Redesigning the Structure and Sanitary Aspects of the Portable Toilet

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The purpose of this project was to address the lack of appropriate facilities for women in the construction industry, specifically regarding portable toilets and how they can pose health and safety risks. To do so, a hackathon event was organized with the goal of brainstorming solutions to improve the current design and functionality of portable toilets. This paper provides an overview of what a hackathon is and why it was chosen for this project, and the planning involved. The event took place in the Simpson Strong-Tie Materials Demonstration Lab on California Polytechnic State University’s campus on June 8th and 9th, 2023. Also outlined in this paper are the milestones of the event including a description and visuals of each logistics plan that was created, as well as a detailed summary of the day-of operations. The hackathon provided a platform for participants to use their creative minds and develop physical and digital models to present their solutions. The paper concludes by highlighting the importance of considering women’s needs in the construction industry and discusses further research opportunities, such as exploring other disparities that women face in the construction industry.

Key Words: Construction Industry, Women, Porta Potty, Logistics Plan, Inclusivity

Introduction

According to the Women in Construction page on OSHA, women report that they avoid drinking water on the job, risking heat stress and other health problems because of the lack of appropriate facilities available to them (OSHA, n.d). These facilities include the portable toilet. Not every construction jobsite will have the opportunity to have a jobsite trailer with a restroom that has running water, and many women end up having to use the porta potties on site. In addition to this, OSHA requires that 1 porta potty is provided for every 40 workers when there are more than 20 workers on a single job site, and cleaning of the porta potty must be done twice a week in order to be considered sanitary (Swanson, 2006). The reason that women report avoiding using porta potties is that they often are not suitable for women’s needs. Most porta potties do not have a place to dispose of feminine sanitary products properly nor are they clean enough to sit on the toilet seat. With the growing number of women in the construction industry (Phillips, 2022), it is important to ensure that these needs are being met for health and safety reasons along with addressing diversity and inclusion.
In 2022, a group of students worked together to put on California Polytechnic State University’s Construction Management Department’s first hackathon regarding women in construction. This hackathon was held in hopes of changing the traditional safety vest to be more suitable for women’s use. This event hosted both students and industry members and provided a space that fostered creativity and innovation. With the success of last year’s V.E.S.T. Hackathon, the decision was made to continue pursuing the event by centering the new theme around other gender discrepancies in the construction industry. Bringing together industry members, students, and faculty is an effective way to spread awareness and share different perspectives on topics regarding inclusivity (Yasar, 2023). This paper will discuss what a hackathon is as well as why it was chosen for this project. The event took place in the Simpson Strong-Tie Materials Demonstration Lab on California Polytechnic State University’s campus on June 8th and 9th, 2023

What is a Hackathon?

A hackathon is an event where people work together with the intention of taking an item or technology and making it more suitable for use. Hackathons bring people with technical backgrounds together for problem-solving and developing new ideas, and new and innovative products that would otherwise be costly and complex can be created within a short period during hackathons (Yasar, 2023). This type of event can be either a competitive event or create more of a collaborative atmosphere. Although hackathons were originally created for coding and the technology industry, they have since then been expanded to other industries to foster creativity and encourage growth (Bernabei, 2022).

A typical hackathon runs for a period of time that can last from 24 hours or over the course of a weekend (Lawrence, 2016). There is a structure that most hackathons follow, including a demographic of people that all share a similar interest in the topic. The event begins with an introduction of the topic of the hackathon and a description of the sequence of activities that will take place. Afterward, participants are split into groups to discuss what steps they will take to address how they want to improve the topic of discussion. The hosts of the event may assist in facilitating discussions and answering questions where necessary (Bernabei, 2022).

Part of a hackathon is encouraging people to participate. This can be done in different ways, and for this specific hackathon, some of the main incentives that were given were the opportunity to network with one another and win prizes.

Why a Hackathon was Chosen for this Project

Conducting a hackathon to address issues regarding the portable toilet on job sites can be an effective way to spread awareness on the topic by bringing together members of industry and students to work towards a solution. It also incorporated California Polytechnic State University’s main objective of “learn by doing” (Cal Poly, 2021). by providing a workspace to discuss their ideas and physically put them into action by creating models of their ideal porta potty.

Hosting a hackathon is a good way to bring together members of industry as well as students and faculty to address the issue at stake. It is also a great way to spread awareness of the issue to other men in the industry as well as male students who may not have been aware of the experiences that women go through when using porta potties.
Milestones

This section of the paper will outline the major milestones of the event, including the development of several logistics plans.

Logistics Plans

Planning and deciding where to host the Hackathon event was one of the major milestones of the project. Three separate logistics plans that considered three different scenarios were created in order to decide the most appropriate location. The initial plan was to host the event in the De Mattei Construction Management Student Lounge (Appendix A). This space would allow for plenty of space for participants to move around. It also allowed for the best temperature regulation in the event that the weather would be poor. Much of the furniture that was currently in the space would be removed and stored in a different location to allow for the necessary equipment to be placed, and some of the furniture would have been able to be utilized, such as computers and table space. However, this logistics plan was not used due to the date change of the event. Originally, the hackathon was going to take place on May 4th - 5th of 2023.

