminar — 1 credit, team taught
- THEA 516 Advanced Design and Production — 2 credits, team taught

Summary of Courses Taught

Fall 2022

- THEA 300 Theater Practicum — 1 credit
- THEA 400 Theater Production — 2 credits
- THEA 413 Drafting for Theater — 3 credits, co-taught
- THEA 416A Structural Design for the Stage 1 — 3 credits *(no longer co-taught)*
- THEA 419 Technical Direction — 3 credits
- THEA 510 Production Design Seminar — 1 credit, team taught
- THEA 516 Advanced Design and Production — 2 credits, team taught

Spring 2023

- THEA 300 Theater Practicum — 1 credit
- THEA 400 Theater Production — 2 credits
- THEA 416B Structural Design for the Stage 2 — 3 credits *(no longer co-taught)*
- THEA 450 Special Topics-Sound Design — 3 credits, co-taught
- THEA 510 Production Design Seminar — 1 credit, team taught
- THEA 516 Advanced Design and Production — 2 credits, team taught
- Technical Direction *Muphy's Law of Pretenders*
- Technical Direction *The Mousetrap*

Fall 2023

- THEA 300 Theater Practicum — 1 credit
- THEA 413 Drafting for Theater — 3 credits, co-taught
- THEA 419 Technical Direction — 3 credits
- THEA 510 Production Design Seminar — 1 credit, team taught
- THEA 516 Advanced Design and Production — 2 credits, team taught
- Technical Direction *Wedding Band*

Spring 2024

- THEA 300 Theater Practicum — 1 credit
- THEA 450 Special Topics-Entertainment Automation — 3 credits
- THEA 510 Production Design Seminar — 1 credit, team taught
- THEA 516 Advanced Design and Production — 2 credits, team taught
- Technical Direction *She Loves Me* or *Big Muddy Festival*

Back to CONTENTS

Thomas K Fagerholm
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Student Evaluations

Back to CONTENTS

Thomas Fagerholm Letter of Support
September 3, 2023

Tom served as my graduate mentor during my time as a graduate student in the SIU School of Theatre and Dance. His mentorship was instrumental in my success in grad school as well as achieving gainful employment post grad school. I started grad school with a lot of anxiety and a general misunderstanding on how a technical director (TD) is an artist in their own way. In my first-year review, Tom told me something that I still think about and have started teaching my students, “Get comfortable being uncomfortable”.

Working as a TD is incredibly stressful, Tom would do his best to make sure his students were aware of coping mechanisms to avoid TD burnout. There is a point where all you can do is lean on your education and gut. This was the first of many important lessons that would stick with me throughout grad school and into my post-grad career.

Toms classes were instrumental in me feeling confident as a TD and a professor. He took the time to research and develop a Scenic Automation class. Before grad school, I had zero exposure to the subject matter. It’s a complicated subject and due to Tom not giving up and constantly exposing us to the subject matter in different productions, I gained an understanding on how it works. Building from this I was able to leverage my experience gained in Toms class and production work to be offered a spot on the local over hire automation crew for the Kansas City leg of Taylor Swifts Eras Tour in the summer of 2023.

In my second year, Tom taught a Metal Fabrication class that turned out to be a skillset that set me apart in the job market when applying for TD/Academia positions. While this is seen as a skillset that’s a requirement when applying for jobs in my area, there aren’t a lot of programs I’ve seen offering formal education in it.

Tom taught a multitude of subjects through our Advanced Design class that led to us learning many skills that not everyone gets the opportunity to learn. Skills such as; advanced 3D modeling, joinery, wood turning, pneumatics, mechanical design, rigging mathematics. The standout lessons/skill I gained from classes with Tom came from a compilation of smaller sections of multiple semesters. We would talk about shop design and how to develop an efficient workflow in your space. This was a massive point in getting my current position. We are in an era where many fine arts departments are looking at renovating or building new theater spaces, these lessons have helped me prepare for this.

Finally, there are many lessons I’ve learned from Tom outside of the classroom. I worked with Tom in the summer of 2022 at the Colorado Shakespeare Festival. In this process I learned a great deal about how to make a good life for myself as a TD, how to truly take time off, enjoy the people around me, and come back to work as the best version of myself. Tom also showed me throughout my three years at SIU that he isn’t exempt from being imperfect. There are always things to learn, better ways to communicate, better ways to handle conflict, and how to grow as an individual and professional at the same time.

Sincerely,

Daniel Hall, MFA
Assistant Professor of Theatre & Technical Director
Campbellsville University

Kyle Ludwig
Assistant Technical Director, Scenery
Glimmerglass Festival

To Whom it may Concern:

I am excited and hopeful for the future of SIU Theater as I write this letter of recommendation. After several successful years working as a manager at Glimmerglass Festival in Cooperstown, NY, I still spend time remembering Tom Fagerholm's impact on my career. When Tom shared with me that his goal was to be a Full Professor at SIU, I couldn't have been happier for the department.

I was a student early on in Tom's time at SIU. I remember taking his Technical Direction class as an undergraduate. The collaborative nature of the class, as well as the blend of hands-on projects with theoretical and research projects was great. I felt that he had an excellent ability to tailor to each student's interests, level of knowledge, and skillset. What stuck out the most to me about this class was a specific project that he assigned: our technical bulletin project. We were tasked with researching technologies that could benefit Theater technical solutions, and writing a magazine style technical brief discussing our findings and applications. I remember when I was not so motivated to do the project, Tom challenged me and convinced me to buy into its value. In the end, I enjoyed the research process, and integrated the technology, electromagnetic connections systems, into my Technical Direction assignment, *Beyond the Horizon.* Tom exceeded expectations as a practicum instructor and mentor on this project. This is just one example of many that show Tom's dedication to the craft of both Technical Direction and education.

Another bonus I found in having Tom as my professor was his impressive collection of valid experience in the field; his time with Cirque du Soleil, The Guthrie, Glimmerglass, Utah Shakespeare, and more to name, was also matched with his skill sets and interests. I see that Tom currently continues to push the envelope by offering students up-to-date experiences with CAD, CNC systems, automation for the stage, structures, advanced metal fabrication techniques, rigging, and sound design. What can't be listed on his resume, though, is the level of dedication I remember him having to the department's and students' success. I am confident that he continues to display this drive and commitment still today.

I look forward to Southern Illinois University committing to Tom the way he is committed to furthering the industry, the Theater department, and most important, the future professionals. Thank you for your time and consideration, and prioritization of what can be the best place in Illinois to get a bachelors' or Masters degree in Theater.

Thank you,

Kyle Ludwig

Theatre
University of Missouri

Pinckney Benedict
Professor
College of Liberal Arts
1000 Faner Dr.
Carbondale, IL 62901

Dear Professor Benedict and Promotion Committee,

I'm sending this letter to you all for my recommendation for Thomas Fagerholm to advance their tenure to full professor in the Department of Theatre in the College of Arts and Media at Southern Illinois University of Carbondale (SIU). I was a graduate student at the School of Arts and Media in Theatre at SIU from 2019 to 2022 and graduated with my Masters in the Fine Arts (MFA) for Theatre with a specialty in Technical Direction in May 2022. Thomas was my graduate advisor and mentor during my time in graduate school at SIU's Department of Theatre as I obtained my MFA.

Thomas was a positive force and compassionate advisor for me as I moved through graduate school gaining knowledge from them to bring me to my end goal of gaining my MFA. They were supportive of my willingness to learn new techniques, analyses, and technology to help advance my goal of becoming a pedagogical technical director in academic theatre. I have utilized different areas of my past studies from under Thomas's mentorship in my current position to help both my colleagues and my students as we work together on theatrical productions. For example, recently I had to plan the construction of a raised platform and weld a steel box tube handrail for the safety of performers being 8 feet off the ground and dance upon it. I used my mathematical knowledge from Thomas's class of Structural Analysis for the Stage to calculate the various forces and load characteristics to make sure the platform and its supports were safe for the performer's movements. During its construction I used welding skills that I developed under Thomas's guidance to help me both plan and construct the metal hand railing to be solid and meeting the set designer's vision. In both cases of this example, Thomas expanded my knowledge with their own experience and mastery of the subjects to help me plan and execute a unique piece of scenery. Thomas's dedication as educator for technical direction aided me in becoming a better technical director myself but also a more well-rounded educator that has helped me advance my own career's development.

Thomas Fagerholm is more than deserving to be promoted to full professorship at SIU for their past work and their constant striving to learn new ideas, methodologies, and technologies to share with their students as they find their own paths. I know I would not be where I am today without Thomas's education and for them instilling in me a greater confidence about myself to follow my life's passion of being a theatre educator. Thank you for your all's time and take care.

Sincerely,
Zachary Alley, Technical Director
Department of Theatre
University of Missouri-Columbia

Kai Youngsteadt
3652 N Keeler Ave, FL 2
Chicago, IL 60641
09/04/2023

Southern Illinois University Carbondale
Perspective Theater Professor
Southern Illinois University Carbondale
1100 Lincoln Dr
Carbondale, IL 62901

Dear Southern Illinois University Carbondale:

Mr. Fagerholm makes a wonderful addition to the product and culture that is the Technical Theater program at Southern Illinois University Carbondale (SIUC). During my time at SIUC I had several classes with Mr. Fagerholm ranging from learning the basics of how to tie knots and build sets, to welding, to learning how to use VectorWorks and AutoCAD. Because of the time and care Mr. Fagerholm puts into his classes and students it allows them to not only learn, but also apply what they have learned to the real world. Mr. Fagerholm and I didn't always see eye to eye, but he also never gave up on me and helped me achieve every idea I brought to him. A fond memory I have with him is the independent study we did together which was Rigging Math. Because of this independent study I was offered many opportunities as a Head Rigger after college which is what lead to me holding the positions of Entertainment Rigger and the position of Scenic Automation Op with Disney Cruise Line. Post Disney I now use skills I learned from Mr. Fagerholm to help me run my own Freelance Lighting Design business which has allowed me to be Head of Lighting and Head of Rigging on a US Concert tour in 2022. In addition to that Tour, I have also done Lighting/Rigging many Medical Trade Shows all over the world, one off concerts, Museum Exhibits, and countless Corporate Events including a car reveal for Toyota.

In conclusion, without the help and care of Mr. Fagerholm during my time at SIUC I do not believe I would be in the place I am today. He not only takes pride in his students' achievements, but he also helps them through their failures. I always knew that he was a person I could count on for help, whether that was with one of his classes or even a personal issue, Mr. Fagerholm is an educator who takes his pride, care, and passion beyond the classroom and that is what helps mold students for their future. I know he would make a wonderful professor at SIUC.

Sincerely,

Kai Youngsteadt, Class of 2019

To Whom it may concern,

It is with great pleasure that I write this letter in support of Mr. Thomas Fagerholm, in his pursuit for promotion to Full Professor at Southern Illinois University. I was a student from January 2016 to May 2018. I hope my account of the learning I received while under the direction of Mr. Fagerholm will aid in your decision.

When I started at SIU, Mr. Fagerholm became my mentor who immediately guided me into my first experiences with technical theater. Mr. Fagerholm mentored me in several classes: Introduction to Stagecraft, Drafting for the Theater, Stage Management and through many of my production assignments. Mr. Fagerholm was vital in my learning to be a Stage Manager, Properties Master/Artisan, Carpenter, Stagehand, Scenic Designer, and Assistant Designer. He also accompanied my success at two theatrical conventions: South Eastern Theatrical Convention (SETC) & United States Institute for Theater Technology (USITT), where they hire for summer theater jobs. My first summer after starting at SIU, I was hired to be a stage manager with a professional theater company, McLeod Summer Playhouse. The following two summers, Properties Designer/Master for Arrow Rock Lyceum Theatre. After graduation, I moved to Chicago where I felt prepared to tackle the theater market thanks to Mr. Fagerholm's leadership. I have worked as a Props Artisan for Chicago Shakespeare Theater and many others, Scenic Designer for multiple companies, and more.

I now work in a corporate environment as a Facilities Specialist, a Global Project Manager, utilizing the same skills that Mr. Fagerholm instilled in me during my time at SIU. Through his teachings and mentorship in Stage Management, Drafting, Scenic Design, Intro to the Stagecraft, Production and more, I have been able to perform my role successfully over the past 4 years. I have designed signage, floor plans, flow plans, events during COVID - all possible because of my training in drafting, scenic design, intro to stagecraft and more under Mr. Fagerholm. I implemented training and plans for training and designing processes and workflows for our teams on a global scale - all possible from my training under Mr. Fagerholm in production, stage management, and more. My ability to think out of the box and find as many solutions with the relevant applicable materials present is aided by his mentorship. I also lead a team of workers who plan our company events and meetings. My leadership mimics Mr. Fagerholm's leadership and direction through is mentorship.

Lastly, I'd like to present how Mr. Fagerholm assisted me in my struggle as a Disabled student. I am hard of hearing and wear hearing aids in both of my ears. Even with aids, I still hear less than normal. Mr. Fagerholm was vital in my success at SIU. When I presented my concerns while working as a Stage Manager my first semester, he immediately took action to create an environment that was more accessible. In the scenic shop, Mr. Fagerholm helped implement procedures that made everyone aware and created a healthier hearing environment. Mr. Fagerholm is vital in the management of production schedules, construction of shows, and events throughout the year in the Department of Theater at SIU. Mr. Fagerholm also continues to stay in touch with his students and continually teach us.

Sincerely,

Christian A. Kurka 9/8/23

To all concerned parties and persons,

Hello, my name is Jeff Richardson and I had the pleasure of studying under Thomas Fagerholm from Fall 2017 through May of 2020. I have been recently made aware that Mr. Fagerholm is currently up for promotion and wanted to reach out and voice my support. Throughout my tenure at SIU I came to know Mr. Fagerholm through a multitube of lenses.

As an instructor, he demonstrated both a desire to pass along his knowledge and experience as well as a passion to expand the classroom learning into areas that he and his students could both learn and develop skills and abilities. His drive to research and explore his field alongside his students led to multiple regional and nation publications and presentations for him and his students. As a student you felt not only the expectation to strive for excellence, but through his example you had that desire built into you to put forth your best effort not only for your personal satisfaction but to help lift and benefit the entire team.

In his roles outside the classroom as Production and Technical Director, Mr. Fagerholm put into practice all that he requested from his students and colleagues. His detailed preparation for meetings, his attention to and ability to utilize resources both human and material, and his willingness to collaborate and compromise were exemplified on every production he was involved in. As a department that is built entirely by collaborative work, this not only made processes that can sometimes be stressful easier but also allowed those that were still developing their skillsets to have the room to expand and grow alongside more experienced team members by knowing that support systems were there to aid when needed.

You can't spend three years working under and alongside someone without getting to know them on a personal level as well. This might be where Mr. Fagerholm shone the most. The desire to teach and learn and lift students extended well beyond the classroom on productions, but to us as humans and individuals as well. There was never any doubt that Mr. Fagerholm cared about those he worked with. I will never forget the excitement on his face and in his voice once when I off handedly said to one of the other Graduate students, "I'm also learning more of what kind of TD I want to be sometimes than just gaining the skillsets".

That reaction, to me, helps sum up Mr. Fagerholm's attitude towards his many roles at SIU. He wants to help his students grow, to gain new understandings, to learn how they can personally apply themselves to their career paths and achieve their goals. I can think of no one more deserving of this promotion than Thomas Fagerholm. As you consider this matter, I hope these comments serve not to try to convince you of his worthiness, but rather reinforce an already established consensus that it has correctly assessed the situation.

Thank you,

Jeff Richardson,
SIU Graduate, MFA in Theater; Production and Design 2020
Technical Director, EKU Center for the Arts

Thomas K Fagerholm
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Peer Evaluations

Back to CONTENTS

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music.siu.edu

To: Promotion Committee
Fr: Tim Fink, Retired Professor, School of Music, SIUC
Re: Tom Fagerholm, Teaching Observation
Dt: Sept 8, 2023

Recently Tom Fagerholm requested that I observe his teaching and provide an evaluation for his dossier; I was happy to do so. On Thursday, Sept 7 I attended his THEA 419 Technical Direction Class, which met from 11:00-12:15 in the Observation room.

I was familiar with Tom's work as a Technical Director, as we had collaborated on a number of productions when I was on the faculty in the School of Music (I retired May of 2019). He was a fine Technical Director, easy to work with and very thorough. I had not seen Tom teach, however, so it was new for me to sit in his class and watch him present material and interact with his students.

Tom began the class with two short videos on applications of 3D printing for theatrical scenic design. He followed this up by asking students for their impressions of the video, and then followed that up asking if anyone had encountered anything new in the field of technical direction that week that they wanted to share. I thought this was a great way to start off the class and generate some fresh energy and enthusiasm for the future.

The material covered that day, "Stock (scenery) vs New" was something I'm fairly familiar with. The material was covered in a well-organized manner, comprehensively, and at a nice pace making good use of the hour and fifteen minutes. But what was most impressive was Tom's use of the Socratic method. He had a good number of well thought out questions which guided the thinking of the students, prompting thoughtful considerations, brainstorming, considering strengths and weaknesses of various choices, and the ramifications of these choices. These ideas were all put up on the chalk board, avoiding repetition, and organized in a way to create perspective of how the parts fit into the whole. Tom spoke with deftness, not dominating the conversation, but provoking it. He was patient, and willing to wait out a little bit of silence as students thought through their responses. But he also kept a good pace, prompting them with more questions when the responses occasionally stalled.

The students were well engaged, comfortably making eye contact with Tom and one another. The students, both upper level undergrad and first year graduate, had had significant experiences, both at SIUC and other places, to offer anecdotes. I thought they were impressive students.

Something Tom pointed out early in the lesson, using a quote from the book, was how limitations (such as time, money, labor, space, etc.) can be freeing--they can be used as prompts to the creative process. As a technical director it can be very helpful to the designer by sharing what you do have already in scenic stock, as well as what you can offer in terms of time, money and space.

In the end it was an enjoyable hour fifteen--almost made me want to teach again. Almost!

Sincerely,

Timothy Fink
Professor (retired), School of Music
Opera and Musical Theater, SIUC

SIU CARBONDALE SOUTHERN ILLINOIS UNIVERSITY
SCHOOL OF MEDIA ARTS

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Date: September 21, 2023

To: Pinckey Benedict, Chair Designee

Re: Tom Fagerholm teaching observation- Technical Direction, THEA/ 419

This letter documents my teaching observation of Tom Fagerholm on September 14, 2023 and includes an overview of his work in the classroom with the two students in attendance and my assessments of his course syllabus, handouts, and assignments.

Professor Fagerholm's class began on time with a review of the work that was presented during the previous week. He also announced the dates of important industry conferences that students in theatre technology should track and become familiar with.

He smoothy transitioned to a review of a new material, Worbla, a thermoplastic used in theatrical design and how formed and sculpted plastic has created design opportunities for theatre designers. He then outlined an assignment where students would write a technical report on the uses of Worbla in scenic, prop and costume design. He then stressed the importance of the format of the technical report and that students should use M.L.A. format, include citations as well as any internet links in their technical report assignments. Professor Fagerholm took extra time to focus on the importance of the writing style of a technical report, noting that the language should be clear and concise and that it needed to adhere to the standards that have been practiced in the professional theatre industry. He then provided context for the students by stressing the importance of communication among technical theatre professionals. For Professor Fagerholm, reading technical reports on new materials and practices is more than *technical learning*, it's an opportunity to learn from others in the field who have a vested creative interest as well as a commitment how these products are used safely and in a cost effective manner. He circulated examples of professionally produced technical reports as examples and ended that section of the class session with a discussion about the assignment.

The main focus of the class featured how Build Schedules are used by technical directors as a way of managing the budgeting, design phase and construction portions of the overall delivery process when creating a professional theatrical production. Professor Fagerholm is an organized presenter and he skillfully related how all of the aspects of a Build Schedule need to work in consort in order to have the production stay on schedule. He provided templates in the form of handouts and described how

Build Schedules can be easily created using readily available software. Professor Fagerholm also emphasized how the Build Schedule serves as a "living document" of the process, and while Build Schedules exist as a graphic workflow, it is important for students to remember that developing clear communication skills becomes paramount when working on projects that are reliant on how different departments (design, construction, paint etc.) coordinate to help deliver a production.

Professor Fagerholm also taught students how to assemble a budget using the W.B.S. (work, breakdown, structure) of budgeting. This portion of the class was especially valuable for the students and Professor Fagerholm, noting their interest, quickly pivoted the class to an open question and answer session that also looped back on how W.B.S. and Build Schedules can be combined. He took care to cite specific instances where budgets and schedules might align according to the needs of a specific genre i.e., classical production vs. contemporary.

Professor Fagerholm's syllabus is clear, with an abundance of recommended texts, and rigorous set of course outcomes and requirements. The assignments are sequenced in a way that mimics the entire process of delivering the technical aspects of the theatrical production to the live stage.

In conclusion, I truly enjoyed observing Professor Fagerholm's class this semester. He was always ready to answer questions from his students and provided excellent examples, while also offering to meet with students after class to brainstorm how to put practices in place for theatrical productions here at SIUC.

All my best,

Jay Needham, MFA
Professor and Director of Graduate Studies, MFA Program

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April 27, 2023

H.D. Motyl
Interim Director, School of Theater and Dance
Southern Illinois University
Carbondale, IL 62901

Dear H.D.,

I am delighted to offer a peer observation of teaching for Tom Fagerholm. I observed his THEA 416B Structural Design for the Stage Part II, on April 19, 2023. Overall I found his teaching to be very clear and strong, with a focus on assisting student understanding of a difficult and complex topic.

Before commenting on the observed class itself, I must comment on Tom's preparation. I have known many senior faculty who, at this point in their career, just go into the classroom with little preparation, simply "winging it" based on previous experience with the class. As a colleague with an office just two doors down from Tom's, I know this is not the case with him. Tom spends a good amount of time preparing for each class, making sure the material is fresh. He also spends extensive time giving comprehensive feedback when grading. Tom is an instructor clearly dedicated to student success.

In regards to the classroom observation, I must note it is a topic I myself am not familiar with. To that end, I cannot comment on the content delivered, but will focus this observation on the method and effectiveness of delivery and teaching.

Tom has a comfortable attitude when entering the class. At the beginning of the class period, a recent current event was mentioned (a campus power outage) and Tom tied a comment about it to a concept related to the subject matter. That said, he also clearly took control of the class when it was time to start and moved seamlessly into the lesson for the day.

It was brought to my attention that there is a regular formula for the class. Each period starts with a review of the assigned reading, followed by an ungraded examination of the even numbered problems in the book. Finally, the student is assigned the odd numbered problems in the book as graded homework. I found this a clever way to ensure the student has proper instruction to feel comfortable with the homework, while still giving them plenty to try on their own.

