

*C*R*A*S*H* -COURSE *Guide!*



WOMEN IN ENGINEERING LEADERSHIP ASSOCIATION



TECHNICAL PROJECT 2013

PROJECT TITLE

**ACCESSIBILITY FOR ALL:
PORTABLE STUDY
TABLE**



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1. Forward

This document serves as a guide for the Women in Engineering Leadership Association (WELA) technical project team, to aid them in their design and manufacture of a wheelchair study table in the year 2013.

This document was compiled by Claudia Powell, who will serve as the liaison between the Advanced Mechatronic and Technology Centre (AMTC) and the WELA programme for the duration of the project. All project related queries are to be directed to Claudia, who is to be contacted via email using Claudia.Powell@nmmu.ac.za.

2. Background

Upon the discovery of the challenges that are posed to a student Heinrich Williams, resulting from inadequate facilities to accommodate his disability, this project was initiated to ensure that all students have equal access to all learning facilities at NMMU. As Heinrich is a wheelchair user and his lecture halls do not permit space for him at desks, the concept of making him a portable table top was investigated.

3. Budget

This project is not restricted by a budget, however it is specified that all innovations within this project are to be considered for *future* manufacture in a cost effective way, to ensure that accessibility *is* available to all.

This project will be funded by AMTC, however it is encouraged that external contributions be collected by the WELA technical team. This includes, but is not limited to; the purchasing of materials, services and components at negotiated costs for the purpose of this community project.

A technical team fund raising event will also be permitted for this project and is highly encouraged.

4. Deadline

A single designed and manufactured wheelchair table will be required to be presented in **June 2013**.

5. Project Aims

The following aims have been identified for this project:

1. Research, design and manufacture a suitable study table for a disabled wheelchair user.
2. Provide professional standard documentation for the entire project, to be submitted at the end of the project.
3. Perform a fund raising event to provide partial funding for the cost of the study table.

6. Technical Project 2013 – Crash Course Project Guide

Congratulations for being part of this revolutionary student initiative and a role player in the WELA 2013 technical project. As you will have read in my introductory text, we have a crushing deadline to adhere to which will hit us in June this year. This project will be life changing for the recipients of your innovations and dedicated work and also beneficial to you as a young professional. This project will provide you with an opportunity to practically demonstrate your capacity as an engineer, and will be conducted with the up most professionalism in everything you do. This unique opportunity has been afforded to WELA in great faith and it is now up to us to make it happen, to transform ideas into reality and to use our engineering skills to improve the quality of life for others. I understand that we are entirely undergraduates forming this technical team and I have provided a project guide to assist you in getting the project going!

Typically a project is divided into phases. For ours we need the following Phases:

1. Project Scope (Identify your project)
2. Design
3. Procurement and Manufacture
4. Assembly
5. Handover

How you conduct the project is entirely your prerogative, however I hope to assist you with this generalised crash course in project conduction. Let's begin at the start by identifying your Project Scope.

Project Scope

I cannot emphasize enough the importance of this initial stage. Before you begin any project, you must fully understand what you are required to do and how you foresee this happening. In our case we are asked to produce a study table for a wheelchair user. Do you fully understand your requirements? Of course not, we have identified no restrictions for the design which leaves us with a multitude of possible solutions. As engineers we are required to find the right solution and provide substantial evidence for that solution. I like to call this stage 'getting your ducks in a row'.

In summary, for this section we need to answer the following questions:

1. Who are my team members and what are their roles within the team?

You will need to form a data sheet or table with the team member's names, established roles and contact details.

Get to know one another and work with your teams strengths not weaknesses. Discover who is most comfortable with writing documents, speaking to people, researching, organising, computer drawing, presenting ideas and position these people in roles that will enrich the project. Also identify each individuals field of study, as they will possess a set of skills that can greatly assist the project.

The success of a project is often dictated by how the team works together. I would suggest that you work dynamically together, be aware that you will have upcoming tests and assignments on top of this project, so each and every team member should be in a position to lead and follow. During times when a section of the team is writing tests, the project should still be able to continue through the leadership of the others.

Also determine how you will communicate with one another and decide on periodical meeting times, remember Friday afternoons are off the timetable.

2. Who are the stake holders in this project?

Now a stake holder is a fancy name for all the persons who are involved in this project.

Draw up a separate table with a list of your immediate contact names and their roles. For our project this would mean you must list the WELA staff members- they will provide you with necessary assistance with booking the WELA room for meetings, booking projectors for your presentations, booking laptops to use, getting access to a phone to call suppliers etc. I would also be listed as a stake holder as your AMTC correspondent, and also your client Heinrich Williams who you are designing the table for. We have no external sponsors at this time, but if we did they would also go in this section.

In summary you are creating a database of the contacts involved that needs to be organised, this will help you maintain contact throughout the project.

I recommend printing points 1 and 2 so that everyone on the team has the same access to information.

3. What are my available resources?

This section may seem primitive, but it is essential that you determine what you have available right now, and what you will need to make available to ensure the success of the project.

For our project, which will be conducted at NMMU, we will have access to a multitude of computer software (Inventor, MultiSim) for example, which is an available resource. Determine what you have direct access to now and what you need to arrange to have access to (eg Phones...).

Document this in the project and make this information available to all the team members.

4. What does my client require from this project?

Your client is Mr Heinrich Williams, an industrial engineering student. You will be required to formally arrange an engineering consultation with Heinrich to fully determine what he needs.