The second and third logistics plans were created for the use of the Simpson Strong-Tie Materials Demonstrations Lab (SST). Two separate plans were created for this space to accommodate for the sheds built by the Residential classes (CM 214) that were built and stored in the SST. Typically, when each section of CM 214 has completed the construction of their sheds, the sheds are removed and repurposed or disposed of. Each shed is built on a metal track that is installed on the floor of the SST, and removal of these sheds and metal tracks was not able to be completed before the event was to take place. One logistics plan was created given the scenario that the sheds would be removed prior to the event (Appendix B), and the other was created given the scenario that the sheds would not be removed (Appendix C). The SST is a large, open space that would allow for all necessary equipment and materials to be readily available to participants. One main concern about using the SST was that the sheds take up a large area that blocks off the space. Another main concern of using this space was lack of control over room temperature.

Before creating the logistics plans, it was necessary to be aware of the needs of the project. This included knowing roughly how many attendees would be there, choosing the appropriate size tables, among other parameters. This year’s event planning was for 15-25 people. The event ran from the morning until early afternoon, totaling six hours. Knowing the event would be going on for most of the day, it was necessary to make sure that each participant was comfortable in the provided space. It was also necessary to gather information regarding what materials would be ordered for the event before creating logistics plans. It was decided that sixteen tables and seventy chairs would be ordered along with curtains and rods. Eight of the tables ordered were round tables with a four-foot diameter, and the other eight tables were eight-foot long rectangular tables. The round tables were to be used for participant seating with five or six chairs at each. The rectangular tables were meant to be used for check-in, food and drink, and material placement. Other materials for this event included a speaker for music, and prizes for participants.

As the hackathon day approached, it became clear that the sheds would stay in the SST and we would position the event around them. The final decision was to place six tables running from the entrance to the back of the space, with the check in table inside the building, at the entrance. Behind the check in table were a series of posters that displayed information regarding last year’s hackathon as well as steps taken so far for this year’s hackathon.
Please see Appendix A, B, and C for logistics plans.

\textit{Day-Of Events}

Another major milestone was the occurrence of the hackathon itself. The event began on June 8th at the SST, where participants gathered for check-in and an introduction of what the sequence of events would be. This was held from 3:00-5:00 PM. Shortly following the introduction was a dinner held at Luna Red in downtown San Luis Obispo. This dinner was held from 6:00-8:00 PM, and allowed participants to network and get to know one another. The next morning on June 9th, check-in began at 8:30 AM and the event ran until 1:00 PM.

After receiving these survey responses, preliminary ideas for redesigning the portable toilet included removing the urinal, including exterior hanger hooks, adding boxes for feminine sanitary products, as well as brainstorming ways to improve ventilation and lighting.

During this time, participants began by writing in the booklets that were provided where they could visualize their thoughts and draw out solutions. Breakfast was served at 9:00 AM. At around 9:30 AM, participants had finished filling out their booklets and moved on to share their ideas with one another, creating three groups. Once they had all agreed on components of the porta potty that they thought should be changed, groups began creating their models. Sketching, design books, cardboard, tape, scissors, and other materials were available for these models to be constructed. Each group created different models that had similar considerations. For example, all three groups came up with solutions for the ventilation issue that porta potties tend to have. The physical “hacking” section of the event took up the majority of the day, ending at around 11:00 AM. During this time, each group also created a digital model of their cardboard structure in SketchUp. From 11:00 AM - 12:00 PM, groups presented their models and explained why they chose to include each modification. At 12:00 PM, lunch was provided.

\textit{Conclusion}

The logistical layout of the event were outlined in this paper, with additional layouts included in the appendices. The goal for this event was to spread awareness on the topic and provide a space to foster new ideas regarding the portable toilet. The process of doing this included creating several logistics plans in order to decide on what the most desired option was. Every so often, products need to be revamped and redesigned to better fit the needs of its users. Some of the results included the removal of the urinal, a place to dispose of feminine products, and even hooks for hanging bags or coats. The portable toilet was chosen for this year’s hackathon because with the growing number of women in the construction industry, it is important to keep their needs in mind and make them feel included and welcomed on the job site.

Being a part of this event was incredibly rewarding. Working with a group of individuals who all share a common goal and are all passionate about the topic choice made this a great learning experience.

\textit{Further Research Opportunities}

Portable toilets and safety vests are not the only disparities that women experience in the construction industry. The hackathon has been a successful event for two consecutive years now that have fostered the growth of new ideas and spread awareness to people who may not have given it much thought.
before. With success, there is also always room for improvement. One thing that may be improved for this event is the promotion and date of the event. Since this event takes place on California Polytechnic State University’s campus, traveling for industry members is required. Finding a date when members of the industry will be in San Luis Obispo would help to increase the number of industry participants. Industry participation is important for events like this hackathon because it provides a variety of perspectives to the end goal. This year, industry participation was low due to the Construction Management Advisory Council annual meeting taking place during the same date and time as the hackathon. In terms of student inclusion, planning the event to avoid midterms and finals week would also be beneficial. For next year, hosting the event during Women in Construction week (WIC week) could be a great time to bring together these people.

Aside from the date of the event, choosing what to “hack” next is an important consideration. There are many different things that women struggle with having to adjust to. Some ideas may include hard hats, work boots, and potentially power tools.
Sources


*Department of Labor Logo United States department of Labor*. Whether toilets at a construction jobsite must be in a sanitary condition to meet the requirements of 29 CFR 1926.51(c). | Occupational Safety and Health Administration. (n.d.). https://www.osha.gov/laws-regs/standardinterpretations/2006-05-17-0


Appendix B

Hackathon Logistics Plan - Sheds Removed

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First Floor

ENTRANCE
### Appendix C

**Hackathon Logistics Plan - Sheds NOT Removed**

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**First Floor**

- **ENTRANCE**
- **Check in**
- **Sheds**