As the lesson for the day progressed, Tom used a combination of lecturing, referencing the text, and drawing diagrams on the blackboard to explain the material. Throughout this, he had clear delivery, and an eye to what the student needed. At one point he noted that the concept was "not clicking" with the student, and adeptly pivoted to find another way to explain the idea being taught. This was a definite case of being able to read the room and adjust accordingly.

It should be noted Tom fosters a classroom atmosphere where his graduate assistant feels comfortable contributing to the discussion. Student engagement is also quite clear. The material is difficult to grasp, but student involvement in their own learning was high, as they closely followed the conversation. After Tom re-explained the concept as noted in the previous paragraph, and segued to the problems in the book, the student said "I didn't get any of them right, but now I understand better." Tom's response to this was supportive and encouraging.

The class continued with Tom guiding the student through the problems, soliciting responses from the student when appropriate, offering encouraging feedback, and guiding them to the next step. To me as the observer, the material was dry and difficult, but everyone in the room was thoroughly invested in the topic.

I have to search to find something to critique in this class. Most of us have our verbal tics, and Tom's in this class was "Right?" I would encourage him to be aware of this. What can feel like a way of checking in can sometimes feel off-putting to some students. In this case, it did

not appear to deter student effort, undoubtedly due to the level of trust that has been built between instructor and student.

While this observation is written about this particular class, this is far from the only time I have witnessed Tom's teaching. Overall I find him to be a dedicated instructor, always striving to provide the best instruction and challenging material, to help his students rise to the top of their field. He is an excellent example of what a senior faculty should be.

If I can offer any further insights, please let me know.

Thank you,
Wendi

Wendi Zea
Associate Professor, Costume Design
Head of Design, School of Theater and Dance
Southern Illinois University
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Thomas K Fagerholm
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External Evaluations

Back to CONTENTS

Tshwane University of Technology
We empower people

Faculty of Arts & Design

Prof. Fagerholm masterclass at the Department of Performing Arts

11 September 2023

To whom it may concern,

Tshwane University of Technology (TUT) takes a pragmatic approach to nurturing industry-ready graduates, aligning with our vision of being "A people's university that makes knowledge work." Our mission is to address historical inequalities by providing access to education for all communities, especially those on the fringes of society. Our goal is to produce graduates who can actively contribute to solving societal challenges and become productive, engaged citizens.

Within the Department of Performing Arts (Theatre Arts and Design - Technical Theatre Stream), we are dedicated to training technicians in various fields, including lighting, costumes, makeup, properties, sound, set design, and stage management. While our program offers master's and doctoral qualifications, most of our graduates become technical theatre practitioners. It's important to note that the South African performing arts industry faces significant funding challenges, and many of our students come from disadvantaged backgrounds, often without prior exposure to a theater environment.

Given these circumstances, we greatly value opportunities to share insights from international experts, as it allows us to expose our students to broader horizons. On 24 August, we had the privilege of hosting Prof. Fagerholm, who conducted a masterclass titled 'What it is to be a Technical Director in the USA.' This session was open to technical theatre students ranging from first to fifth year (including postgraduate students) and was conducted via Zoom. While we had 21 students logged into the session, it's worth noting that connectivity issues led some of our students to share devices, making it challenging to determine the exact attendance. Additionally, the session was attended by me and Mr. Estian Gericke, our prop workshop manager.

The masterclass spanned two hours and covered two key topics related to technical theatre. The first hour was dedicated to production management, including management techniques and tools essential for supporting the production process. Prof. Fagerholm shared examples from equity productions and discussed scene changes, utilising video footage for illustration. The subsequent half-hour segment focused on stage automation practices and research projects that Prof. Fagerholm is actively involved in. The final half-hour was an open Q&A session, allowing students to engage directly with Prof. Fagerholm.

Our students thoroughly enjoyed the session and were particularly impressed by the productions presented by Prof. Fagerholm. They posed questions about employability in the US and the essential skills needed for international viability.

We are looking forward to the second online workshop with Prof. Fagerholm scheduled for October. Our students are eagerly anticipating this opportunity for further learning and growth.

Thank you for your support in our mission to provide our students with a well-rounded education and global perspectives.

Yours sincerely

Mienke Fouche

Doctor of Performing Arts
Lecturer: Department of Performing Arts (Theatre Arts & Design)
Chairperson: Faculty of Arts & Design Research Ethics Committee
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Thomas K Fagerholm
Summary of Instructor Course Evaluations

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Executive Summary

In the School of Theater and Dance (SoTD) I teach a variety of classes that fall into three areas: SoTD core courses for the Bachelor of Arts degree (THEA 218A and 300), technical direction specific courses (THEA 416A/B, 419, and 450 Special Topics – Entertainment Automation), and courses that cover all areas of theater design (THEA 413, 425, 450 Special Topics – Sound Design, 510, and 516). As part of our mission to help embody the collaborative nature of theater, some of these classes are team-taught with the other professors in the design/tech area (THEA 413, 416A/B, 450 Special Topics – Sound Design, 510, and 516). Where possible, Instructor Course Evaluations (ICEs) scores were completed for each faculty member.

Before examining the ICE scores in detail, there are a few notes about the data. THEA 510 Production Design Seminar is team-taught with a group of four professors; therefore, ICEs did not seem to be an efficient means of assessment for this course. Similarly, THEA 516 Advanced Design is a team-taught course with a group of four professors but delivery of course content is separated by graduate area advisors and their graduate students. Due to the structure of this team-taught listing, ICEs are limited. Specifically, ICE responses could not be separated by individual instructor's contributions when ICEs went online for the first few years. As such ICE data is not represented for evaluation. Starting in 2022/2023 THEA 416A/B was no longer team-taught.

The majority of the courses I teach are targeted toward advanced undergraduate and graduate students. The enrollment numbers in these courses are traditionally low. This is a benefit to our students as the work often requires intense hands-on and one-on-one instruction with feedback. This personal approach allows me to personalize my methodology to fit the needs of the individual student.

Survey participation has dropped significantly since the ICEs shifted away from paper to an online format. The paper response rate was almost 100 percent; online the response rate is less than 50 percent. This pronounced drop in participation is consistent with my colleagues in the SoTD. Classrooms for the School of Theater and Dance do not have dedicated computer workstations, so students are required to respond to the survey outside of class time. Since ICEs went online, the survey questions have changed. Some previous questions have been eliminated while others are numbered differently from year to year. Where possible, I have paired similar questions from the paper format with the online versions. When questions in the analysis span across years the first number (ex. #40/#6) refers to the old ICE forms and the second to the new format accessed through D2L.

Course	Semester	YR	Overall
419	FA	19	4.62
425	SP	20	4.11
416A	FA	20	4.31
390	SP	21	5
450	SP	21	4.43
416B	SP	21	4.69
425	SP	22	5
530	SP	22	5
400	FA	22	5
413	FA	22	4.53
419	FA	22	4.92
416A	FA	22	4.62
450	SP	23	4.72
416B	SP	23	4.77
		AVERAGE	**4.6943**

My "Overall Mean" ICE course scores are very strong, with course means for classes ranging from 4.11 to 5.0 on a 5-point Likert scale with 5 being excellent. The average "Overall Mean" across the classes I have taught since receiving tenure is 4.69. My scores also show improvement over successive years (including during the COVID-19 pandemic) and scores have remained high.

Back to CONTENTS

Summary of Courses Taught

Full Analysis

THEA 218A Beginning Stagecraft-Scenery is an undergraduate BA core course requirement for the degree. It is also a requirement for a Theater Minor. This course is designed to give basic instruction into the techniques of stagecraft and scenery construction. Students apply knowledge from class lectures, discussions, and learned procedures to SoTD projects and productions. I have not taught this course since promotion and tenure but have supervised our graduate students teaching the course. One of the first lectures in the class is related to health and safety while working on-stage or in our production shops. I serve as the guest lecturer for this day as the Health and Safety Coordinator for the School of Theater and Dance. As the Production Manager for the SoTD performances, this allows the students to interact with me early in the semester and get acquainted with the school's health and safety practices.

THEA 300 Theater Practicum is a core course for the BA degree. Students in THEA 300 learn and gain experience by working on SoTD productions with guidance from the instructor and other faculty involved in the production. This course does not have a direct teaching component; therefore, ICE's are not an efficient means of assessment. Instead, there is a written self-evaluation component of the course where students reflect on their work and growth over the course of their production assignment. These self-evaluations shed light on students working relationships with their peers and faculty on productions. I utilize their comments to adopt meaningful changes to my syllabus. I have also used their self-reflections to guide future practicum assignments that better fit their students' needs (since BA theater majors take the course four times).

THEA 413 Drafting for Theater has changed since I first started teaching it at SIU. We no longer cover traditional hand drafting but rather have split the class into three sections. The first section is co-taught and covers drafting recommended best practices. In this area, I have continued to improve my drafting at SIU and professionally to follow the United States Institute for Theater Technology (USITT) recommended best practices that we teach in class. The second section covers AutoCAD drafting software and the third covers Vectorworks, another Computer Aided Drafting (CAD) software. We teach the two CAD programs to set our students up for success at a variety of professional organizations like Colorado Shakespeare Festival, Glimmerglass Festival, Atomic Design, or the Guthrie Theater. My professional creative activity has greatly aided our advanced portion of the class, allowing me to teach three-dimensional modeling and other advanced software techniques to students who repeat the course for advanced work. I have continued to develop my skills and teaching methods for this section by utilizing software we teach professionally and on SIU productions. I feel this is evident in my ICE scores, notably that my mean in the Fall of 2022 for "The instructor was knowledgeable about the course content" was 5.0, above the SoTD mean of 4.65. I also would like to note for that same year that "The instructor showed interest in student success" was 4.67. I feel this demonstrates my dedication and interest to our students and the subjects I teach.

THEA 413 Drafting for Theater is an upper-level undergraduate elective course and a prerequisite for many of the upper-level design courses. It is also a requirement for graduate students in design and technical direction. This course is structured to acquaint the student with the commonly accepted conventions, practices, and graphic standards for theatrical drafting. Students practice the necessary skills to produce drafting appropriate to theatrical productions. The class is co-taught between the lighting design faculty and me. ICEs reflect my contributions to the course only. One area of considerable improvement in the ICEs is responses to the amount of work assigned even though the underlying assignments have changed little. I believe this can be best explained by my growth as an instructor, communicator, and user of the software programs we utilize.

Summary of Courses Taught

Course	Semester	YR	Instructor (#20/#15) Effective Overall	Course (#40/#6) Good Learning Experience	Instructor (#16/#12) Showed Interest in Students	Course (#28/#3) Amount of Work	Enrolled	Responding
413	FA	15	4.29	4.33	4.67	3.33	7	7
413	FA	16	4.17	4.42	4.17	3.67	14	12
413	FA	22	4.33	4.33	4.67	4.67	5	3
COURSE MEANS			4.26	4.36	4.50	3.89		

THEA 416A and 416B Structural Design for the Stage is a two-semester biennial course designed to acquaint students with the commonly accepted conventions and practices of structural design for theater. Students practice the necessary skills to analyze and produce appropriate, stable, and safe structures for theatrical productions. Topics range from wood and steel beam design to truss design. In my first year at SIU, this was a one semester course covering only wood beams and columns. To better prepare our students for the challenges and materials in modern and professional productions, the course was expanded to two semesters beginning in AY 16-17. The class was co-taught between myself and the lighting design professor until his retirement in the spring of 2022 after which I have been the sole instructor of record. ICEs during co-taught years represent my contributions only.

Course	Semester	YR	Instructor (#20/#15) Effective Overall	Course (#40/#6) Good Learning Experience	Instructor (#16/#12) Showed Interest in Students	Instructor (#6/#10) Effectively Communicated Content	Enrolled	Responding
416A	FA	16	4.67	4.67	5	4.33	4	3
416A	FA	18	4	4.5	4.5	3.75	4	4
416B	SP	19	3.67	4.67	4.67	3.33	4	3
416A	FA	20	4.31	5	5	4	5	1
416B	SP	21	4.69	4.5	5	5	5	2
416A	FA	22	4.62	3	5	5	1	1
416B	SP	23	4.77	4	5	5	1	1
COURSE MEANS			4.39	4.33	4.88	4.34		

THEA 419 Technical Direction is an upper-level undergraduate elective course and a requirement for MFA candidates in Technical Direction. This course is designed to familiarize students with the role of the Technical Director as it applies to modern theater and stagecraft practice. Course content includes in-depth analysis of the planning, bidding, scheduling, structural design, and construction processes used in the production of scenery. Students apply knowledge from class lectures, discussions, and exercises to hypothetical “real-world” examples of stagecraft challenges facing the modern Technical Director.

Summary of Courses Taught

Course	Semester	YR	Instructor (#20/#15) Effective Overall	Course (#40/#6) Good Learning Experience	Instructor (#16/#12) Showed Interest in Students	Instructor (#6/#10) Effectively Communicated Content	Enrolled	Responding
419	FA	14	4	4.67	4.5	4	4	4
419	FA	15	3.6	4	4.8	3.8	5	5
419	FA	16	5	5	5	5	3	3
419	FA	19	5	4.33	4.67	4.67	4	3
419	FA	22	5	5	5	5	2	1
COURSE MEANS			4.52	4.60	4.79	4.49		

THEA 425 Metal Fabrication is a course I developed for Spring 2016. This course grew out of a section from a past special topics course at SIU. Metal Fabrication provides an introduction of the knowledge and practice of the various welding processes for entertainment as well as an understanding of the theater practitioner's responsibility to the quality and safety of their projects. The art and skills of metal fabrication and welding are intrinsically hands on. This aspect has been a strength for me but became a difficult challenge during the COVID-19 Pandemic. I was able to pivot all the lecture material online, but the course had to forgo the practical application of the skills and techniques discussed. Fortunately, the American Welding Society offered a number of its expensive online instructional videos for free to educators and students during the pandemic. I was able to incorporate these instructional videos into the class for our students. I believe this transition is why I received high ICE scores for the pandemic specific question #22 "The instructor altered instructional methods effectively to fit the sudden transition to remote or online learning" with a score of 4.5 above the SoTD mean of 4.27 and the university's 4.17. Similarly, one can observe the students felt they missed out on the kinesthetic skills when we moved online with question #23 "I learned as much in the remote or online portion of the course as I did before the sudden transition" with a score of 2.5 which was below both the means of the SoTD and the university.

Course	Semester	YR	Instructor (#20/#16) Effective Overall	Course (#40/#6) Good Learning Experience	Transition to Online (#22) Instructor altered instructional methods effectively.	Transition to Online (#23) I learned as much online as before.	Enrolled	Responding
450	SP	16	5	5	n/a	n/a	11	9
425	SP	20	5	4.5	4.5	2.5	4	2
425	SP	22	5	5	n/a	n/a	5	3
COURSE MEANS			5.00	4.83				

THEA 450 Special Topics Sound Design is a standalone course in both sound technology and design. Written student evaluations from my first semester teaching Sound Design suggested there were too many design projects and not enough projects or lectures relating to the technology and software related to creating designs. Reflecting on and incorporating the student feedback, I reduced the number of sound design projects from three to two, added more hands-on opportunities in class, and utilized a

graduate student as a teaching assistant the second time I taught the course (Spring 2019). The course was offered again in the spring of 2023. The effects of these changes can be noted in the question "Required work was appropriate" where the scores improved from 4.14 in 2017 to 4.5 in 2023 where the SoTD mean was 4.44. A few other comparisons that demonstrate my commitment to developing my courses and teaching are:

The instructor: "Organized, presented subject well" improved from 3.86 in 2017 to 5.0 in 2023.

The instructor: "Explained the subject Clearly" improved from 3.86 in 2017 to 5.0 in 2023.

One comment stands out to me from the most recent ICEs in 2023. When the students were asked "What are this instructor's strengths as an educator? What suggestions do you have for improvement" one student wrote "Very passionate about subject matter and very approachable when questions arise." Communication is critical to a collaborative artform such as theater and I work hard to model that in my lectures and workshops. This has been an area of considerable growth for me as it relates to sound design since I started at SIU.

THEA 450 Special Topics Sound Design was a new course I developed in 2017 which is offered triennially. I taught the course for a third time in the Spring of 2023. The content of this course explores the elements of design, artistic processes, and mechanics related to designing sound for theatrical productions through class lectures, demonstrations, and practical projects. Students have consistently rated my instruction and their overall learning experience as very high.

Course	Semester	YR	Instructor (#20/#16) Effective Overall.	Course (#40/#6) Good Learning Experience.	Transition to Online (#22) Instructor altered instructional methods effectively.	Transition to Online (#23) I learned as much online as before.	Number enrolled	Number responding
450	SP	17	4.14	4.43	4	4.14	10	7
450	SP	19	4.67	4	5	4.67	4	3
450	SP	23	5	5	5	4.5	3	2
COURSE MEANS			4.60	4.48	4.67	4.44		

Back to CONTENTS

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Sample Syllabi

Back to CONTENTS

THEA 300 – Theater Practicum – FALL 2023

Class times: Wed 8/23 & 8/30 4:30-5:00pm
Class location: COMM 1037 - McLeod Theater

Instructor: Thomas Fagerholm **E-Mail:** tfagerholm@siu.edu
Office: Comm. Bldg. 2234 **Student Hours:** Tu, Th, Fr 2:30-4:30pm by Appt.

Course Objective

To practice the skills, crafts and art of modern theatrical production through participation in the School of Theater and Dance (SoTD) productions or studio assignments. (G1, 2, 4) *

*See SoTD Website for SoTD Mission & Program Goals

Content

Students will perform an assignment on one SoTD production or work 45 hours in one of the shops (costume, lighting, scenic, or sound). Performing an assignment requires executing all the duties of the assigned position as described to you by the SoTD production handbook and your area supervisor, participating in all rehearsals and performances for which you are called, reporting for all calls or work hours on time and prepared to perform your function, and attending strike for the production to which you are assigned.

Assignment Request Form:

Fill out and return the assignment request form to Tom Fagerholm's mailbox located in the theater main office (COMM 1033) no later than **Friday (8/25) at 12:00pm**. By not submitting your Assignment Request Form by the due date, you are forfeiting your opinion as to the assignment that is most appealing to you.

Self-Evaluation (D2L):

Write a brief self-evaluation of your performance on your completed assignment. Describe the duties you performed. Indicate what things you have learned during this semester and how they will help you in the future. A good self-evaluation is honest, specific, notes areas of growth and opportunities for improvement. This self-evaluation is due **UPLOADED to D2L** no later than 4:30pm Friday, December 8th. LATE PAPERS WILL NOT BE ACCEPTED. All papers must be typed and AT MINIMUM 1 page (**of content**) in length double-spaced. Turn paper in to D2L.

Evaluation:

SoTD Health and Safety Test is required. Grades will be determined as follows: (see Performance Evaluation form for plus minus scale) `

85% **Performance Evaluation** (the faculty supervisor of your assigned area will evaluate you on the following: Assignment Completion/Attendance, Effort, Initiative/Leadership, Learning/Growth, Dedication/Responsibility, and Dependability)

15% Self Evaluation (Due on **8/25/23** by 4:30pm)

Production Attendance: Production assignments are as vital to a successful production as the performers. As such, if a student misses an assigned call with approval from the faculty instructor, their overall grade will only be lowered 10%. If a student misses an assigned call without an excused absence from the faculty instructor, they will receive an F in the course.

Shop Attendance: Work in the shops is critical to production and as such is treated like a job.

- Students are required to complete 45 hours of laboratory work in one of the shops.
- All shops are open: **M,T,Th,F** from **2pm - 6pm. CLOSED WEDNESDAYS.**
- Students are suggested to schedule 4(four) hours per week with area supervisor.
    - For each hour of an assigned work call that a student misses, the student will receive **half** that number of negative hours. Example: If you have 12 hours to date and you miss a 2-hour call, you will have 1 hour deducted from you total which is now 11.
- Students are allowed ONE excused absence from lab hours
    - Instructor must be notified **by e-mail only** at least 24 hours in advance.
- Extra credit can be earned from working more than 45 lab hours.
    - For each additional hour worked, a student can earn 0.25% toward their final grade for a maximum extra credit of 10% or 40 hours.

- Students who are ill OR in quarantine, will not be permitted to work in the shops for laboratory hours. They must discuss with their instructor about alternate measures for lab hours to be completed during that period.

EXTRA CREDIT: Students wishing to earn extra credit may do so by working extra in the shops. Each hour worked in a shop beyond the required 45 hrs. is worth 0.25% towards your final grade.

SCHEDULE

8/23/23	Introduction to Class
8/25/23 before 12:00pm	Assignment Request Forms Due (no class attendance required)
8/30/23	Production Assignments Meeting
12/8/23 before 4:30pm	Self-Evaluations Due (no class attendance required)

THEATER PRACTICUM ASSIGNMENT REQUEST FORM

Name:_____

Phone#:_____

E-mail:_____

Undergraduate Classification (circle one)

FR SO JR SR

Circle Courses you've Taken

218A 218B 218C

POTENTIAL CONFLICTS

******please indicate any productions from which you would be prevented from performing crew duties because of your schedule and explain why, i.e. "I have an evening job" or "I have a wedding that weekend." Also indicate any positions you have already been assigned and for which you would like to receive credit.***

Please mark a first (1) AND second (2) choice of crew assignments AND first (1) and second (2) choice of productions.

ASSIGNMENTS:	**PRODUCTIONS:**
(MARK 1ST, 2ND)	**(Mark 1st, 2nd)**
SHOW SPECIFIC:	
___ ASST. STAGE MANAGER	___ *Ride the Cyclone (Oct. 4-15)*
___ ASST. MASTER ELECTRICIAN	
___ MASTER CARPENTER (WORKS IN SCENIC STUDIO)	___ **Wedding Band (Nov 15,16, 27-Dec. 3 & 7-10)**
___ ASST. PROPS MASTER (WORKS IN PROPS STUDIO)	**Additional THEA 400 Credit Available*
___ STAGE CREW (SCENERY, PROPS, ETC.)	
___ FLY RAIL OPERATOR	
___ DRESSER	
___ SHOW ELECTRICIAN (SPOTLIGHT, PROJECTORS, ETC.)	
___ LIGHT BOARD OPERATOR	
___ SOUND BOARD OPERATOR	
___OTHER (SPECIFY) _____	
SEMESTER SPECIFIC:	
___ SCENIC STUDIO (MUST HAVE 218A)	
___ LIGHTING STUDIO (MUST HAVE 218B)	
___ COSTUME CONSTRUCTION (MUST HAVE 218C)	
___ OTHER (SPECIFY)_____	

Performance Evaluations Student's Name: _____
Practicum 300 Assignment: _____
Production 400 Production: _____

This form is to be filled out by the faculty or staff supervisor that had the most contact with the above student during their production assignment. If the grade is less than an "A", please justify in the "comments" space provided at bottom of this form.

