

ME 328 Machine Design
Project, DID 1 – What is currently known (background)
Individual assignment, not team

Pedagogical Purpose of DID's: Design is a long process (semester long in this course) with work be accomplished on a regular basis. DID's are what the ME faculty at UP call any written or computer design work that leads to a completed design (the title of "DID" is unique to UP ME's). They provide a way to easily document your work. The design process is all about filling knowledge gaps and making decisions based on that new knowledge. In essence, there are three basic ways engineers learn (fill knowledge gaps):

- Learning from others (other engineers, publications, internet searches, etc.). Generally, this is the background section of a report.
- Learning from analyzing. You have lots of experience with this. For example, you may use analysis to learn how thick a part needs to be to prevent yielding)
- Learning from testing and experimenting. You have lots of experience writing lab reports. Practicing engineers will use that information to help answer design questions.

In ALL CASES, for ALL DID's, it is essential to follow the intent of the standard problem-solving format. In other words, the purpose must be clear and it must be clear what you are doing .

For the ME328 design project you will eventually be assigned to a team, but for now, you are working alone.

Knowledge Gap #1: *we need to understand the actual problem and the end-user's needs.*

The first task in design is to understand the problem you are wanting to solve – that seems obvious, but it is often one of the more difficult and important things to accomplish well. You may create a wonderful, impressive product, but if it isn't what your customer really wanted, your design will fail. Therefore, your first assignment for this project is to understand your customer and their needs.

As your "lead engineer" on this project, I am giving you 2 to 3 hours to complete a background search – no more, no less. Keep track of your time. Your deliverable for this DID is a memo (however long it needs to be) written to me with the highlights of your background search. Remember for technical reports, letters, memo's etc., the first sentence in the introduction should describe the purpose of the document (just like standard problem-solving format). You also need to include a good paragraph discussing your conclusions (what are the most important things you learned that you should remember as you progress in this project). In the body of the memo (between the introduction and conclusion paragraphs), you may use bullet-form with incomplete sentences – like notes, because these are notes. It needs to document what you learned and needs to include URL/links citing where you obtained the information so that you or your teammates can return to the site later. For each URL, you need to write some sort of summary about what information or knowledge that cite contains and how it pertains to this project. Do not spend time "polishing" the memo, however, it should be understandable by *Lulay Sisters*. It must have at least two well written paragraphs: an introduction and a conclusion.

To help you understand your customer, here is a description of a “typical” week for your “typical” customer:

Most days John of Uganda has to wake up at 4am so he can milk the cow and clean the house. On days he has to go into town to sell his harvest he wakes up at 3am to beat the rush into town.

Today isn't a day he has to sell in town, but it is a busy day. After John does his morning chores, he heads to the fields to check the crop to see if any pests are within them. He notices a green bug within some of the crops, some of the crops leaves have been eaten too. He'll have to spray the fields later.

After checking the crop, he starts to weed the fields trying to clear the weeds as much as possible. This takes him a few hours. After weeding, John starts to water the plants. Because he has a few acres, this takes him a while. He tries to finish this before lunch. Most days he doesn't because it just takes too much time. Today he does finish before lunch.

After lunch, John heads into town to buy pesticides. He hopefully buys to right one and returns to the farm. For the rest of the day he spends it spraying the field to hopefully eliminate the pests within the crop.

The next day starts out the same. Milks, cleans, checks, weeds, and waters. No pests this time. After lunch, John returns to the fields to harvest them this time. It takes him the rest of the day and into the night.

On the very next day, John gets up at 3am to pack as much crop into his push cart and takes the 15mile walk to the supplier. There he sells his crop and buys as much seed as he needs and heads back home. He gets back at dinner time.

The next few days will be dedicated plowing and planting. John hopes complete the plowing of plowing one of the fields, so it can get ready for planting. After turning the field (aka plowing), he will pull other farm implements across them before seeding them. When he is done with that, John will water the fields.

Remember, Lulay Sisters wants not just a technically sound design, but one that also shows awareness of engineering responsibility and awareness of the impact of engineering. All of these things will help define the problem you will be solving. Besides technical background, you should include somethings about society, religion, political stability, economic conditions, environmental concerns, etc. for Uganda.

In addition to understanding your customer's specific needs for this project, it seems like you would want to learn something about plows in general (~20 minutes of searching) and farming in sub-Saharan Africa (specifically, Uganda) (~30 minutes). There may be other things you want to search.

Here are a few suggested search terms:

“Plows”

“Ploughs”

“Farm plows”
“Pulling a farm plow”
“Farm plowing methods in Uganda”
“Plowing methods in Uganda”
Etc.

I understand that some of the following URL's may be helpful as well – I don't know, I haven't looked at them.

<http://www.yesterdaystractors.com/cgi-bin/viewit.cgi?bd=implment&th=208776>

<http://www.yesterdaystractors.com/cgi-bin/viewit.cgi?bd=implment&th=208776>

<https://reliefweb.int/report/uganda/beefing-agriculture-northern-uganda>

<http://farmingequipmentcanada.com/farming-equipment-canada/types-of-plows/>

<https://www.honkforhelp.com/explore/2015/whats-a-winch-and-how-it-works/>

https://www.northerntool.com/shop/tools/category_winch

<https://www.summitracing.com/search/part-type/winch-replacement-parts>