This section must be completed by all the team members, who must participate in the consultation and this meeting must be documented

professionally. You will need to devise a meeting plan prior to Heinrich's meeting, which will serve as a guide to keep conversations on track. This plan must be printed out to take with you, and also emailed prior to your client and stakeholders.

Engineers love to waffle on with ideas; this plan provides the necessary grounding to conduct a quality meeting in an allotted time span. Meeting minutes must also be taken at every meeting, this is so that external participants can receive information and be kept up to date with your progress. Please remember all your documentation serves as a direct representation of you and your capacity as an engineer.

Ensure that you make a folder with all your meeting plans and minutes as proof of your professional conduct. When in a discussion with a client, ensure you are beyond prepared and dress in a professional manor.

When conducting this meeting with Heinrich, come armed with plenty of existing examples of wheelchair tables- make preparations for printing these images out or have the projector ready.

The information you obtain from this consultation will form your project and it is up to you to change your audible instructions into written ones- that can be followed by the team and external persons.

From this meeting you will be able to define your project scope, you will have established what is and isn't expected from your design.

Also when communicating to external persons, you are an ambassador for WELA which you are proud of- make yourself an email signature with your contact details and WELA logo as a further illustration of your professional conduct.

5. What is my Project Scope?

This section will dictate how the remaining project phases will be conducted. Here you must take your information from your client and determine what is required from your project.

To accompany this, you must also provide what is not included in your project. This may sound trivial also, but for an external person reading your project it must be crystal clear, what exactly you plan to do. For our project, something not to be included is the wheelchair itself for example. This section, like all the

project sections, will form part of your project documentation- which will be read by external persons. Consider now how you wish to share this document, how you are going to layout the document, establish a general font for the document and professional layout.

(Google project management documents for some template ideas).

6. How will I achieve my project using my identified scope?

Now that you know what you need to do, the next huge challenge is deciding how will you obtain your requirements.

Produce a project gantt chart. I like to start by making a provisional gantt chart, as with all engineering projects you can't predict the future and changes will need to be made as you progress with the project.

Start by listing the most obvious tasks that need to be done to make a portable study table for a wheelchair user. You first need to spend time designing what you want, then time to purchase materials (procurement time), then some time to assemble these items to produce the study table.

Now you also need to spend some time on the business side of your project, raising funds to assist you in creating this life changing piece of equipment. Using these headings, sub-tasks are identified in order to achieve the main task. For example, the task of designing the table is achieved by researching existing products, deciding on a suitable design, then to produce working drawings of its components.

Make a list of tasks and assign an appropriate time span for them to be achieved in, there's your first gantt chart. Get this printed out big and along the time line make note of everyone's test dates and holidays. This will provide you with a realistic idea of the time available to you and will assist you in managing your time.

This section of the project is typically presented as a project plan. Industrial engineers will be able to produce this. The use of MS Project Software is brilliant for producing gantt charts and should be used in the final project documentation-go on and learn a new skill.

- **A feedback presentation to WELA and externals.**

This is really your chance to show off your ideas and impress the socks of

people. **You should also bring along a printed handout of phase 1 of the project.** This could also be an opportunity for us to invite possible project sponsors, pitch to them our plan and see if they are willing to assist us in assisting our fellow students. [Feedback session and submission date is to be decided and arranged by you.]

Design Phase

Not only do we need to design the table, but also design a plan to raise some funds to go towards it. By now you would have already done research into what makes up the table, because you needed to define some tasks and time limits in your project plan. As time is so limited here, we will show our innovation by not re-inventing the wheel, but creating a practical and affordable product; using what is available to us. An extreme example would be to build a motor from scratch, why do that?!? When we can just buy one! Your innovation will be shown through what you use and how you use it; through your final design.

- **A feedback presentation to WELA and externals.**

Here your ability to defend your ideas will come into play. You will be required to pitch your ideas to a panel, which will most likely be blown away by you all! This is your chance to shine again, here you must show to an audience your thought process and how you came to this final design. This is also a fantastic opportunity to receive feedback, which could send you back to the drawing board! Ensure any issues are resolved here, rather than later on during manufacture.

Print and bring along **specification sheets** for items that you intend to purchase, and also **working drawings** of circuits and mechanical systems that you are going to make. You will also need to provide an approximate **budget** for the completed table and any **fundraising plans** to wish to implement. [Feedback session and submission date is to be decided and arranged by you.]

Procurement/Manufacture/Assembly Phase

Well ladies we are known for our love of shopping and nothing beats opening a parcel full of...nuts and bolts! Definitely the best part of every project is making your idea, which was on your computer last month, into a reality.

Here you will have the opportunity to interact with industry and practice your professional communication skills. This will be an opportunity for you to negotiate discounts on behalf of this community project, which further develops our local community relationships. Here you will also become familiar with what engineering materials are available to you in South Africa, become familiar with engineering terminology and specifications.

Handover Phase

With the study table complete, it is ready to be given to Heinrich. As a commemoration to all your dedicated hard work, it is only right that you present your final product in true WELA style. This will be revealed during your final feedback presentation.

For this final meeting you will be required to submit your professional standard project report.

Note:

2x Presentations.....

3x Project document hand-ins.....

You decide on suitable dates, with reasonable notice and arrange these with Nicole and Zandra. Use this flexibility to your advantage!