Please give one of the following grades for each of the categories below:

A 100-93	B+ 89-88	C+ 79-78	D+ 69-68	F 59-0
A- 92-90	B 87-83	C 77-73	D 67-60	N/A
	B- 82-80	C- 72-70		

____ **Effort:** (Did the student attempt their assignment to the best of their ability?)
Comments:

____ **Initiative/Leadership:** (When the student had an assignment completed, did the student seek out another assignment? Did the student have an opportunity to show leadership skills, and if so how successful was this student?)
Comments:

____ **Positive Attitude:** (Did the student demonstrate a positive and professional attitude? Did this student demonstrate a respect for authority?)
Comments:

____ **Dependability/Responsibility:** (Could you as a supervisor depend on this student to execute their position? Was the student dedicated to the production? Did the student show responsibility towards his/her work?)
Comments:

____ **Learning/Improvement:** (Did the student learn/grow during this assignment? Has this student proven themselves ready to accept more challenging roles/assignments?)
Comments:

____ **Attendance/Assignment Completion:** (Did the student attend all assigned calls? Did the student arrive on time for all assigned calls? Did the student complete the assignment? **If a student missed an assigned call please put 0. If a student missed an assigned call with an approved excuse from the faculty instructor, their overall grade will only be lowered 10%. If a student missed an assigned call without an excused absence from the faculty instructor, they will receive an F in the course**.)
Comments:

____ Total (Add total of all above scores)
____ Grade (Total divided by 6)

General Comments:

Please Sign below:
Faculty/Staff Supervisor:_____

THEA 400 – Theater Production – SPRING 2023

Instructor: Thomas Fagerholm **E-Mail:** tfagerholm@siu.edu
Office: Comm. Bldg. 2234 **Student Hours:** Tu, Th, Fr 2:30-4:30pm by Appt.

Course Objective

To practice the skills, crafts and art of modern theatrical production and/or performance through participation in the School of Theater and Dance (SoTD) productions. (G1, 2, 4) *

*See SoTD Website for SoTD Mission & Program Goals

Content

Students will perform an assignment related to a SIU SoTD production.

Assignments for THEA 400 are faculty approved production, artistic, design and/or technical positions such as Actor, Director, Choreographer, Musical Director, Dramaturge, Playwright, Stage Manager, Designers, Technical Director, etc., as well as assistants to those positions.

Performing an assignment requires:

1. Executing all the duties of the assigned position as described to you by the SoTD production handbook and your area supervisor.
2. Participating in all meetings, shop hours, work calls, rehearsals and performances for which you are called, and reporting for all calls or work hours on time and prepared to perform your function.
3. Attending strike for the production to which you are assigned.
4. Completing all course requirements as listed below.

Course Requirements

NOTE: This is an experiential class much like an internship, where the instructor receives an evaluation from your faculty production supervisor. This course requires your attendance at production meetings, performances, and rehearsals or shop times rather than during a regular class time. It is the responsibility of the student to attend all required calls, and to follow the directions on this syllabus to provide—on or before the stated deadlines—the papers and assignments detailed in these Course Requirements.

Production Goals Paper (D2L):

At the beginning of each production project, the student will write a brief statement of goals they set for themselves for this production project. The student should list 2 to 4 **specific** goals related to their assignment, briefly describe (a bullet point list is acceptable) the duties they anticipate performing, and how they hope to accomplish those goals as well as what skills, methods and lessons, etc. they hope to learn during the production. All papers must be typed and should be no more than 2 pages in length, double-spaced. Papers are to be **UPLOADED to D2L** .

Self-Evaluation Paper (D2L):

Write a brief self-evaluation of your performance on your completed assignment. Address the goals set at the beginning of the project, and describe the duties performed, to what extent you achieved your goals for the production, what skills, methods and lessons, etc. you learned during the production process, and how the process will help you in future productions. A good self-evaluation is honest, specific, notes areas of growth and opportunities for improvement. This self-evaluation is due **UPLOADED to D2L** (SEE DATES UNDER SCHEDULE). LATE PAPERS WILL NOT BE ACCEPTED. All papers must be typed and 1-2 pages (**of content**) in length double-spaced. Turn paper in to D2L.

Evaluation:

SoTD Health and Safety Test is required. Grades will be determined as follows: (see Performance Evaluation form for plus minus scale)

10% **Production Goals**

80% **Performance Evaluation** (the faculty supervisor of your assigned area will evaluate you on the following: Assignment Completion/Attendance, Effort, Initiative/Leadership, Learning/Growth, Dedication/Responsibility, and Dependability)

10% **Self Evaluation**

Production Attendance: Production assignments are as vital to a successful production as the performers. As such, if a student misses an assigned call with approval from the faculty instructor, their overall grade will only be lowered 10%. If a student misses an assigned call without an excused absence from the faculty instructor, they will receive an F in the course.

EXTRA CREDIT: Students wishing to earn extra credit may do so by working extra in the shops. Each hour worked in a shop beyond the required 45 hrs. is worth 0.25% towards your final grade.

SCHEDULE

2/3/23	Production Goal papers for 03 MTP **DUE**
2/17/23	Production Goal papers for 04 BMF **DUE**
3/3/23 before 4:30pm	Self-Evaluation Paper and completed Performance Eval. for 03 MTP **DUE**
3/24/23	Production Goal papers for 05 SON **DUE**
3/31/23 before 4:30pm	Self-Evaluation Paper and completed Performance Eval. for 04 BMF **DUE**
4/28/23 before 4:30pm	Self-Evaluation Paper and completed Performance Eval. for 05 SON **DUE**

Performance Evaluations Student's Name: _____
Practicum 300 Assignment: _____
Production 400 Production: _____

This form is to be filled out by the faculty or staff supervisor that had the most contact with the above student during their production assignment. If the grade is less than an "A", please justify in the "comments" space provided at bottom of this form.

Please give one of the following grades for each of the categories below:

A 100-93	B+ 89-88	C+ 79-78	D+ 69-68	F 59-0
A- 92-90	B 87-83	C 77-73	D 67-60	N/A
	B- 82-80	C- 72-70		

____ **Effort:** (Did the student attempt their assignment to the best of their ability?)
Comments:

____ **Initiative/Leadership:** (When the student had an assignment completed, did the student seek out another assignment? Did the student have an opportunity to show leadership skills, and if so how successful was this student?)
Comments:

____ **Positive Attitude:** (Did the student demonstrate a positive and professional attitude? Did this student demonstrate a respect for authority?)
Comments:

____ **Dependability/Responsibility:** (Could you as a supervisor depend on this student to execute their position? Was the student dedicated to the production? Did the student show responsibility towards his/her work?)
Comments:

____ **Learning/Improvement:** (Did the student learn/grow during this assignment? Has this student proven themselves ready to accept more challenging roles/assignments?)
Comments:

____ **Attendance/Assignment Completion:** (Did the student attend all assigned calls? Did the student arrive on time for all assigned calls? Did the student complete the assignment? **If a student missed an assigned call please put 0. If a student missed an assigned call with an approved excuse from the faculty instructor, their overall grade will only be lowered 10%. If a student missed an assigned call without an excused absence from the faculty instructor, they will receive an F in the course**.)
Comments:

____ Total (Add total of all above scores)
____ Grade (Total divided by 6)

General Comments:

Please Sign below:
Faculty/Staff Supervisor:_____

THEA 413 DRAFTING - FALL 2023

Class Time: Wednesdays 2-4:15pm
Class location: Design Lab (COMM 2041)
Version 1.0

Instructor: Jaemin Park
Office: Comm Bldg. 2232
E-Mail: jaemin.park@siu.edu
Student Hours: T, Th: 1 pm – 4 pm

Instructor: Thomas Fagerholm
Office: Comm Bldg. 2234
E-Mail: tfagerholm@siu.edu
Student Hours: T, Th, F: 2:30 pm – 4:30 pm

Course Objectives:

This course is designed to acquaint the student with the commonly accepted conventions, practices, and graphic standards for theatrical drafting. Students will practice the necessary skills to produce drafting appropriate to theatrical production.

Student Objectives:

1. Basic understanding of graphic standards for producing draftings for the theater. (G2 & 4)*
2. Develop basic skills in utilizing one or more CAD software applications for the creation of theatrical drafting. (G1, 2, 4)
3. Complete one packet of drawings from a theoretical production. (G1, 2, 4)

*See SoTD Website for SoTD Mission & Program Goals

Recommended Reading:

Shanda, Mark, et al. *Drafting for the Theatre*. 2nd ed. ed. Southern Illinois University Press, 2012.
Shrock, Cheryl R. *Beginning Autocad 2024 Exercise.* INDUSTRIAL PRESS, 2023.
Vectorworks supplement: Hillmar, Gregg. Light Plot Deconstructed

Web Resources:

Software:

AutoCAD 2023/2024 free student download: http://www.autodesk.com/education/free-software/all
Vectorworks free student download: http://student.myvectorworks.net/
WYSIWYG free student download: https://cast-soft.com/students/

Tutorials:

Switching from AutoCad to Vectorworks: https://www.youtube.com/watch?v=2sBO8r8PGL8
Vectorworks getting started tutorials: http://www.vectorworks.net/training/getting-started-guides/
AutoCAD 2023 User's Guide: https://help.autodesk.com/view/ACD/2023/ENU/
Vectorworks tutorial: PDF also available from instructor
WYSIWYG getting started tutorial: PDF available from instructor

HYBRID Elements

Several class periods will be dedicated studio (project) work time with access to faculty assistance. During these class times students may choose to work from home rather than in class. An online meeting will be setup for any students working from home to answer questions.

Late Work

All assignments are due uploaded to D2L at the BEGINNING of class on the Due date specified on the class Schedule. Assignments must include the source file AND a PDF of the completed project. Final Exam due at end of exam period. Any work that is turned in late will be lowered by one letter grade for each class period. All electronic file names please use the following format: last name, first initial assignment name & number as shown in this example (FagerholmT VW2 ***OR*** ParkJ AutoCAD1).

DO NOT come to class sick! Please contact the instructors before class if you will be tardy or absent.

Final Grade

Each Assignment will be graded on a 100pt scale. Final Grade will be determined as follows: Assignments = 60% of final grade, Final Project = 40% of final grade. Grading scale is:

A 100-93	B+ 89-88	C+ 79-78	D+ 69-68	F 59-0
A- 92-90	B 87-83	C 77-73	D 67-60	
	B- 82-80	C- 72-70		

DATE	ACTIVITY	ASSIGNMENTS DUE
23-Aug	Introduction to Course	
30-Aug	Theatrical Drafting Practices and Graphic Standards	
6-Sep	Intro to Vectorworks	
13-Sep	Vectorworks Studio	**Advanced Class:** Assignment Due Date #1
20-Sep	Vectorworks Studio	
27-Sep	Vectorworks Studio	Assignment 1 Due: Vectorworks
4-Oct	Vectorworks Studio	
11-Oct	Intro to AutoCAD	Assignment 2 Due: Vectorworks **Advanced Class:** Assignment Due Date #2
18-Oct	AutoCAD Studio	
25-Oct	AutoCAD Studio	
1-Nov	AutoCAD Studio	Assignment 3 Due: AutoCAD **Advanced Class:** Assignment Due Date #3
8-Nov	AutoCAD Studio & Assign Final	
15-Nov	Studio work on Final Project	Assignment 4 Due: AutoCAD
22-Nov	**Thanksgiving Break**	
29-Nov	Studio work on Final Project	**Advanced Class:** Assignment Due Date #4
6-Dec	Studio work on Final Project	
TBD	**Final Exam TBD**	**Final Projects Due by End of Exam Period**

THEA 416A – Structural Design for the Stage – FALL 2022

Class Time: Wednesdays & Fridays 11am - 12:15pm
Class location: Observation Room (COMM 2040)
Subject to Change: Make certain you have the latest version. Version 1.0

Instructor: Thomas Fagerholm
Office: Comm Bldg. 2234
E-Mail: tfagerholm@siu.edu
Office Hours: T, Th., F: 2:30 pm – 4:30 pm

Course Objectives:

- Acquaint the student with the commonly accepted conventions and practices of structural design for the theater. To accomplish this, students will practice the necessary skills to analyze and produce appropriate, stable, and safe structures for theatrical productions.

Course Content

- Course will consist of lectures, demonstrations with discussions, written assignments, and in-class exercises.
- Topics:
  - Forces, Stresses, and Strains
  - Stress Analysis for Beams
  - Geometric Properties
  - Saw Lumber Beam Design
  - Combined Loading Design for Sawn Lumber

Course Outcomes

Students successfully completing this course must be able to:

- **Demonstrate,** through discussions and classroom assignments:
  - A familiarity with and understanding of the importance of structural design for creating safe theatrical structures. (G1, 4)*
  - A familiarity with and understanding of technical theater terms, construction materials, and stagecraft practices. (G4)
  - A critical framework with which to analyze scenic designs for construction purposes. (G1, 4)
  - An ability to analyze and evaluate various materials used in scenic construction. (G1, 4)

  *See SoTD Website for SoTD Mission & Program Goals

Required Text:

- Holden, Alys. Sammler, Bronislaw. Powers, Bradley L. & Schmidt, Steven A. Structural Design for the Stage. 2nd Edition. Focal Press. 2015

Course Supplies:

- Scientific calculator (there are good phone & tablet apps for that)
- Three ring binder with standard notebook paper and pencils with erasers

Assignments:

Assignments will be given daily with the expectation that they completed by the next regular class period.

Late work:

Late work is not accepted. Absent or incomplete work will receive a failing grade for that assignment.

DO NOT come to class sick! Please contact the instructors before class if you will be tardy or absent.
Due to COVID-19 remote work and extensions on assignments will be permitted on a case-by-case basis. We would rather have you join us remotely or work from home than take a chance getting others sick.

Methods of Evaluation:

Final Grade:

Grades will be determined as follows:

- All assignments are weighted equally. Final grade will be determined by averaging all assignments.
- Only odd numbered problems assigned are graded and averaged.
- Even numbered problems are required as part of participation. They are not graded and averaged, however failure to complete even numbered problems will result in a 2% reduction in final grade for each occurrence.

Syllabus change policy:

- This syllabus is a guide for the course and is subject to change with advanced notice.

Grade	Quantitative	Qualitative	Definition
A A-	93 to 100 90 to 92	Excellent	Superior mastery of content for the specific assignment, demonstrated ability to apply structural concepts covered to a practical structural application.
B+ B B	88 to 89 83 to 87 80 to 82	Good	Good understanding of the content for the specific assignment, demonstrated ability to apply structural concepts covered to a practical structural application.
C+ C C-	78 to 79 73 to 77 70 to 72	Average	Sufficient understanding of the content for the specific assignment, ability to apply structural concepts covered to a practical structural application.
D+ D	68 to 69 60 to 67	Below Average	Incomplete understanding of the content for the specific assignment, inability to apply structural concepts covered to a practical structural application.
F	59 and below	Failure	Lack of understanding of the content for the specific assignment, failure to apply structural concepts covered to a practical structural application.

Recordings:

Class lectures / sessions may be recorded as part of the delivery of the course. These recordings will be made available only to students enrolled in the class, to assist those who cannot attend a class session. Recordings will be available for review in D2L in a “view only” format. The recordings will not be downloadable. All class recordings will become unavailable to students in the class when the course is complete.

DATE	CHAPTER . SECTION/READING	ASSIGNMENTS DUE
24-Aug	Introduction to Course & Math review	
26-Aug	2.1, 2.2, pgs. 5-11	
31-Aug	2.3, pgs. 11-16	2.1 and 2.2
2-Sep	2.4, pgs. 16-19	2.3
7-Sep	3.1 pgs. 23-31	2.4
9-Sep	3.2 pgs. 31-32	3.1
14-Sep	3.3 pgs 33-37	3.2
16-Sep	3.4 pgs. 37-43	3.3
21-Sep	3.5 pgs. 43-49	3.4
23-Sep	3.6 pgs. 50-53	3.5
28-Sep	4.1, 4.2 pgs. 59-68	3.6
30-Sep	4.3, 4.4 pgs. 68-74	4.1 and 4.2
5-Oct	4.5 pgs. 74-75	4.3 and 4.4
7-Oct	4.6 pgs. 75-82	4.5
12-Oct	5.1, 5.2 pgs. 87-98	4.6
14-Oct	5.3 pgs. 98-102	5.1 and 5.2
19-Oct	5.4 pgs. 102-106	5.3
21-Oct	5.5 pgs. 106-111	5.4
26-Oct	5.6 pgs. 111-114	5.5
28-Oct	5.7 pgs. 114-124	5.6
2-Nov	6.1 pgs. 129-136	5.7
4-Nov	6.2 pgs. 136-142	6.1
9-Nov	6.3 pgs. 142-145	6.2
11-Nov	**Veterans Day - No Class**	
16-Nov	6.4 pgs. 145-150	6.3
18-Nov	7.1 pgs. 153-156	6.4
23-Nov	**Thanksgiving - No class**	
25-Nov	**Thanksgiving - No class**	
30-Nov	7.2 pgs. 156-159	7.1
2-Dec	7.3, 7.4 pgs. 160-167 & Assign Final	7.2
7-Dec	Final Project	7.3 and 7.4
9-Dec	Final Project	
TBD	**Final Exam**	Final Project

READ SECTION 8.1 by 1st Class of Spring Semester
Have evens done for 1st CLASS

THEA 416B – Structural Design for the Stage – SPRING 2023

Class Time: Wednesdays & Fridays 11am - 12:15pm
Class location: Observation Room (COMM 2040)
Subject to Change: Make certain you have the latest version. Version 1.0

Instructor: Thomas Fagerholm
Office: Comm Bldg. 2234
E-Mail: tfagerholm@siu.edu
Office Hours: T, Th., F: 2:30 pm – 4:30 pm

Course Objectives:

- Acquaint the student with the commonly accepted conventions and practices of structural design for the theater. To accomplish this, students will practice the necessary skills to analyze and produce appropriate, stable, and safe structures for theatrical productions.

Course Content

- Course will consist of lectures, demonstrations with discussions, written assignments, and in-class exercises.
- Topics:
  - Steel Beam Design
  - Steel Column & Tension Design
  - Plywood Design
  - Truss Design

Course Outcomes

Students successfully completing this course must be able to:

- **Demonstrate,** through discussions and classroom assignments:
  - A familiarity with and understanding of the importance of structural design for creating safe theatrical structures. (G1, 4)
  - A familiarity with and understanding of technical theater terms, construction materials, and stagecraft practices. (G4)
  - A critical framework with which to analyze scenic designs for construction purposes. (G1, 4)
  - An ability to analyze and evaluate various materials used in scenic construction. (G1, 4)

Required Text:

- Holden, Alys. Sammler, Bronislaw. Powers, Bradley L. & Schmidt, Steven A. Structural Design for the Stage. 2nd Edition. Focal Press. 2015

Course Supplies:

- Scientific calculator (there are good phone & tablet apps for that)
- Three ring binder with standard notebook paper and pencils with erasers

Assignments:

Assignments will be given daily with the expectation of them being completed by the next regular class period.

Late work:

Late work is not accepted. Absent or incomplete work will receive a failing grade for that assignment.

DO NOT come to class sick! Please contact the instructors before class if you will be tardy or absent.
Due to COVID-19 remote work and extensions on assignments will be permitted on a case-by-case basis. We would rather have you join us remotely or work from home than take a chance getting others sick.

Methods of Evaluation:

Final Grade:

Grades will be determined as follows:

- All assignments are weighted equally. Final grade will be determined by averaging all assignments.
- Only odd numbered problems assigned are graded and averaged.
- Even numbered problems are required as part of participation. They are not graded and averaged, however failure to complete even numbered problems will result in a 2% reduction in final grade for each occurrence.

Syllabus change policy:

- This syllabus is a guide for the course and is subject to change with advanced notice.

Grade	Quantitative	Qualitative	Definition
A A-	93 to 100 90 to 92	Excellent	Superior mastery of content for the specific assignment, demonstrated ability to apply structural concepts covered to a practical structural application.
B+ B B-	88 to 89 83 to 87 80 to 82	Good	Good understanding of the content for the specific assignment, demonstrated ability to apply structural concepts covered to a practical structural application.
C+ C C-	78 to 79 73 to 77 70 to 72	Average	Sufficient understanding of the content for the specific assignment, ability to apply structural concepts covered to a practical structural application.
D+ D	68 to 69 60 to 67	Below Average	Incomplete understanding of the content for the specific assignment, inability to apply structural concepts covered to a practical structural application.
F	59 and below	Failure	Lack of understanding of the content for the specific assignment, failure to apply structural concepts covered to a practical structural application.

Recordings:

Class lectures / sessions may be recorded as part of the delivery of the course. These recordings will be made available only to students enrolled in the class, to assist those who cannot attend a class session. Recordings will be available for review in D2L in a “view only” format. The recordings will not be downloadable. All class recordings will become unavailable to students in the class when the course is complete.

DATE	CHAPTER. SECTION/READING	ASSIGNMENTS DUE
18-Jan	8.1 pgs. 171-179*	
20-Jan	8.2 pgs. 180-188	8.1
25-Jan	8.3 pgs. 189-195	8.2
27-Jan	8.4 pgs. 196-202	8.3
1-Feb	8.5 pgs. 202-211	8.4
3-Feb	9.1 pgs. 215-220	8.5
8-Feb	9.2 pgs. 221-224	9.1
10-Feb	9.3 pgs. 225-226	9.2
15-Feb	9.4 pgs. 227-234	9.3
17-Feb	10.1 pgs. 237-240	9.4
22-Feb	10.2 pgs. 241-250	10.1
24-Feb	10.3 pgs. 250-254	10.2
1-Mar	**SETC**	
3-Mar	**SETC**	
8-Mar	10.4 pgs. 254-260	10.3
10-Mar	14.1 pgs. 355-363	10.4
15-Mar	**Spring Break - USITT**	
17-Mar	**Spring Break - USITT**	
22-Mar	14.2 pgs. 363-369	14.1
24-Mar		
29-Mar	14.3 pgs. 370-377	14.2
31-Mar	14.4 pgs. 377-381	14.3
5-Apr	14.5 pgs. 381-385	14.4
7-Apr	14.6 pgs. 385-390	14.5
12-Apr		
14-Apr	15.1 pgs. 393-397	14.6
19-Apr	15.2 pgs. 397-401	15.1
21-Apr	15.3 pgs. 401-411	15.2
26-Apr	15.4 pgs. 412-417	15.3
28-Apr	15.5 pgs. 417-433	15.4
3-May	Final Project	15.5
5-May	Final Project	
TBD (5/?	**Final Exam**	Final Project

THEA 419 – Technical Direction – FALL 2023

Class times: T-TH, 11:00am-12:15pm

Class location: Observation Room (COMM 2040)

Subject to Change: Make certain you have the latest version. This is version 1.2 8/22/2023

Instructor: Thomas K. Fagerholm
Email: tfagerholm@siu.edu
Office: Comm. Bldg. 2234
Student Hours: Tu, Th, Fr 2:30-4:30pm by Appt.

Required Text:

- Dionne, Rich. Project Planning for the Stage. SIU Press, 2018. ISBN: 9780809336890
- Stribling, Zachary, and Richard Girtain. The Technical Director's Toolkit. New York: Focal, 2016. ISBN: 9780415747295

Recommended texts:

- Shanda, Mark, and Dennis Dorn. Technical Management for the Performing Arts. New York: Focal, 2016. ISBN: 9781138910751
- Rossol, Monona. The Health & Safety Guide for the Film, TV & Theatre. 2nd Edition, Allworth Press, 2011. ISBN: 1581158629
- Raoul, Bill. Stock Scenery Construction Handbook 2nd Edition, Broadway Press, 2015. ISBN: 0911747435
- Hendrickson, Alan, and Colin Buckhurst. Mechanical Design for the Stage. Amsterdam: Focal, 2008. ISBN: 024080631X
- Sammler, Bronislaw J., and Don Harvey. Technical Design Solutions for Theatre: The Technical Brief Collection. Vol. 1-3. Boston: Focal, 2002 & 2013. ISBN: 9780240804903, 9780240804927, 9780415824309
- Circuit & Gear Podcast. https://www.circuitandgear.com/

Class Objectives

- Acquaint the student with the role of the Technical Director as it applies to modern theatre and stagecraft practice. This is accomplished through an in-depth analysis of the planning, bidding, scheduling, structural design, and construction processes used in the production of scenery. Students will apply knowledge from class lectures, discussions, and exercises to hypothetical "real-world" examples of stagecraft challenges facing the modern Technical Director.

Course Content

- Course will consist of lectures, demonstrations with discussions, written assignments, in-class activities and presentations by the students.

Course Outcomes

Students successfully completing this course must be able to:

- **Demonstrate,** through discussions, projects and a final project, a familiarity with and understanding of the roles of the technical director in the SIUC School of Theater and Dance and the theater world at large. (G 1 & 2)*
- **Demonstrate**, through discussions, papers, projects and a final project, a familiarity with and understanding of technical theater terms, materials, and stagecraft practices. (G4)
- **Demonstrate**, through discussions, presentations, and written projects, a developing critical framework with which to analyze scenic designs for the purpose of bidding and preparing production budgets. (2 & 4)
- **Demonstrate** through class assignments, problems, and presentations an ability to analyze and evaluate resources necessary to schedule and complete a theatrical production. (G1, 2, 4)
- **Demonstrate,** through technical research and special topic papers a beginning understanding of proper basic academic writing skills. (G4)
- **Demonstrate** a clear understanding of the planning and paperwork necessary to track a scenery project through the creation of calendars, budgets, material orders, shop drawings, etc. (G2 & 4)

*See SoTD Website for SoTD Mission & Program Goals

Course Requirements:

Projects (90%)

1. Paper: A short paper conveying the students understanding of the roles of a technical director.
2. Bidding Materials & Labor: Estimation of materials and labor hours necessary to complete a scenic design for a theatrical production.
3. Build Schedule: Generate a long-term outlook for the build of a theatrical production considering time, space availability, labor, and materials.
4. New Material Report: Research & present a new material you've not previously used in a theatrical project. Include material availability, cost and feasibility. Provide printed copies of the presentation for class.
5. To Do Lists: Organization and management of the day-to-day operations and goals of a production build.
6. Production Labor: Putting dollar figures to estimated labor hours for assigned production.
7. Rigging Project: Solve a rigging challenge through analysis and drafting to fly a complicated piece of scenery.
8. Shop Drawing packet: Generate a complete packet of construction drawings for a given design packet.

Participation (10%): Participation reflects active engagement in discussions, project presentations, and a positive attitude toward the work. Students are expected to behave in a professional manner, challenge themselves, and give constructive feedback to each other. 10pts Extra Credit awarded for each episode of Circuit & Gear with a paragraph reflection on the episode. (200pts max)

Late work: Late work is not accepted. Absent or incomplete work will receive a failing grade for that assignment. All assignments are due uploaded to D2L at the BEGINNING of class on the Due date specified on the class Schedule. Assignments must include the source file and a PDF of the completed project. All electronic file names please use the following format: last name, first initial, assignment name as shown in this example (FagerholmT TDPaper).

DO NOT come to class sick! Please contact the instructor before class if you will be tardy or absent.

Method of Evaluation:

- Projects @ 90%
  - Paper: What is a TD?
    - 50 pts
  - Bidding project (Materials & Labor)
    - 150 pts
  - Build Schedule
    - 100 pts
  - New Material Report
    - 100 pts
  - To Do Lists
    - 50 pts
  - Production Labor
    - 100 pts
  - Rigging project
    - 100 pts
  - Shop drawing packet
    - 250 pts
- Participation @ 10%
    - 100 Points

❖ Total Points Possible = **1000**

The instructor reserves the right to adjust the student's final grade by a half letter based on his perception of that student's demonstrated growth in knowledge as well as the quality of the student's class participation.

Grade	Quantitative	Qualitative	Definition
A A-	93 to 100 90 to 92	Excellent	Superior quality in the mastery of content and method of the course, demonstrated ability to perceive relationships, initiative in doing work in which quality consistently surpasses that required.
B+ B B-	88 to 89 83 to 87 80 to 82	Good	Good understanding of the content and method of the course, demonstrated ability to recognize relationships, better than average achievement of course objectives and fulfillment of course requirements.
C+ C C-	78 to 79 73 to 77 70 to 72	Average	Sufficient understanding of the content and method of the course, demonstrated ability to recognize obvious relationships, adequate achievement of course objectives and fulfillment of course requirements.
D+ D	68 to 69 60 to 67	Below Average	Incomplete understanding of the content and method of the course, inability to demonstrate satisfactory recognition of obvious relationships, unsatisfactory achievement of course objectives and requirements.
F	59 and below	Failure	Lack of understanding of the content and method of the course, failure to achieve objectives and/or complete requirements of the course.

Attendance:

- Attendance and participation is required and will be reflected in the final grading.
  - ✓ The student is responsible for all lecture and reading material.
  - ✓ Professionalism is expected: Must be punctual and prepared. Coming to class unprepared (i.e. without the tools or clothing needed to work) will be considered an unexcused absence.
  - ✓ A student's final grade will be lowered 1.5 % for each absence, and .5 % for each late arrival to class.
  - ✓ DO NOT come to class sick or under the influence of drugs (including prescribed medications that might cause drowsiness), alcohol, stimulants, etc. If you are suspected of being "Under the influence" you will be asked to leave and a report will be filed with the Chair.

  REMEMBER: Call or email at least 2 hours before class if you will be tardy or absent.

Syllabus change policy:

- This syllabus is a guide for the course and is subject to change with advanced notice.

419 Technical Direction FALL 2023

Schedule v1.0

subject to change

8/14/2023

DAY	DATE	CLASS	Project	Due Dates	Reading	
					Tool Kit	Project Planning
Tue	22-Aug	Intro, Syllabus, production team, & the Collab. Proces	*Assign: TD paper*		Ch 1	Ch 1 &2
Thu	24-Aug	The job, TD @ SIU		**TD Paper DUE**	Ch 2-2.1	Ch 3
Tue	29-Aug	Production Calendars & Excel Tips/Tricks	*Assign: Excel*			Ch 5 & 6
Thu	31-Aug	Excel Presentations & Bidding Materials	*Assign: Bid Project*	**Excel Presentations**		Ch 7
Fri	**1-Sep**	**LAST DAY TO SUBMIT PAPERWORK TO DROP/ WITHDRAW and be eligible for a refund**				
Tue	5-Sep	Bidding Labor				
Thu	7-Sep	Stock vs New Scenery & Steel vs Wood				
Tue	12-Sep	Materials & Technical Writing	*Assn. New Material Rpt.*		Ch 2.3	
Thu	14-Sep	Build & shop schedules, Flow Charts				
Tue	19-Sep	Gantt Charts & Project Management Software	*Assn. Build Sch.*		Ch 4.5	
Thu	21-Sep	Shop safety, OSHA, & SDS				
Tue	26-Sep	Bid Project Presentation & New Material Rpt. update		**Bidding Proj DUE**		
Thu	28-Sep	Safety Continued: Risk Assesments				
Tue	3-Oct	New Material Presentations & To Do Lists	*Assn. To Do Lists*	**New Material DUE**		
Thu	5-Oct	To Do Lists continued &Production Labor	*Assn. Production Labor*		Ch 4.2-4.4 & 5-5.1	Ch 4
Tue	10-Oct	Build Sch. Presentation & Personnel & Shop Mgmt		**Build Sch. DUE**		
Thu	12-Oct	Tool Maintenance & Selection		**To Do Lists DUE**	pg83-98 & Ch 5.8	
Tue	17-Oct	Shop drawings: rear elevations, orthographic proj.	*Assn. Shop Drawings*			
Thu	19-Oct	Shop drawings: Layers, Classes, Blocks, & Symbols				
Tue	24-Oct	Shop Drawings: Drafting in 3d (or work day)			Ch 5.2-5.3	
Thu	26-Oct	Rigging approaches/ Flown scenery				
Fri	**27-Oct**	**LAST DAY TO SUBMIT PAPERWORK TO DROP or WITHDRAW**				
Tue	31-Oct	Labor Pres., Rigging hardware & tools, demo: crimping		**Prod. Labor DUE**		
Thu	2-Nov	Rigging math & analysis of forces	*Assn. Rigging Proj.*			Ch 8
Tue	**7-Nov**	**NO CLASS - ELECTION DAY - GO VOTE!**				
Thu	9-Nov	Shop Drawing Check-In & Tracking Progress		**Groudplan DUE**	Ch 5.4-5.6	
Tue	14-Nov	Moving scenery: revolves, tracking, automation				
Thu	16-Nov	Automation continued			Ch 4-4.1	
Sa-Su	**18-26th**	**NO CLASS - THANKSGIVING BREAK (Sat. - Sun. Nov. 19-27)**				
Tue	28-Nov	Facility Management & Planning New Shop				Ch 9
Thu	30-Nov	Rigging presentations & Variance & Control		**Rigging Proj. Due**		Ch 10
Tue	5-Dec	Project Closeout & Review				
Thu	7-Dec	A TD's Portfolio & Getting the Job				
???	**???**	**???, December ??? @ 2:45pm-4:45pm**		**Shop Drawing Presentation**		

THEA 425 – METAL FABRICATION – SPRING 2022

Class times: W, 2:00-4:50pm

Class location: Comm. 1057 Scene Shop

Subject to Change: Make certain you have the latest version. This is version 1.0 12/14/2022

Instructor: Thomas K. Fagerholm
Email: tfagerholm@siu.edu
Cell: 651-341-3926
Office Hours: T, TH, F 2pm-4:30pm
Office: Comm. Bldg. 2234
by appointment

Required Text:

- Finch, Richard. *Welder's Handbook: A Guide to Plasma Cutting, Oxyacetylene, ARC, MIG, and TIG Welding*. New York: HP, 2007. Print.

Course Supplies

- Textbook
- Notebook and writing implement
- Personal welding equipment (recommended, but optional)
  For extra Practice Materials, go here: https://www.jflf.org/ProductDetails.asp?ProductCode=METAL

Fees:

- There is a $40 lab fee for this course. During this course many perishable items and supplies will be consumed. This fee helps cover non-personal safety equipment, practice metals, and welding shop consumables.

Class Objectives

- Provide an introductory study of the knowledge and practice of the various welding processes for the stage as well as an understanding of the theater practitioner's responsibility to the quality and safety of their projects.

Course Content

- Course will consist of lectures, demonstrations with discussions, written assignments, and projects.

Course Outcomes

Students successfully completing this course must be able to:

- **Demonstrate,** through discussions, projects, practical exams and a final exam, a familiarity with and understanding of metal fabrication as it pertains to theater. (G1, 2, 4)
- **Analyze, Interpret, and Utilize** construction drawings used in the welding process to measure and layout parts to be welded. (G4)
- **Demonstrate**, through projects, practical exams, and a final exam, a familiarity with and understanding of various welding techniques for theater. (G2 & 4)
- **Identify and Utilize**, through discussions, projects, and exams, the tools necessary for metal fabrication and welding typically found in a scene shop. (G2 & 4)

Lab Groups:

Each student will be assigned a Lab group. This group is responsible for meeting outside of the class for a minimum of 3hrs per week. The purpose of this group is to allow students to work outside of class on the techniques demonstrated during the class period and also to complete the projects due for the course. There are two rules that apply to the welding shop during evening and weekend hours:

1. Absolutely NO ONE may work on a welding project alone. Someone else must be present for safety reasons.
2. One person that must be present is a student that is on University payroll (graduate or work-study student)

Participation: Participation includes attendance, and a positive attitude toward the work. Students are expected to behave in a professional manner, challenge themselves, and actively engage in classroom discussions and application of course materials.

Late work: Late work is not accepted. Anyone who comes to class with absent or incomplete work will receive a failing grade for that assignment.

Method of Evaluation:

- Project A – Rebar 10%
- Project B – Brazing & Soldering 10%
- Project C – Layout 10%
- Project D – Shop Project 15%
- Oxyacetylene/ ARC Practical 5%
- Jig/Layout Practical 5%
- Mig Welding Practical 5%
- Quizzes on reading 20%
- Written Final Exam 20%

❖ Total Possible = **100%**

Grade	Quantitative	Qualitative	Definition
A A-	93 to 100 90-92	Excellent	Superior mastery of content for the specific assignment, demonstrated ability to apply techniques to a practical metals project, and initiative in doing work in which quality consistently surpasses that required.
B+ B B-	88-89 83-87 80-82	Good	Good understanding of the content for the specific assignment, demonstrated ability to apply techniques to a practical metals project, and better than average achievement of project objectives.
C+ C C-	78 to 79 73-77 70-72	Average	Sufficient understanding of the content and method of the course, demonstrated ability to recognize obvious relationships, adequate achievement of course objectives and fulfillment of course requirements.
D+ D	68 to 69 60-67	Below Average	Incomplete understanding of the content and method of the course, inability to demonstrate satisfactory recognition of obvious relationships, unsatisfactory achievement of course objectives and requirements.
F	59 and below	Failure	Lack of understanding of the content and method of the course, failure to achieve objectives and/or complete requirements of the course.

The instructor reserves the right to adjust the student's final grade by a half letter based on his perception of that student's demonstrated growth in knowledge as well as the quality of the student's class participation.

Attendance:

- Attendance and participation is required and will be reflected in the final grading.
  - ✓ The student is responsible for all lecture and reading material.
  - ✓ Professionalism is expected: Must be punctual and prepared. Coming to class unprepared (i.e. without the tools or clothing needed to work) will be considered an unexcused absence.
  - ✓ A student's final grade will be lowered 1.5 % for each absence, and .5 % for each late arrival to class.
  - ✓ DO NOT come to class sick or under the influence of drugs (including prescribed medications that might cause drowsiness), alcohol, stimulants, etc. If you are suspected of being "Under the influence" you will be asked to leave and a report will be filed with the Chair.

  REMEMBER: Call or email at least 2 hours before class if you will be tardy or absent.

Syllabus change policy:

- This syllabus is a guide for the course and is subject to change with advanced notice.

THEA 425 Metal Fabrication 2022 CALENDAR

subject to change: Version 1.2 1/11/2022

DATE	MATERIAL COVERED IN CLASS	Chapter	DUE
12-Jan	Intro. & Safety *ONLINE*	**1,2,3,4,5**	
19-Jan	Shop Tools & Metal Basics Tools, Oxyacetylene cutting, bending, welding	**7,8,9**	
23-Jan	**LAST DAY TO DROP and be eligible for a refund**		
26-Jan	Oxyacetylene Brazing and Soldering	**10**	
2-Feb	Plasma Cutting/ Arc Welding	**11,14**	**Project A**
9-Feb	Mig Welding Introduction	**12**	
16-Feb	**Oxyacetylene / Arc Practical Exam**		**Project B**
23-Feb	Jigging Introduction and Demo	**6**	
24-27 Feb	***Big Muddy Play Festival***	**Sun. STRIKE**	
2-Mar	**USITT - NO CLASS**		
9-Mar	**Spring Break & SETC- NO CLASS**		
16-Mar	Final Project idea discussion & work day		**Final Proj. Idea**
23-Mar	**Jigging/Layout Practical Exam**		**Project C**
23-Mar	Welding adjustments & Demo		
27-Mar	**LAST DAY TO DROP**		
30-Mar	**MIG Aluminium**		
6-Apr	**Final project drawings/material list Due**		
13-Apr	**Mig Welding Practical Exam**		**Project D**
20-Apr	Work in Class		
21-24 Apr	***Lucky Stiff***	**Sun. STRIKE**	
27-Apr	Work in Class OR Tig Welding Introduction	**13, 15**	
TBD	**FINAL EXAM & Project E 2:45 - 4:45pm**		**Project E**

THEA 450-743 – Entertainment Automation – SPRING 2021

Class times: W-F, 12:35-1:50pm
Class location: Studio (0022A)
Subject to Change: Make certain you have the latest version. This is version 1.0 1/13/2021

Instructor: Thomas K. Fagerholm
Email: tfagerholm@siu.edu
Cell: 651-341-3926
Student Hours: T, TH, F 2pm-4:30pm
Office: Comm. Bldg. 2234
by appointment

Required Text:

- Conner, Gareth. *Scenic Automation Handbook.* New York: Routledge, 2018. Print.

Recommended texts:

- Platt, Charles. *Encyclopedia of Electronic Components: Power Sources & Conversion.* 1st ed., Vol 1, Maker Media, 2015.
- Platt, Charles, and Frederik Jansson. *Encyclopedia of Electronic Components: Signal Processing*. 1st ed., Vol. 2, Maker Media, 2016.
- Platt, Charles, and Fredrik Jansson. *Encyclopedia of Electronic Components: Sensors*. 1st ed., Vol. 3, Maker Media, 2016.
- Monk, Simon. *Programming Arduino: Getting Started with Sketches*. McGraw-Hill, 2012.

Course Supplies

- Notebook and writing implement
- Software: Spikemark (free)
- Arduino Uno starter kit (Department has 10 Elegoo Arduino kits for check out)
    - Elegoo Uno Project Starter
    - Vilros Uno Ultimate + LCD

Class Objectives

- An in-depth study of the vocabulary, equipment, and practice of entertainment automation as well as an understanding of the safety requirements and standards related to automation.

Course Content

- Course will consist of lectures, demonstrations with discussions, written assignments, and projects.

Course Outcomes

Students successfully completing this course must be able to:

- **Demonstrate,** through discussions, projects, practical exams and a final exam, a familiarity with and understanding of automation as it pertains to the entertainment industry and theater. (G1, 2, 4)
- **Analyze, Interpret, and Utilize** mechanical and electrical drawings used in stage automation to build or setup stage machines. (G4)
- **Demonstrate**, through projects, exams, and a final exam, a familiarity with and understanding of various automation techniques for entertainment or theater. (G2 & 4)
- **Identify and Utilize**, through discussions, projects, and exams, the tools necessary for stage automation typically found in a scene shop. (G2 & 4)

Lab Groups:

Each student will be assigned a Lab group. This group is responsible for meeting outside of the class for a minimum of 2hrs per week. The purpose of this group is to allow students to work outside of class on the techniques discussed & demonstrated during the class period and also to complete the projects due for the course. There are two rules that apply to the scene shop during evening and weekend hours:

1. Absolutely NO ONE may work in the scenic studio alone. Someone else must be present for safety reasons.
2. One person that must be present is a student that is on University payroll (graduate or work-study student)

Participation: Participation includes attendance, and a positive attitude toward the work. Students are expected to behave in a professional manner, challenge themselves, and actively engage in classroom discussions and application of course materials.

Late work: Late work is not accepted. Absent or incomplete work will receive a failing grade for that assignment.

DO NOT come to class sick! Please contact the instructors before class if you will be tardy or absent.
Due to COVID-19 remote work and extensions on assignments will be permitted on a case-by-case basis. We would rather have you join us remotely or work from home than take a chance getting others sick.

Method of Evaluation:

- Project 1 – Arduino 1 5%
- Project 2 – Arduino 2 15%
- Project 3 – Spikemark 10%
- Project 4 – PLC Model 15%
- Project 5 – TBD (Machine Design) 15%
- Quizzes 20%
- Written Final Exam 20%

❖ Total Possible = **100%**

The instructor reserves the right to adjust the student's final grade by a half letter based on his perception of that student's demonstrated growth in knowledge as well as the quality of the student's class participation.

Grade	Quantitative	Qualitative	Definition
A A-	93 to 100 90-92	Excellent	Superior mastery of content for the specific assignment, demonstrated ability to apply learned techniques to automation projects, and initiative in doing work in which quality consistently surpasses that required.
B+ B B-	88-89 83-87 80-82	Good	Good understanding of the content for the specific assignment, demonstrated ability to apply techniques to a practical automation project, and better than average achievement of project objectives.
C+ C C-	78 to 79 73-77 70-72	Average	Sufficient understanding of the content and method of the course, demonstrated ability to recognize obvious relationships, adequate achievement of course objectives and fulfillment of course requirements.
D+ D	68 to 69 60-67	Below Average	Incomplete understanding of the content and method of the course, inability to demonstrate satisfactory recognition of obvious relationships, unsatisfactory achievement of course objectives and requirements.
F	59 and below	Failure	Lack of understanding of the content and method of the course, failure to achieve objectives and/or complete requirements of the course.

Attendance:

- Attendance and participation is required and will be reflected in the final grading.
  - ✓ The student is responsible for all lecture and reading material.
  - ✓ Professionalism is expected: Must be punctual and prepared. Coming to class unprepared (i.e. without the tools or clothing needed to work) will be considered an unexcused absence.
  - ✓ A student's final grade will be lowered 1.5 % for each absence, and .5 % for each late arrival to class.
  - ✓ DO NOT come to class sick or under the influence of drugs (including prescribed medications that might cause drowsiness), alcohol, stimulants, etc. If you are suspected of being "Under the influence" you will be asked to leave and a report will be filed with the Chair.

  REMEMBER: Call or email at least 2 hours before class if you will be tardy or absent.

Syllabus change policy:

- This syllabus is a guide for the course and is subject to change with advanced notice.

THEA 450-743: Entertainment Automation 2021 CALENDAR

subject to change: version 2.0 - 3/16/20

DATE	CLASS	ASSIGNMENT	DUE	READING DUE
1/20	Intro., Our CC Gear, racks, motors, gears, & toys			
1/22	What is Automation? CH: 1 & 2			**CH. 1 & CH. 2**
1/31	**LAST DAY TO DROP W/ REFUND**			
1/27	CH 3: Common Theatrical Machines			**CH. 3**
1/29	Arduino & Basic Commands	Project 1 - Arduino 1 Basic		
2/3	CH 4: Motivating a Machine			**CH. 4**
2/5	Arduino Programming	Project 2 - Arduino 2 Advanced	**Project 1**	
2/10	CH 5: Powering Motors and Actuators			**CH. 5**
2/12	Arduino motor control			
2/17	CH 6: Sensing and Measuring Motion			**CH. 6**
2/19	Arduino feedback info			
2/24	1/4" Scale Model Deck Tracks			**CH. 7**
2/26	CH 7: Simple Control		**Project 2**	
3/3	Spikemark & Project 3 Presentations	Project 3 - Spikemark Programming		
3/5	**SETC**			
3/10	Model Assembly	**USITT**		
3/12	**PLC TRAINER Assembly**	**USITT**		
3/17	Spikemark Continued			
3/19	CH 8: Programmable Logic Controllers			**CH. 8**
3/24	PLC Playtime	Project 4 - PLC BASIC	**Project 3**	
3/26	PLC Playtime			
3/28	**LAST DAY TO DROP**			
3/31	CH 9: Motion Control with a PID Loop			**CH. 9**
4/2	Our Racks, Shop Motors, & Hardware			
4/7	CH 10: Safety & Project 4 Demos	Project 5 - PLC ADVANCED	**Project 4**	**CH. 10**
4/9	Visual Basic Programming & HMIs			
4/14	CH 11: Operator Interface			**CH. 11**
4/16	Stting up our System			
4/21	CH 12: Networks			**CH. 12**
4/23	ESP8266 & Rasberry Pi			
4/28	CH 14: Implementation			**CH. 14**
4/30	Project 5 Presentations & Review		**Project 5**	
TBD	**FINAL EXAM PERIOD**			

Thomas K Fagerholm
+1-651-341-3926 · fagerht02@yahoo.com

Sample Lectures

Back to CONTENTS

THEA 450 Lecture Notes

02 – Common Theatrical Machines

Class Objectives

- An in-depth study of the vocabulary, equipment, and practice of entertainment automation as well as an understanding of the safety requirements and standards related to automation.

Course Outcomes

Students successfully completing this course must be able to:

- **Demonstrate,** through discussions, projects, practical exams and a final exam, a familiarity with and understanding of automation as it pertains to the entertainment industry and theater. (G1, 2, 4)
- **Analyze, Interpret, and Utilize** mechanical and electrical drawings used in stage automation to build or setup stage machines. (G4)
- **Demonstrate**, through projects, exams, and a final exam, a familiarity with and understanding of various automation techniques for entertainment or theater. (G2 & 4)
- **Identify and Utilize**, through discussions, projects, and exams, the tools necessary for stage automation typically found in a scene shop. (G2 & 4)

1) Tech News
   a) Tech News
      i) Trainee Video
      ii) Shackles, Burlap, & Lies
1) CHAPTER 3:
   a) Physics and Definitions
      i) Therefore = ∴
      ii) Approximately = ≈
      iii) Velocity: a vector quantifying speed and direction
         (1) Measured in: feet/sec OR meters/sec
         (2) $v = \Delta x/\Delta t$
            (a) v = velocity
            (b) Δ = change (Greek letter delta)
            (c) x = position
            (d) t = time
      iv) Acceleration: The change in velocity over time.
         (1) Measured in: feet/second/second OR feet/sec^2 (substitute feet for meters for SI)
         (2) $a = \Delta v/\Delta t$
            (a) a = acceleration
            (b) Δ = change (Greek letter delta)
            (c) v = velocity
            (d) t = time
      v) Force: a push or pull exerted on an object resulting in a change of velocity (i.e. acceleration or deceleration)
         (1) F = *m*a
            (a) F = force
            (b) *m* = mass
            (c) a = acceleration
         (2) Measured in pounds (lbs) in the US, or Newtons (N) elsewhere
         (3) An increase in mass or acceleration will increase the force exerted.
            (a) ∴heavier objects require more force to move at same acceleration as lighter objects.
            (b) Newton's First Law of Motion
               (i) If a mass is stationary it will remain stationary, or if a mass is moving with a constant velocity it will continue to do so, until any net force acts on the mass.
            (c) Friction & Gravity
               (i) These other forces act upon scenery requiring force to keep objects moving at a constant velocity.

vi) Work: force exerted over a distance
vii) Power: Work over time
(1) Critically important in machinery: Amount of power required is determined by the speed and force.
(a) Same load can be moved with less power at a lower speed.
(i) Race cars have large motors creating lots of power to go FAST!!!
(2) Measured in: horsepower (HP) in US, or watts (W) & kilowatts (kw) everywhere else.
(3) 1hp = 550lbs at 1ft/sec
(a) 1hp ≈ 750w or 0.75kw
(4) To determine how much power (HP) you need for a machine consider these basics
(a) P = (F x v)/550
(i) P = power in horsepower
(ii) F = force in pounds
(iii) v = velocity(speed) in feet per second
viii) Torque: rotational force
(1) Measured by perpendicular (tangent) linear force multiplied by distance from center of rotation.
(a) Noted as foot-pounds (ft-lb) OR inch-pounds (in-lb) in US and newton-meters (Nm)
(2) Lever arm – greater distance from center of pivot point creates greater rotational force (torque)
(3) In motors, the rotational force exerted by the motor decreases the further a load is from the center of the shaft
(4) Torque of motor:
(a) Torque (in-lb) = (Horsepower x 63025) / Motor RPM
(i) RPM = revolutions per minutes

b) Components:
i) McMaster Carr
ii) Go through Book & shop
(1) Gear Reducer
(2) Pulleys
(3) Sprockets
(4) Chain
(a) ANSI #(25,35, 40, 50, 60, 80, 100)
(5) Shafts
(6) Bearings
(a) Radial vs Thrust vs Linear
(b) Bushings
(c) Roller bearings
(d) Pillow block bearings
(e) Flange Bearings
(7) Miss-alignments
(a) Angular misalignment
(b) Parallel misalignment
(8) Couplings
(a) Rigid
(b) U-join
(c) Bellows
(d) Spider
(e) Chain
(9) Brakes & motors
(10) Winches
(a) Fleet angle
(b) Encoder
(c) Limits
(11) Dogs & Knives
(12) Turntables
(a) Pivots
(i) Shaft and sleeve
(ii) Flanged blocks
1. Single vs double
(iii) Slew rings
(b) Dive methods
(i) Friction
1. Wheel
2. Cable
3. Chain
(ii) Chain driven – engaged
(iii) Gear drive
(13) Hoists
(a) Secondary brake
(b) ANSI E1.6.2012
(14) Lifts
(a) NOT ELEVATORS
(b) Scissor lifts
(c) Four post lifts
(15) Roll Drops
(16) Turtles

Motivating A Machine

THEA 450 – Entertainment Automation

Prof. Thomas K. Fagerholm

- Power Sources
  - What's doing the work?
    - Electric Motors
    - Pneumatics
    - Hydraulics

- Electric Motors
  - Speed Control
  - Torque
  - Noise
  - Mounting options
  - Electrical Requirements
  - Motor types
    - DC Permanent Magnet Motors
    - AC Induction Motors (single phase)
    - AC 3-Phase Induction Motors
    - Brushless DC Servo Motors
    - Stepper Motors

LEARN MORE:

Electric Motors and Drives 5th ed. by Austin Hughes and Bill Drury

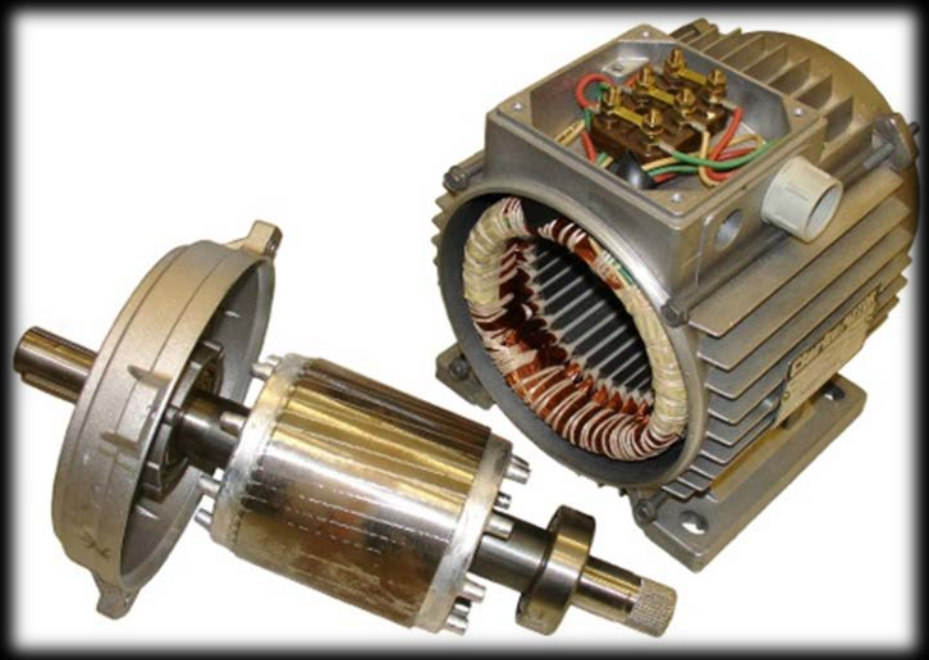
Electric Motors and Control Systems

Wiring Simplified 45th ed.

- Parts of a Motor
  - Rotor
  - Stator

- How an Electric Motor Works
  - Magnetic Flux – radiating lines of force that flow from north pole of magnet to south pole
  - Like poles repel
  - Unlike poles attract

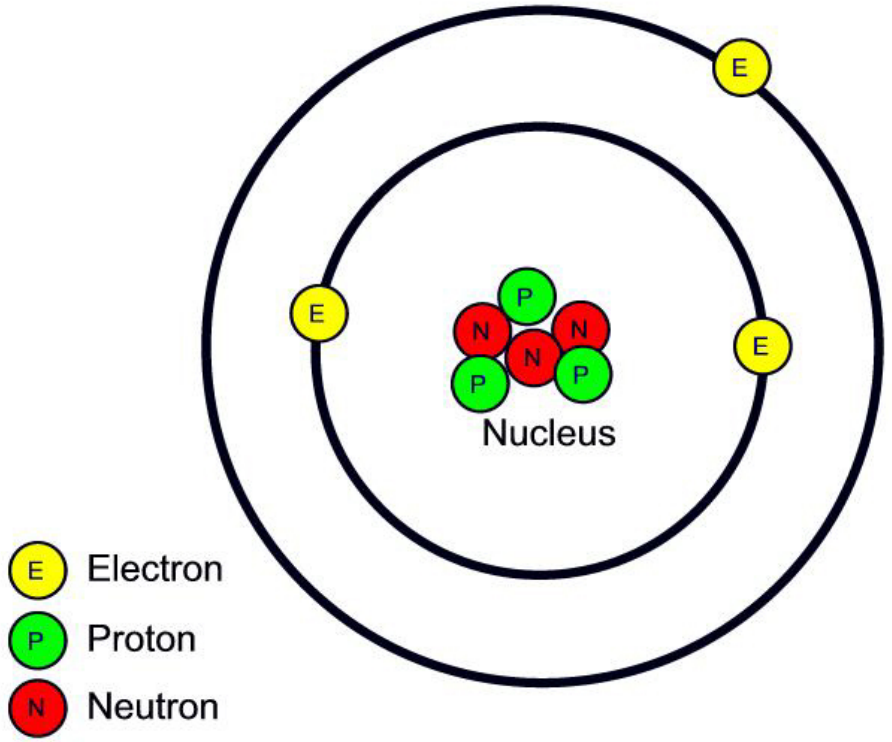
- Links to Check Out
  - DC Motors
  - Single Phase AC Induction Motors
  - 3 Phase AC Motors



- Electricity: electromotive force to perform work
  - Make lamps glow
  - Motors run
- Electronics: low voltage circuits and devices used to control the flow of electricity

The Atom: Smallest Particle of a chemical element that retains the structural properties of that element

ANATOMY OF AN ATOM



<u>Anatomy of an Atom:</u> Nucleus & orbiting Electrons

<u>Parts of the Nucleus</u>

Proton: A fundamental particle in the structure of the Nucleus of an atom. Possesses a positive charge

Neutron: A fundamental particle in the structure of the Nucleus of an atom; possesses a neutral charge.

<u>Orbit</u>

Electron: A negatively charged fundamental particle that orbits around the nucleus of an atom

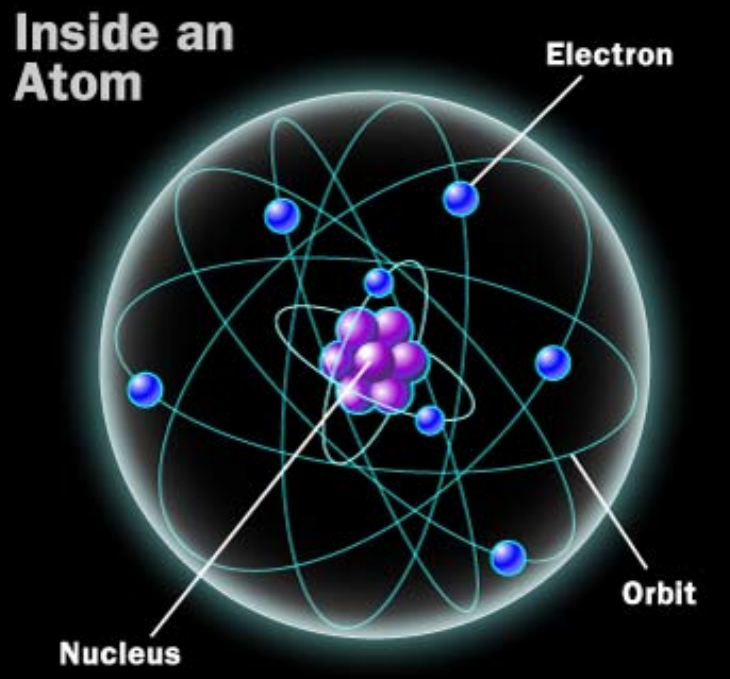
LAW OF CHARGES:

Like charges repel.

Unlike charges attract.

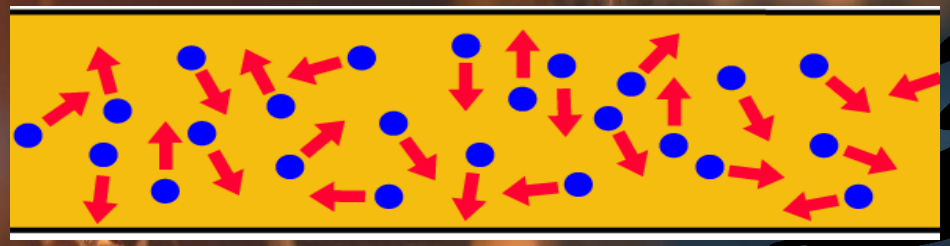
Electrons flow towards Protons.

This force keeps electrons in orbit.



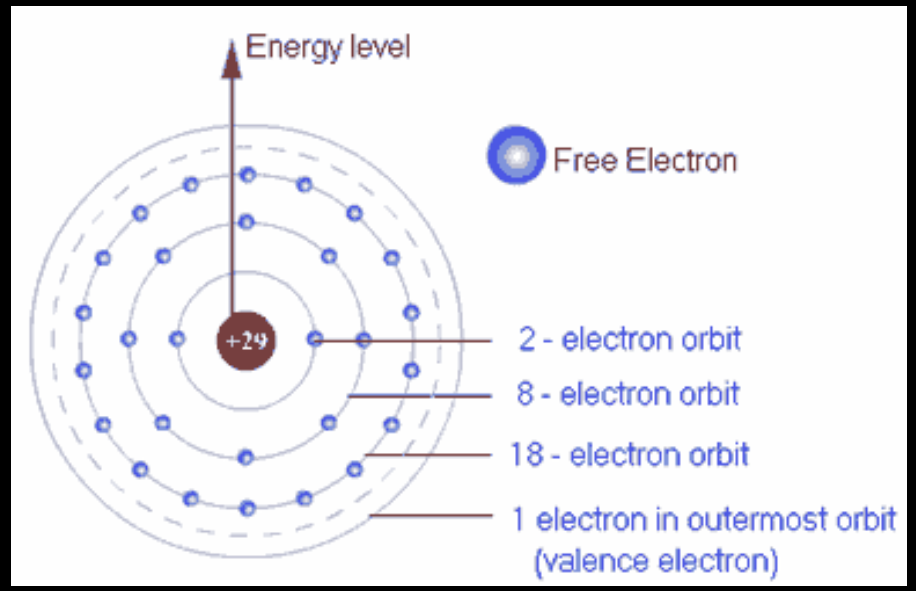
Valence Electrons

The electrons in the outermost shell of an atom are called valence electrons; they dictate the nature of the chemical reactions of the atom and largely determine the electrical nature of solid matter.

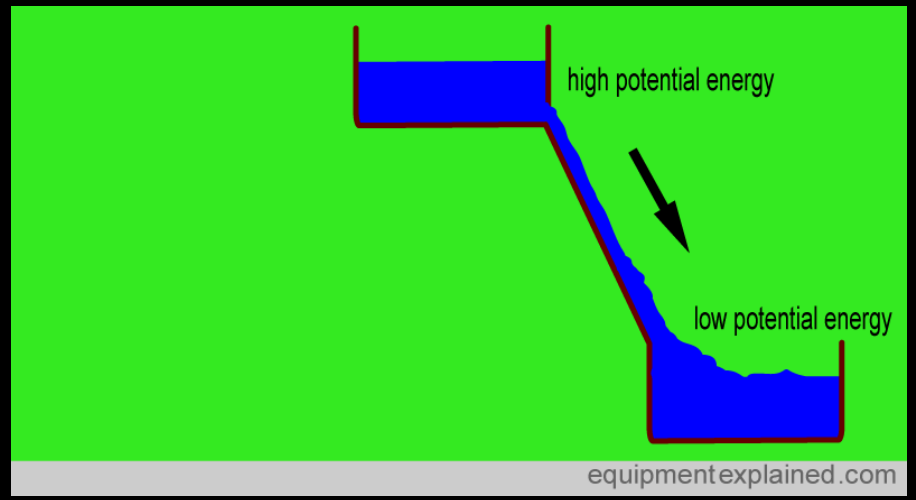


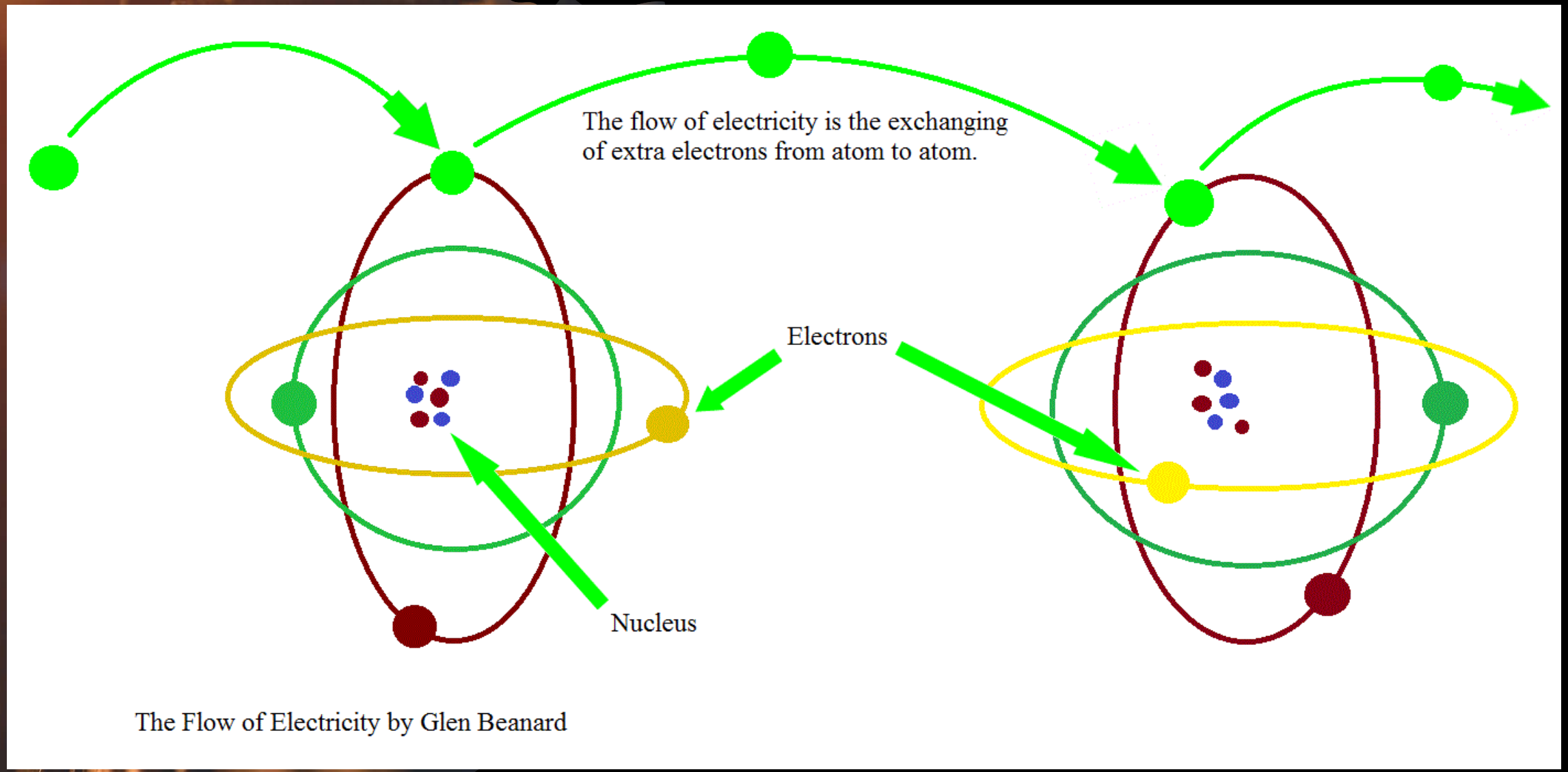
Natural electron movement within copper

Potential: The difference in electrical charge between two bodies; measured in volts.



COPPER ATOM





The Flow of Electricity by Glen Beanard

Potential is created when there is a deficit of electrons.

Electrical Current: The flow or movement of electrons through a conductor.

Conductor: Any material with may free electrons, such as copper, silver, gold and aluminum.

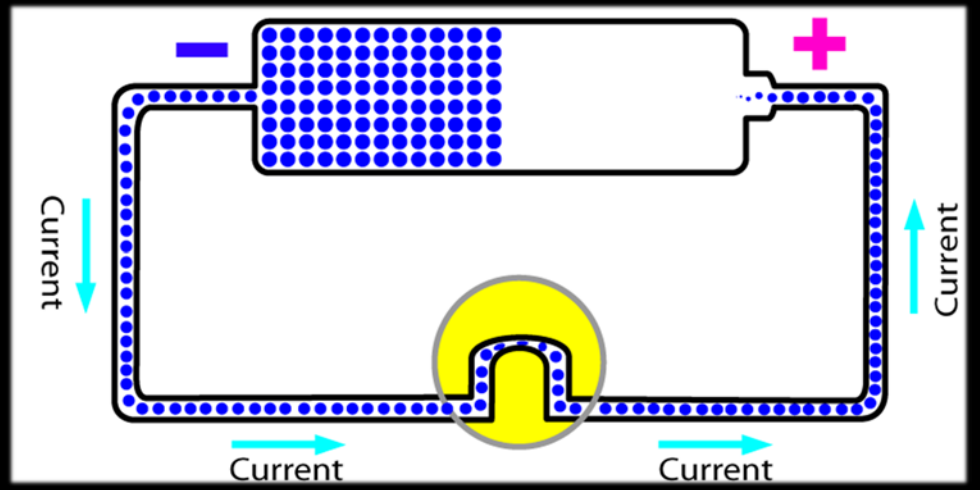
Ampere (Amp): The unit of measurement of electrical current.

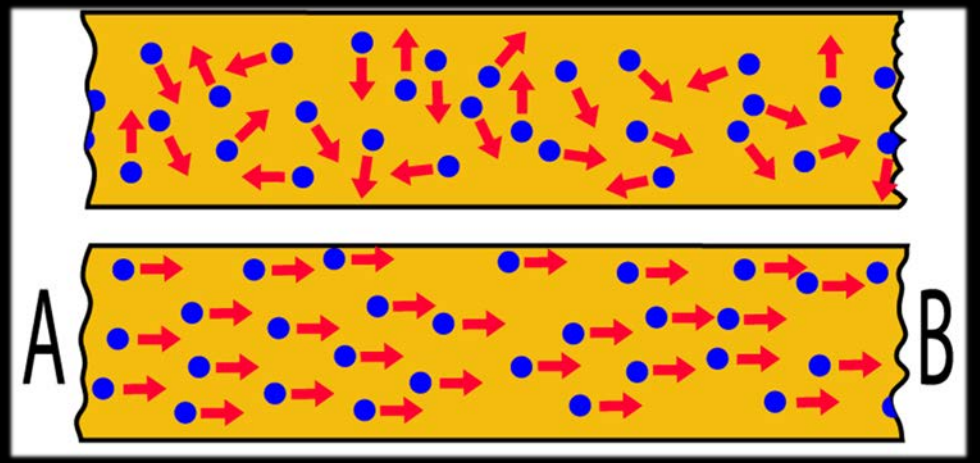
Voltage (Volts): Unit of measurement of electrical potential. (The difference in the electrical charge between the bodies.)

Wattage (Watts): Measure of power (W=VA)

Source: The origin of electrical potential. Ex. Battery or wall outlet.

Circuit: A conductive path through which electricity flows.





Electron movement is directed by potential, creating current.

POWER CALCULATIONS

Current is the flow of electrons, amperage.

Speed of electron flow is constant.

Amount of electrons in current flow is variable, measured by Ampere.

i.e. Water pressure in a pipe.

Potential difference, or voltage, is what makes electrons, and therefore, current flow

Measuring Potential of a circuit

West Virginia formula: W=VA

W = Watts

V = Volts

A = Amperes

PIE formula: P = IE

P = power in watts

I = current in amperes

E = voltage in volts

W=VA

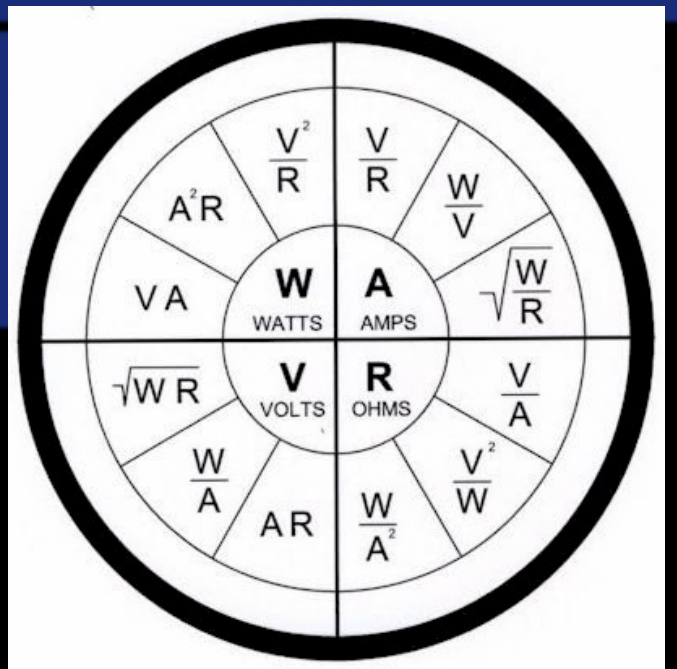
$A=\frac{W}{V}$

$V=\frac{W}{A}$

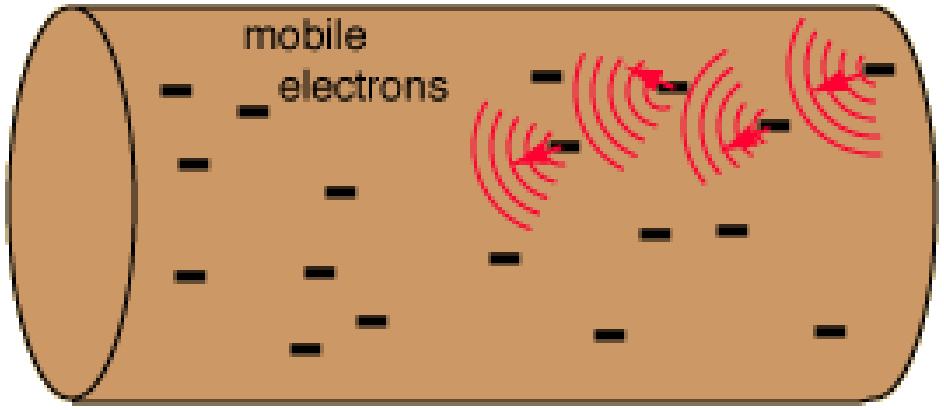
P=IE

$I=\frac{P}{E}$

$E=\frac{P}{I}$

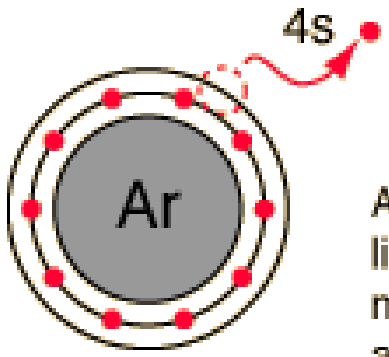


Cross-section of copper wire



An external influence repels a nearby electron

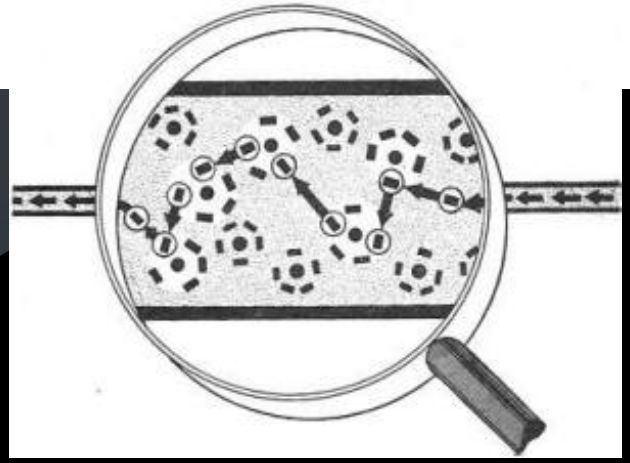
The electron's neighbors find it repulsive. If it moves toward them, they move away, creating a chain of interactions that propagates through the material at the speed of light.



$(Ar)3d^{10}4s$

Copper's valence electrons move freely throughout the solid copper metal.

Atoms of insulating materials hold on tightly to their outer electrons, like good parents watching all their children. Copper and other metals tend to be "poor parents" of their outer or "valence" electrons, and they are just out wandering the neighborhood.



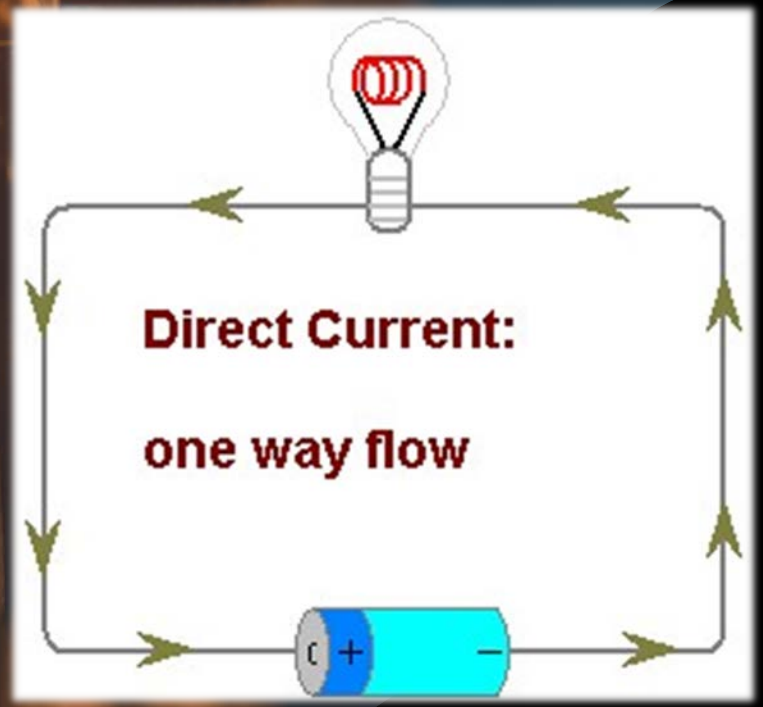
Ohm's law: As voltage increases, current increases; as resistance increases, current decreases.

Resistance:
The opposition to electron flow within a conductor, measured in ohms; the amount of the resistance is dependent on the chemical makeup of the material through which the electricity is flowing.

TYPES OF CURRENT

Direct Current (DC): The flow of electrons in one direction. Travels only short distances.

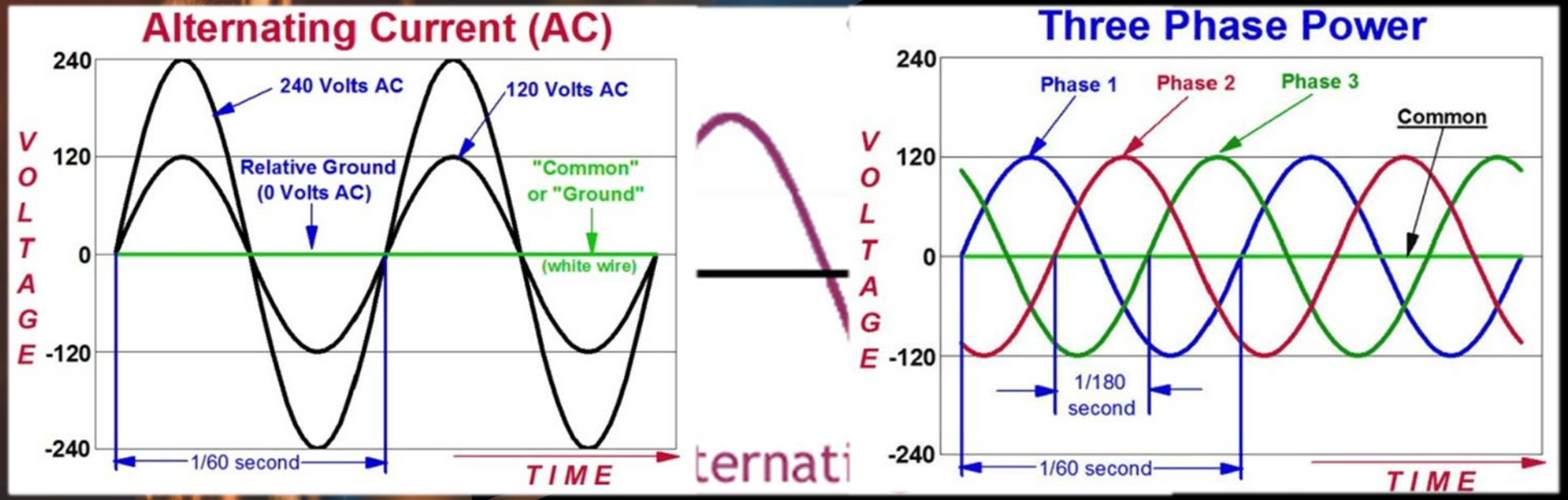
- Sources:
  - Batteries
  - DC Power Supply (wall wort)
- Voltages
  - 3.3v, 5v, 12v, 24v, 36v, 96v



TYPES OF CURRENT

Alternating Current (AC): The flow of electrons reverses direction periodically. In the US it reverses direction 120 times every second, or 60 cycles a second (60Hz). (Europe is 50Hz)

- Sources: POWER PLANT
- Voltages: Measured between the Root Mean Square (RMS) of the waveforms. Typical voltage in US homes varies from 115v to 125v (nominal 120v).
  - Single Phase
    - 120v (hot, neutral, ground) Measured between one 120v hot leg and neutral.
    - 220v (hot, hot, ground) Measured between two 120V hot legs.
  - Three Phase
    - 208v (hot, hot, hot, ground) Measured as the RMS of all three phases
      - Line to Line Voltage – measured between any two phases
      - Phase Voltage – measured between any one phase and ground/neutral

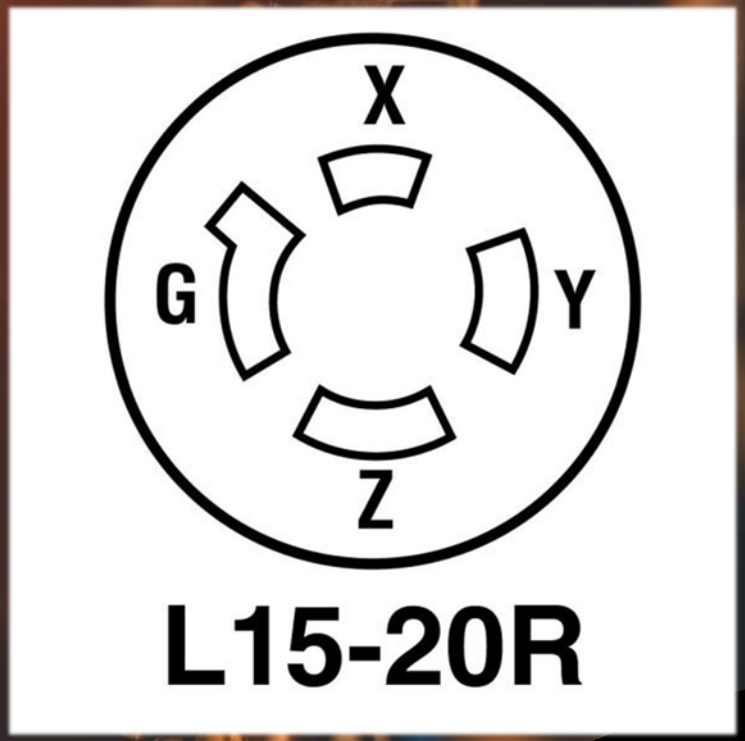


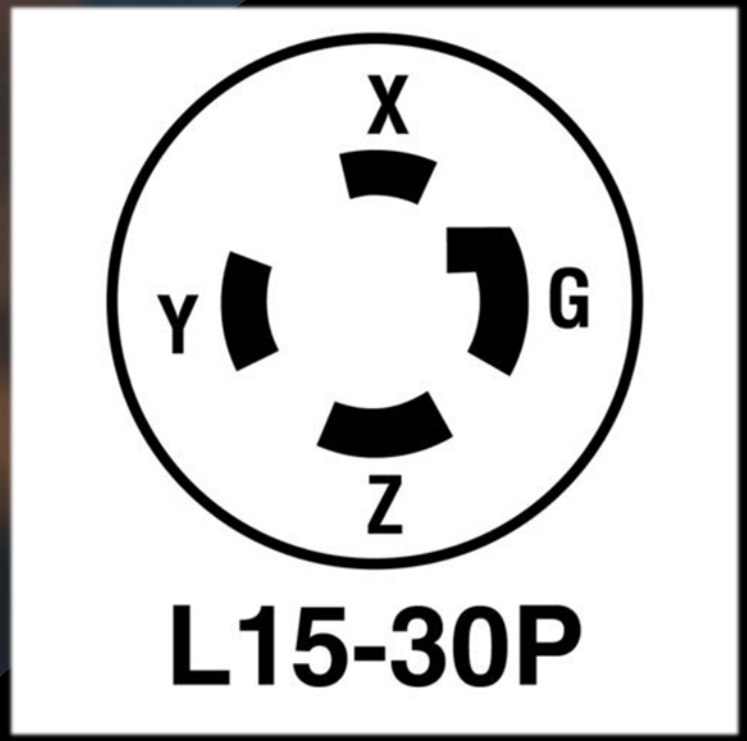
Three Phase Plugs

NEMA – National Electric Manufacturers Association

- L15-30
  - L15-30R
  - L15-30P
- L14-30
  - Intended for 125/250V 30-amp circuits. NOT INTENDED FOR 3Phase
  - Hot, Hot, Neutral Ground

- If you have doubt, confirm the voltage of the power source with a multimeter





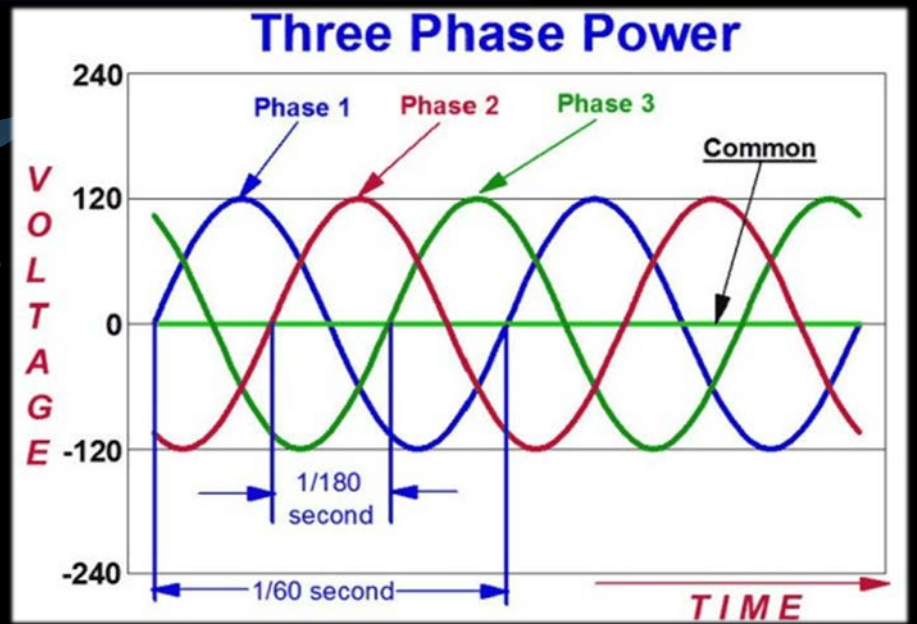
AC Induction Motors

AC Induction motors create a magnetic field in the stator and through the windings, induce a magnetic field in the Rotor causing it to turn in relation to the field moving around the stator.

Single Phase VS Three Phase

- Single Phase AC Induction Motors are NOT suited for Automation
  - Require extra components to start rotation
    - Split-Capacitor Start
    - Shaded Pole
  - Poor torque at lower speeds

- Three Phase Induction Motors
  - The Go-To of Automation Motors

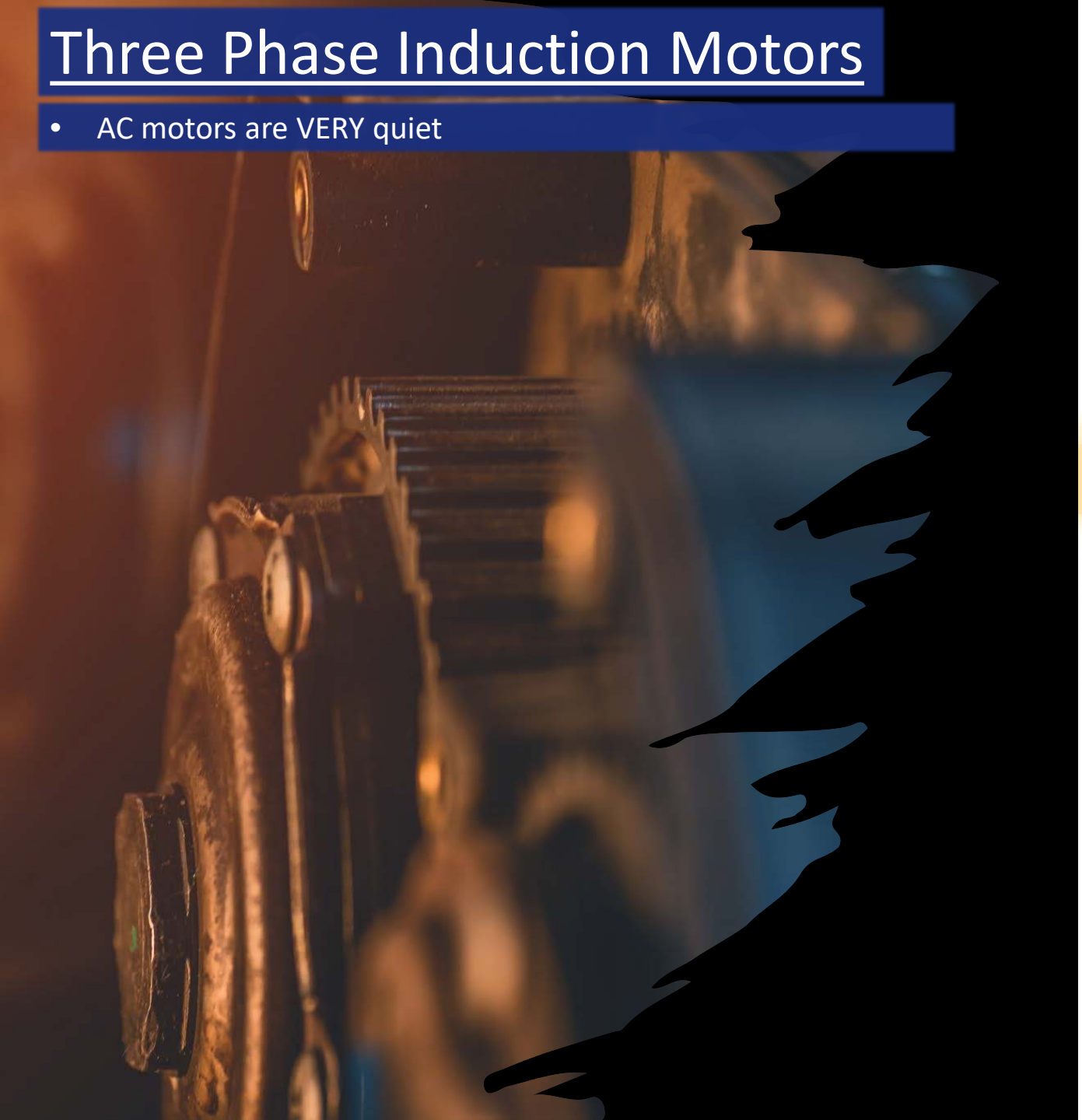


Three Phase Induction Motors

- Inverter Duty – Built to produce consistent torque at varying frequencies
- Direction:
  - Changing Direction is easy
    - Swap any two of the three hot (power) leads
- Speed:
  - Controllable through a Variable Frequency Drive (VFD)
    - VFDs are considered an Amplifier in the Pentagon
- Torque
  - Can be good at low speeds, not as good as DC counterparts
  - Requires a VFD capable of Zero-Speed Torque
    - AND a sensor (encoder) on the motor shaft

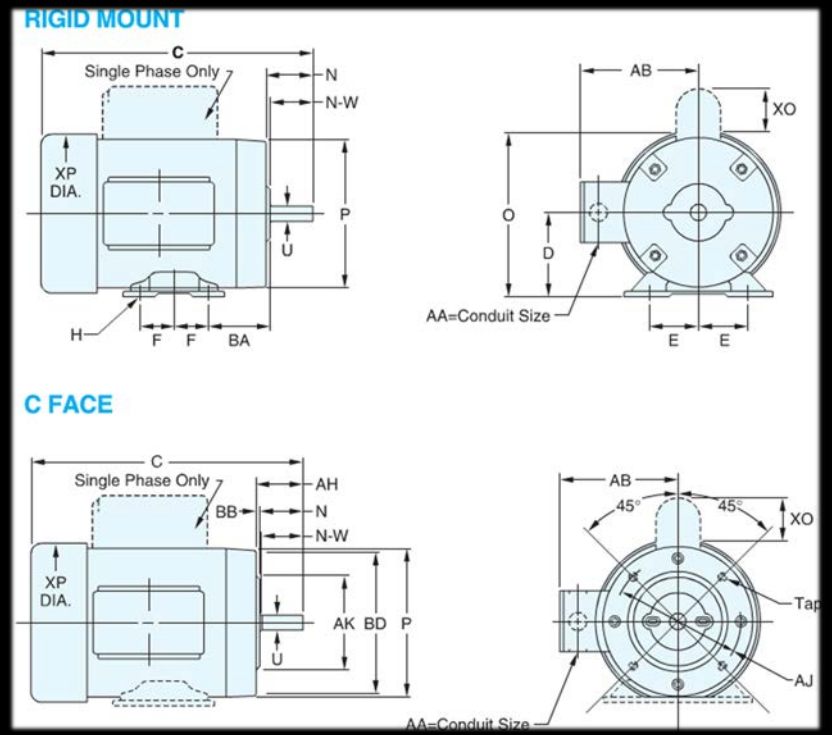
Three Phase Induction Motors

- AC motors are VERY quiet



Three Phase Induction Motors

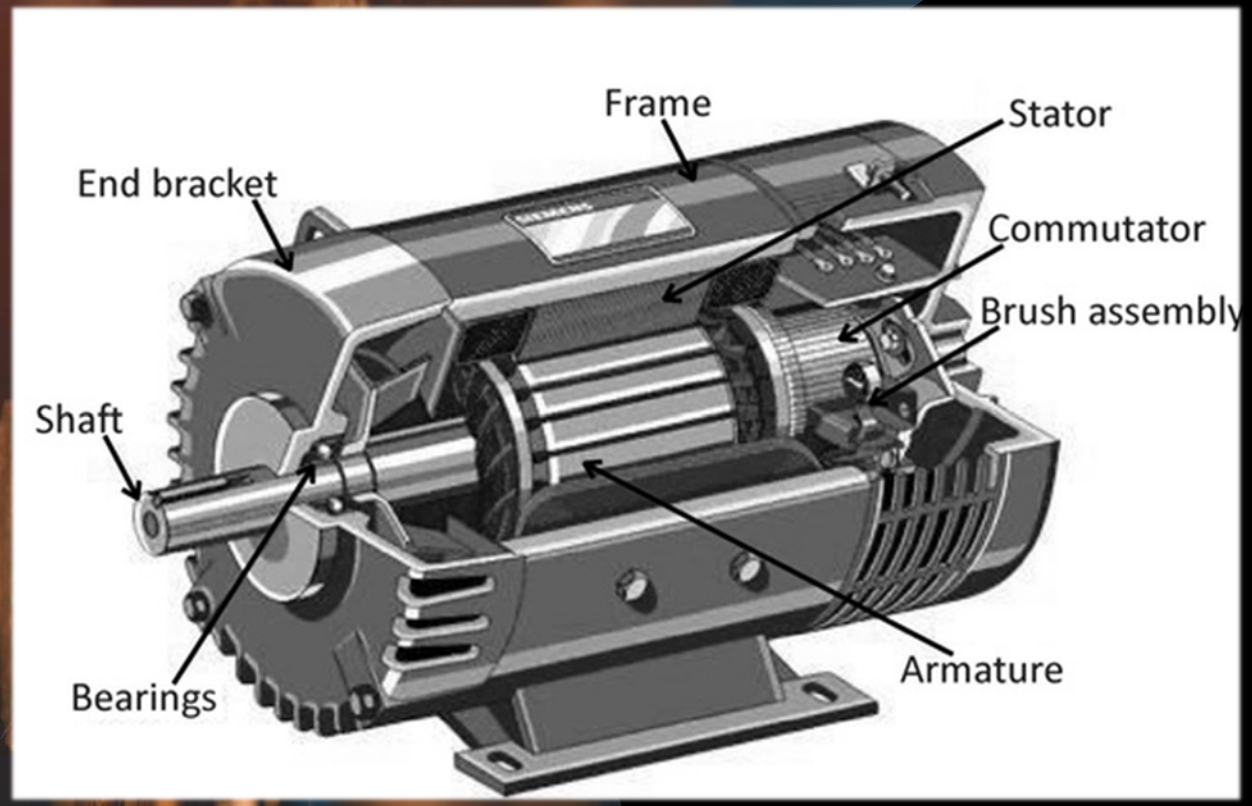
- AC motors are VERY quiet
- Flexible Mounting
  - Can easily attach to:
    - Speed Reducers
    - Brakes
    - Encoders
  - NEMA (National Electrical Manufacturers Association)
    - C-Face
      - Many options for components
- Price
  - Inexpensive Compared to DC Permanent Magnet Motors and Brushless Servo Motors

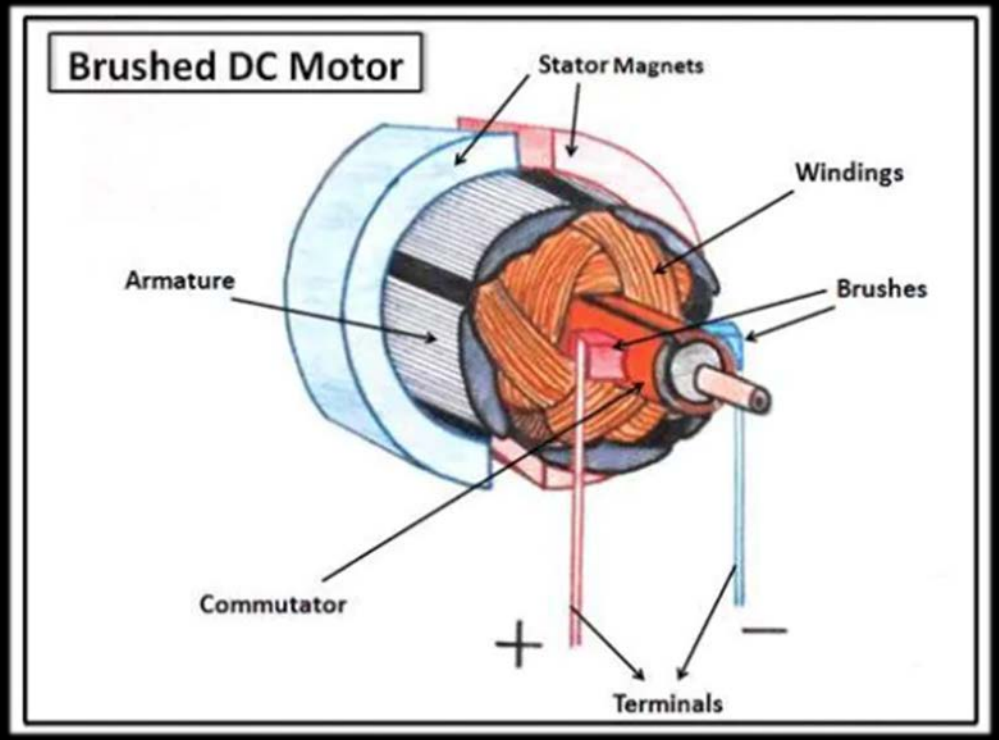


DC Permanent Magnet Motors

Construction

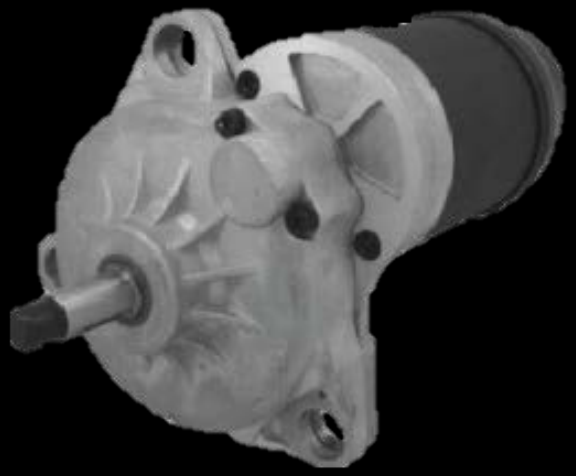
- Stator
  - Permanent Magnets of opposing poles mounted in Stator
- Rotor
  - Copper windings around Armature on Rotor
  - When coils are electrified, a magnetic field is generated around the rotor
    - Causes rotation in relation to permanent magnets
- Brushes transfer power to the commutator on rotor
- Commutator transfer power from brushes to coils in rotor





DC Permanent Magnet Motors

- Speed Control
  - Simple (much simpler than AC)
    - To change speed, change the voltage
    - Potentiometers or Change Resistance
    - Motor Controllers are much cheaper than VFDs



DC Permanent Magnet Motors

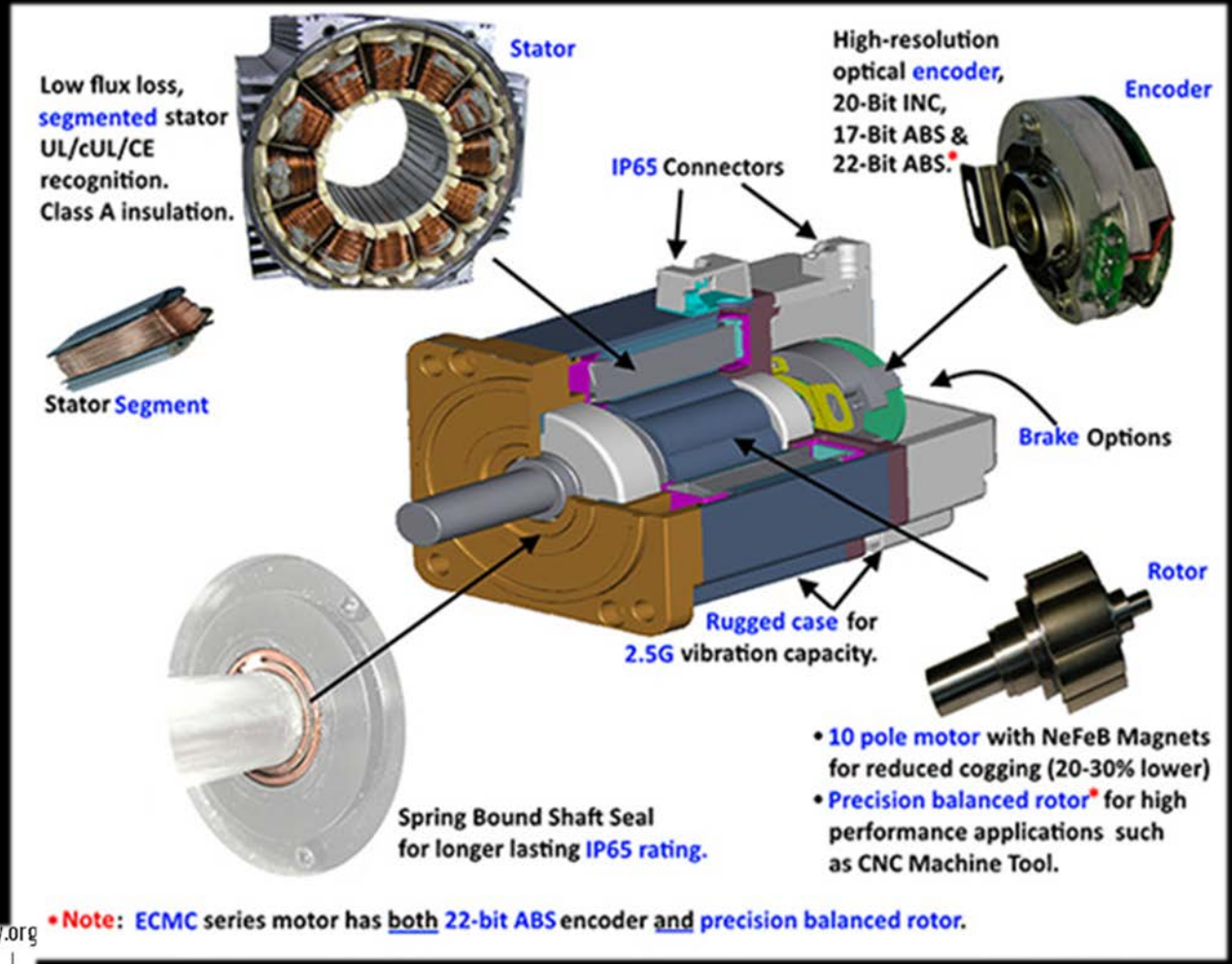
- Speed Control
  - Simple (much simpler than AC)
    - To change speed, change the voltage
    - Potentiometers or Change Resistance
    - Motor Controllers are much cheaper than VFDs
- Torque
  - Excellent low-speed torque
  - Holding a load is easier than with AC Induction Motors
- Flexible Mounting
  - NEMA C-Face options (1/4hp and up)
    - Many options for components

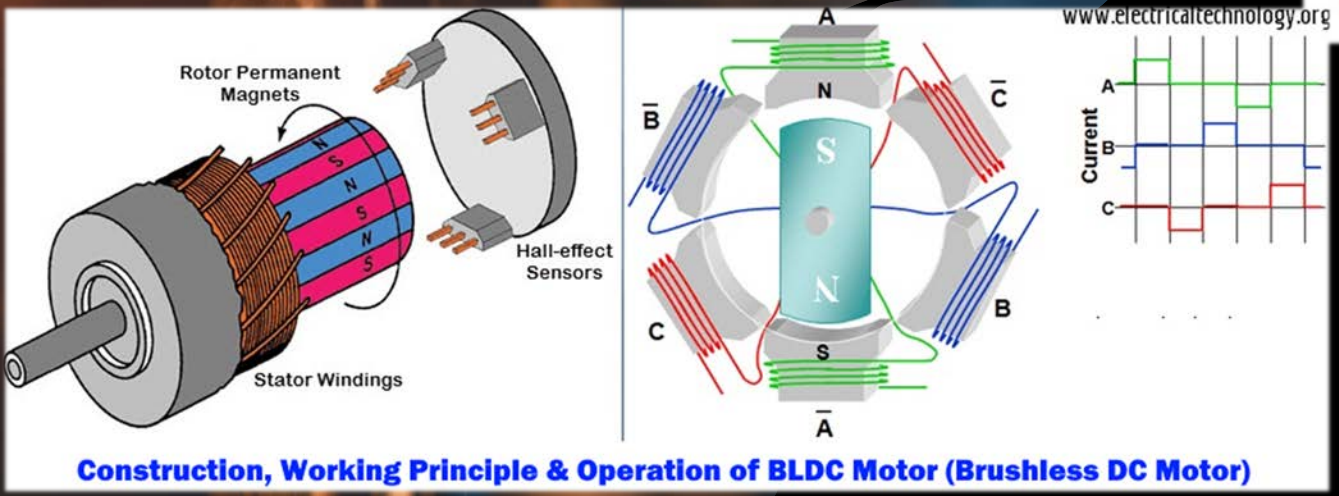
DC Brushless Servo motors

Construction

Same basic Parts but more Complex

- Stator
  - Segmented
  - Independently wired
- Rotor
  - Permanent magnets are mounted in the rotor
- Rotation is caused by timed DC pulses through stator windings
- Encoder
- Driver (amplifier)
  - Utilizes encoder position information to time DC Pulses to rotate motor.





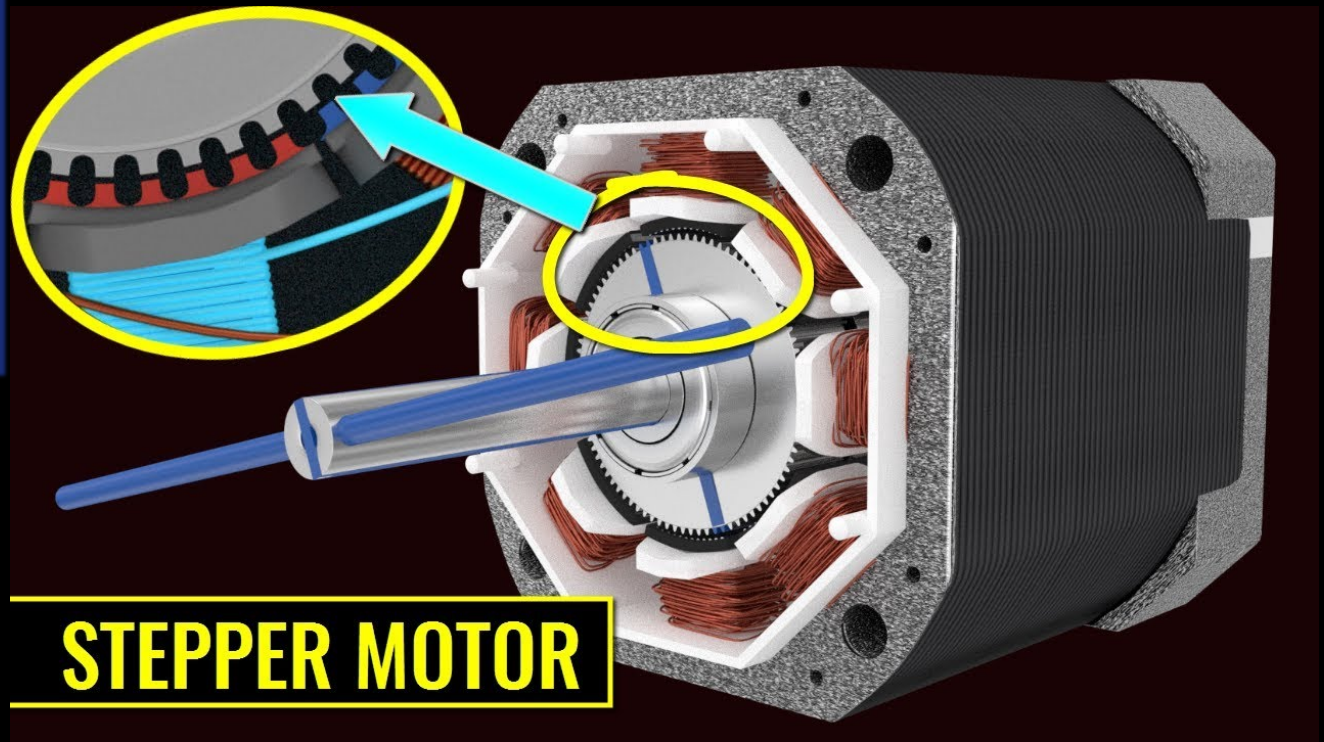
DC Brushless Servo motors

Construction

- Speed Control
  - Requires specialized Drive matched/specific to motor
  - With drive, great control
    - Without – NO GO
- Torque
  - Good low-speed torque
  - Good torque through ought speed range
- Noise
  - Virtually silent
- Flexible Mounting
  - NOT C-Face BUT other mounting options available
  - Hight efficiency speed reducers available
- Size
  - Smaller and lighter than AC Induction Motors
- Price
  - $$$$$$$

Stepper Motors

- Complex Construction
- Torque
  - Low torque overall
  - Good low-speed torque
  - High speed torque is reduced dramatically
- Control
  - Requires specialized Driver
  - Can get some accuracy in position/rotation without encoder
- Noise – Distinctive whine/pitch
- Flexible Mounting
  - NEMA sizes
- Price
  - Inexpensive compared to closed loop options



Structural Design for the Stage

Appendix A: Math Review

Absolute Value: The absolute value of a number is its "distance" from zero and is, therefore, always positive

$|-4| = 4$

$|4| = 4$

MULTIPLICATION AND DIVISION OF POSITIVE AND NEGATIVE NUMBERS

- Multiplying or dividing two positive numbers results in a positive number:
  (+)(+) = +
- Multiplying or dividing two negative numbers results in a positive number:
  (-)(-) = +
- Multiplying or dividing a positive number and a negative number results in a negative number:
  (+)(-) = -

FRACTIONS AND DECIMALS

Integer: whole number

Fraction: any real number that is not an integer

Improper Fraction: a fraction in which the numerator is greater than the denominator

Two parts to a fraction

Numerator: Top value

Denominator: Bottom value

Reciprocal: The reciprocal of a whole number or fraction is its inverse.

$\frac{10}{4} = \frac{4}{10}$ $\quad 6 = \frac{6}{1}$ $\therefore$ the reciprocal is $\frac{1}{6}$

Scientific Notation:

$29{,}000{,}000 = 2.9x10^{7}$ $\quad 6{,}020{,}000 = 6.02x10^{6}$

$0.0000562 = 5.62x10^{-5}$ $\quad 0.0030507 = 30.507x10^{-4}$

ROUNDING

Largely a matter of opinion

Follow these rules

1. Choose a number of significant figures and round all numbers to have that many digits
2. Round up or down to the nearest digit

Conservative & safe approach

a. Round up values which are requirements
   i. Need a min. area of 5.213 in^2
   ii. Round to 5.3 in^2 or 5.5 in^2
b. Round down allowable values
   i. Member has allowable load of 54.7 lbs per in^2
   ii. Round to 54 psi

EQUATIONS

Variables: letters which represent numbers in equations

- Used if an expression is true for all numbers
- Used to represent an unknown number

Communicative and Associative Laws of Addition and Multiplication: If an expression involves addition or multiplication, the order in which the numbers are added or multiplied does not effect the answer.

Order of Operations for Equations

1. Perform operation inside parenthesis. If there are multiple levels of brackets, work from the inside out
2. Perform multiplications, powers, & roots
3. Perform additions

Example:

$$10\{(8+2)-[15-2(7)]+3\}$$
$$10\{10-[15-14]+3\}$$
$$10\{10-1+3\}$$
$$10\{12\}=120$$

Quadratic Equation

$$abx+cx^2+=0$$

x is a variable

$a, b,$ and c are constants

If *a, b,* and c are known quantities, x can be solved for by using the quadratic equation

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

TRIGONOMETRY

Angular Relationships

The Greek letters alpha, beta, theta, and phi are commonly used to represent unknown angles.

α = alpha
β = beta
θ = theta
ϕ = phi

Any angle has complementary and supplementary angles

Complementary angle: the angle necessary to complete 90°
Supplementary angle: the angle necessary to complete 180°

Pythagorean Theorem: Describes the relationship between the hypotenuse and the legs of a right triangle

$$a^2 + b^2 = c^2$$

The trigonometric functions of sine, cosine, and tangent are names for the ratios between two sides of any right triangle

$\sin \alpha = \frac{opposite}{hypotenuse} = \frac{opp}{hyp}$

$\cos \alpha = \frac{adjacent}{hypotenuse} = \frac{adj}{hyp}$

$\tan \alpha = \frac{opposite}{adjacent} = \frac{opp}{adj}$

Values for sine and cosine must always be less than 1 because the length of the hypotenuse is always larger than either of the two legs/sides

When trigonometric values for sine, cosine, or tangent are expressed, at least four decimal places are necessary to accurately define an angle.

Chapter 1: Overview

What: Structural design:

Fundamentally a process of

1. Determining how a system will react to external forces
2. Determining the capacity of the system to resist those forces

Why: Structural design provides a basis for improving empirical techniques maximizing efficiency and/or thinness, minimizing weight and potentially cost, etc.

Lessons to learn from Hyatt Regency Disaster:

The success or failure of a structural system is dependent on its being designed, built, and installed/implemented properly.

Design a system which is single failure proof. Neither the original design nor the modification provided redundancy.

In Theater, it is more vital to understand a structure then it is to analyze it.

Chapter 2: Forces Stresses and Strains

Force: a push or pull
Translation: a net force acting on an object tends to move the object in the direction of the force
To define a force one must specify magnitude, line of action, direction, and sense
kip: short for kilo-pound. Equal to 1000 pounds and is an absolute value.
Magnitude: The quantity of a force. Usually measured in pounds or kips.
Line of action: A force's straight-line path both before and after it
Direction: of a force is the relationship between its line of action and a reference line, such as a horizontal or vertical line
Sense: of a force is positive or negative and refers to the way in which the force acts along its line of action. Each direction has two possible senses. Ex. a horizontal force can act to the right or left. By convention, forces acting up or to the right are positive, and forces acting down or to the left are negative.

Representing forces
Forces are represented as arrows

- **Magnitude** is indicated near the arrow. May also be represented by length of arrow in scale relative to other forces and distances in the system.
- **Line of action** is represented as a dashed line before and after the arrow
- **Direction** of the force is indicated by an angle measurement to a vertical or horizontal reference line
- **Sense** in noted as an arrow head

Diagonal forces

- Resolved into vertical and horizontal component forces using trigonometry.
- **Trigonometry**: A branch of mathematics that studies relationships involving lengths and angles of triangles.
- Diagonal force is considered to be the hypotenuse of a right triangle
    - Component forces are the two legs

Representation of a diagonal force

- Vertical and horizontal components are drawn as dashed lines for convenience
- Arrows are drawn head to tail to each other
- Start at the tail of the force and end with a component arrow pointing at the head of the force

Center of Gravity

- A point defined in all directions around which it will naturally pivot
- The point where, if a single force acts at that point, only translation (straight line motion) of that object will occur
- Used in structural design to transform distributed loads into point loads

Free body diagram

- A simplified sketch of the structural system
- Shows the distances between forces
- Construction and loading details represented by line drawings

Moment of a force: the effectiveness of a force in producing rotation about an axis OR the force's tendency to produce rotation of the object on which it acts

Center of moments: pivot point/ point of rotation

Lever arm/Moment arm: the perpendicular distance between the applied force and the axis

Magnitude of a moment: the product of a force and its perpendicular distance from its line of action to the axis of rotation

Units of a moment: force times distance OR $P\ x\ d$

- Typically expressed as foot-pounds or inch-pounds
- Clockwise forces have a positive sense
- Counterclockwise forces have a negative sense

Line of action of the force is tangent to the rotation of the moment

EQUILIBRIUM

Force law of equilibrium: the algebraic sum of all forces acting on an object in static equilibrium is zero

Static Equilibrium

- Object is at rest/ not moving
- All forces acting on it cancel each other out

If a body is in static equilibrium:

1. The sum of the vertical forces equals zero $\Sigma V = 0$
2. The sum of the horizontal forces equals zero $\Sigma H = 0$
3. The sum of the moments about any point equals zero $\Sigma M = 0$

STRESSES

Stresses: internal forces exerted by one part of a body upon other parts of the same body to resist external forces and their effects

Expression: Stresses are expressed in pounds per unit area. TYP pounds per square inch (psi)

<u>Types of Stresses:</u>

Direct or Axial: responses to external forces which act perpendicular to the cross-sectional plane being stressed.

- **Tensile:** a force which pulls on the body
- **Compressive:** a force which pushes on the body

Tangential: responses to external forces which act perpendicular to the axis of the member

- **Shear:** the tendency of one part of a body to slide past another part of the body (most common). Acts perpendicular to the axis of the member, aka. Parallel to the cross-sectional area of the body
- **Torsional:** resists twisting

Direct Stress: The line of action and direction of a stress will be identical to those of the force causing stress

Direct Stress Formula

$f = \frac{P}{A}$ where f is actual stress, psi

P is applied external force, lbs.

A is cross-sectional area of the member, in^2

Allowable Stress: The amount of stress a given material can safely withstand

- Indicated with an uppercase "*F*"
- Changes for each type of material

Tensile Stress

Has a tendency to lengthen the member on which it is acting.

Fails by pulling apart

Tensile Direct Stress Formula

$f_t = \frac{P}{A}$ OR $P = AF_t$ OR $A = P/F_t$

where *A* is the cross-sectional area of the member, in^2

P is the applied load, lbs.

F_t is the allowable tensile stress, psi

f_t is the actual tensile stress, psi

REMEMBER: F_t is a function of the material choice

f_t is dictated by the loading conditions

If $f_t > F_t$ = failed member

Compressive Stress

Has a tendency to push or shorten a body

Amount of compressive stress a member can resist varies with its length

Fails by Crushing and/or Buckling

Compressive Direct Stress Formula

$f_c = \frac{P}{A}$ OR $P = AF_c$ OR $A = P/F_c$

where *A* is the cross-sectional area of the member, in^2

P is the applied load, lbs.

F_c is the allowable compressive stress, psi

f_c is the actual compressive stress, psi

REMEMBER: F_t is a function of the material choice

f_t is dictated by the loading conditions

If $f_t > F_t$ = failed member

Tangential Stress – Shear Stress

Acts perpendicular to the axis of the member/ parallel to the cross-sectional area of a body.

Shear Direct Stress Formula

$f_v = \frac{P}{A}$ OR $P = AF_v$ OR $A = P/F_v$

where *A* is the cross-sectional area of the member, in^2

P is the applied shearing load, lbs.

F_v is the allowable shear stress, psi

f_v is the actual shear stress, psi

REMEMBER: F_v is a function of the material choice

f_v is dictated by the loading conditions

If $f_v > F_v$ = failed member

Flexural Stress: The result of a horizontal beam supporting a downward load. A combination of tension and compression.

ELASTICITY AND STRAIN

Strain: External forces on a body cause internal stresses to develop which cause deformations in the body. A stretch or compression (change of shape) is a deformation. Strain is defined mathematically as the amount of deformation per inch of the member.

$s = \frac{e}{l}$ where s is the strain, inches/inch

e is the total deformation, in

l is the length of member, in

Elastic Limit: The point at which the relationship between stress and strain is no longer linear. The point where an object will no longer return to its original shape.

Elastic Region: the area of the graph where Hooke's law applies. If the stress is removed, the object will return to its original shape.

Plastic Region: the area of the graph in which permanent deformation will take place.

The Yield Point: the point at which the deformation increases without increasing load. (think taffy)

Ultimate Strength: the point where the material will finally rupture. Depending in the material this may be higher or lower than the yield point of the material.

Homogeneous vs Heterogeneous nature of materials refers to the uniformity of the material

Homogeneous materials such as steel, aluminum, and glass have clearly defined elastic limits, yield points, and ultimate strengths.

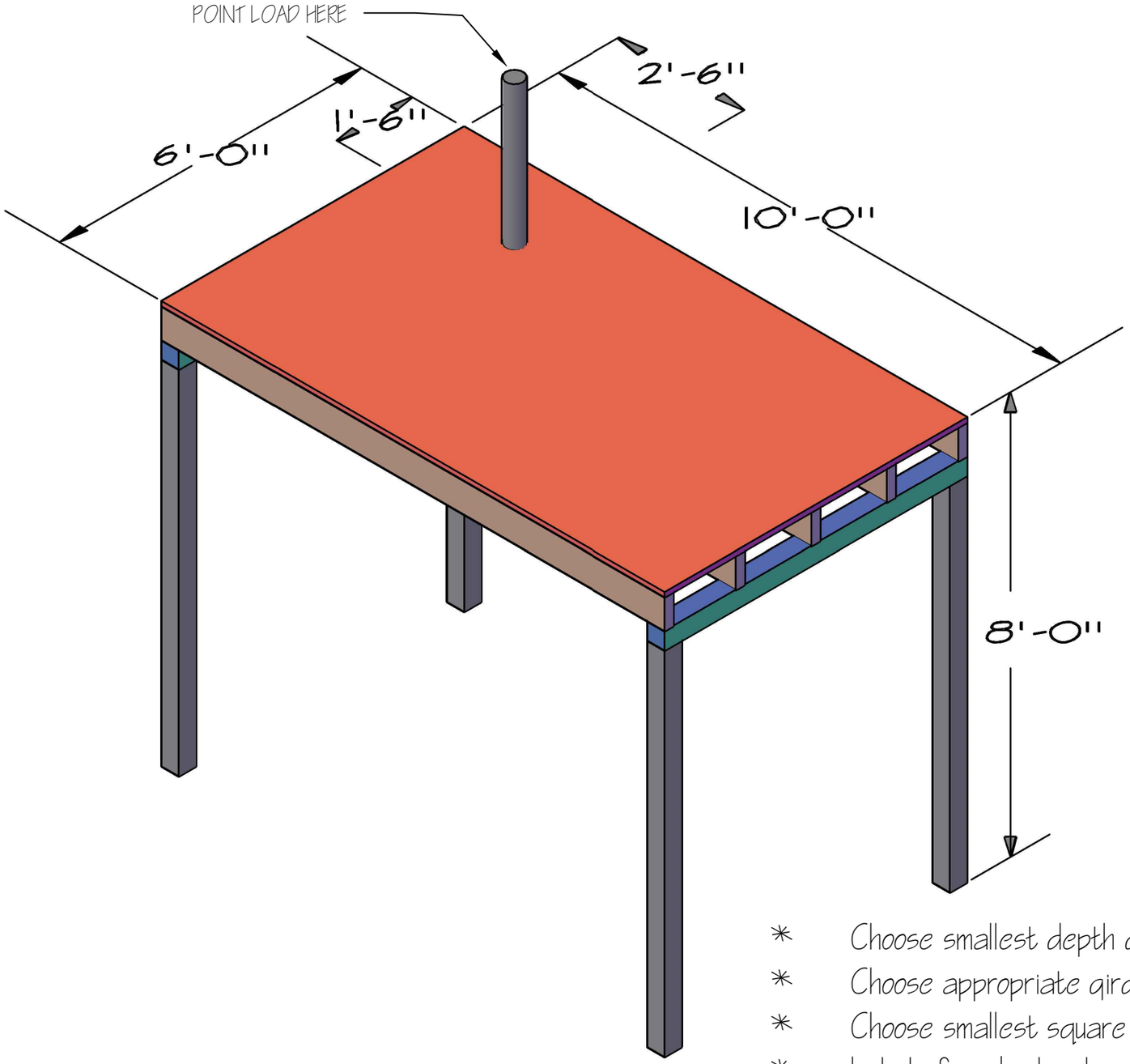
Heterogeneous materials such as wood and concrete do not have easily defined stress verses strain characteristics. Allowable stresses for these materials are calculated more conservatively.

Modulus of Elasticity: The slope of the stress-strain curve in the elastic region. Expressed in psi.

$E = \frac{f}{s} = \frac{stress}{strain} = \frac{psi}{in/in} = psi \quad E = \frac{f}{s} = \frac{P/A}{e/l} = \frac{Pl}{Ae} \quad e = \frac{Pl}{AE} \quad P = \frac{EAe}{l} \quad l = \frac{EAe}{P}$

where *e* is the total deformation, in
P is the applied force, lbs.
A is the cross-sectional area, in^2
l is the length of the member, in
E is the modulus of elasticity, psi

416 A - FINAL



* $\frac{3}{4}$" PLYWOOD DECK
* BEAMS 18" O. C.
* 50 # PER SQ. FT. LIVE LOAD
* 150 # POINT LOAD
* INCLUDE APPROPRIATE ESTIMATED BEAM & GIRDER WEIGHT
* COLUMN HEIGHT = OVERALL MINUS DECK, BEAM & GIRDER DEPTH
* ASSUME TYPICAL THEATRICAL DURATION AND - 1/ 240 FOR DEFLECTION
* ASSUME Ke = 1

* Choose smallest depth dimensional lumber for beams Southern Pine Select Structural
* Choose appropriate girder same species and grade
* Choose smallest square column same species and grade
* Include free-body, shear and moment diagrams

THEA 450 – Metal Fabrication - Lecture Notes

03 – Soldering & Oxyacetylene Brazing

School of Theater and Dance Student Learning Outcomes/Objectives

- Demonstrate an understanding of the individual artist's place in the role of theater as a collaborative art.
- Understand and appreciate the process of production.
- Demonstrate the relationship of theater to world history, societies and cultures.
- Master skills, vocabulary, and concepts necessary in today's theater to understand and practice the art of theater. (SIUC Department of Theater Goals)

I. Joining Metal
  A. Welding - 3,000°-10,000°
    1. Join together metal pieces by heating the surfaces to the point of melting
  B. Brazing - 800° to Melting point
    1. Soldering and brazing, melting a lower-melting-point material between the workpieces to form a bond between them, without melting the work pieces.
  C. Soldering - 800° and lower Capillary action of Soldering and Brazing

II. Soldering
  A. Sealing vs Strength
    1. Used when sealing is more important than strength
      1. Plumbing
      2. Electrical connections
  B. Solder
    1. 50/50 or 60/40
      1. melting temp vs flowing temp
        a. More, Lower flowing temp
        b. Tin percentage always listed first
    2. Leadless Solder
      1. Plumbing & Electronics
      2. Higher melting point so more challenging to learn but can work just as well
  C. Flux
    1. Cleans Chemicaly cleans the material
    2. Seals from atmosphere
    3. Corrosive vs Noncorrosive
      1. Noncorrosive - Rosin core
        a. weak or mild fluxing action
        b. reccomended for all electrical/electronics work
      2. Corrosive
        a. Highly activated fluxing action
  D. Tools
    1. Wire strippers & cutters
    2. Soldering Irons
    3. Soldering Guns
    4. Torch
      1. Acetylene
      2. Propane
      3. Natural Gas
      4. Mapp Gas
  E. Tips
    1. Cleaning
      1. Wire Brush
      2. Steel Wool
    2. Tinning

III. Brazing
  A. Nonferrous Filler Metal
    1. Heated to temperatures above 800°F
      1. 1,050-1,075°F
      2. Mild steel: Bloodred to dark cherry red
        a. Large soft flame at greater distance

1. Medium tip at lower pressures

II. Most common
1. Brass Alloy
a. Copper and Zinc
2. Bronze Alloy
a. Copper and tin

III. Flowing of filler material: Capillary attraction

B. Less likely to warp materials worked on

C. Will join dissimilar metals
I. nickel alloys and copper alloy base metals

D. Strength
I. Joints
1. Lap
2. Strap-Butt Joint
3. T-Joint
4. Angle-Fillet

II. Can be as strong as Welding - 60,000-80,000 psi tensil strength. Bronze on steel ~ 50,000psi

E. Flux
I. Prevents oxidation
II. Aids capillary attraction of nonferrous metal
III. Availabilty
1. Powder
2. Paste
3. Liquid
4. Pre-coated rods

IV. Types
1. specific to types of metal being brazed and use

Thomas K Fagerholm
Examples of Indirect Teaching

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Examples of indirect teaching include:

- Mentoring graduate and undergraduate students as they design and produce theater in the SoTD. Guidance and feedback are given on their performance at each step of the process, including:
  - Design meetings
  - Research
  - Bidding and budgeting labor and materials
  - Sourcing materials
  - Determining technical solutions to design challenges
  - Production meetings
  - Build and install process
  - Technical and dress rehearsals
  - Striking of the production
- Supervising and managing graduate assistants, work-study students, and lab students working in the scenic studio and sound shop.
- Working alongside students in the scenic studio and sound shop.
- Chairing graduate qualifier and thesis project committees and editing the student's document.
- Exhibiting my process when I production manage, technical direct, or design within the SoTD. Students learn through assisting, collaborating, and observing my work.
- Sharing work experiences on productions at other venues and providing further examples of the practice of the craft.
- Teaching new techniques and technology to young professionals with whom I work at outside venues while working on a production.

Students Advised

- Masters' Theses
  - Lenny Lively (Chair)
  - Matthew Logan (Chair)
  - Daniel Hall (Chair)
  - Zachary Alley (Chair)
  - Nathaniel Mohlman (Chair)
  - Jeffrey Richardson (Chair)
  - Robert Anderson (Chair)
  - Micah Daniel Bennett (Chair)
  - Andrew Armas (Chair)
  - John Semanski (Chair)

- Graduate and Undergraduate Technical Directors (other than Thesis)
  - Rachel Schmitz
  - Uriel Achilleus
  - Charlie Lockridge (grad)
  - Matthew Logan (grad)
  - Chynna Bradford (grad)
  - Lenny Lively (grad)
  - Zachary Alley (grad)
  - Jerome Veit
  - Nathaniel Mohlman (grad)
  - Rowen Harder
  - Jeffrey Richardson (grad)
  - Micah Daniel Bennett (grad)
  - Robert Anderson (grad)
  - Andrew Armas (grad)
  - Kyle Ludwig
  - Logan Reagan (grad)

Back to CONTENTS

Examples of Indirect Teaching

- Graduate and Undergraduate Sound Designers
  - Oleksandr Jockusch
  - Molly Heal (grad)
  - Daniel Hall (grad)
  - Stephen Tabor (grad)
  - Ashland Bowman
  - Noah Murakami
  - Kai Youngsteadt
  - Sam Costello
  - Robert Anderson (grad)
  - Jerome Veit
  - Tyler Wyvell
  - Andrew Beyke
  - Logan Reagan (grad)
  - Toni Patti (grad)
  - Mike Maxwell (grad)
  - Sam Forehand

- Graduate and Undergraduate Stage Managers
  - Kayla Mingus
  - Shane Thompson
  - Shelby Patterson
  - Arianna Foreman
  - Lindsey Bergman
  - Eli Jovanovich
  - Grace Reuter
  - Stephen Bognar
  - Genesis Smith
  - Allison Shore
  - Brenna Wiist
  - Veronica Laurent
  - Alex Brue
  - Michelle Macrito
  - Siubhan Stormont
  - Stephen Tabor (grad)
  - Patrick Burke
  - Alexis Wiley
  - Jennifer Caudell (grad)
  - Meg Buntenbach
  - Kyle Aschbrenner
  - Rowen Harder
  - Christian Kurka
  - Justin Broom
  - Chloee Leos
  - Abbigail Warhus
  - Kelley Jordan (grad)
  - Liz Elliot (grad)
  - Bobbi Masters (grad)
  - Sam Forehand
  - Stephanie Chavez
  - Kelli Cotter
  - Elizabeth Dennis
  - Kaitlyn Broyles

- Undergraduate Research Assistants
  - Sam Forehand*

* The UGA program was discontinued after my third year at SIU.

The nature of theater, as a collaborative artform, necessitates indirect instruction. This is prevalent throughout the process from conceptualization, to design, and finally production. My teaching style and strategies in technical direction, stage management, and sound design reflect this both in my work within the School of Theater and Dance and with other professional venues. I believe that as theater artists, our journey is never ending and that there is always something to learn or be taught.

Back to CONTENTS