

# Starting with CAD

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You've got a new idea in your head, and you want to transform it into something real, so that anyone who sees your work can understand what you're going for. You decide to do compute 3D demonstration. You're looking at the computer, he's looking at you back, and you find yourself wondering what to do. this guide should help you understand the system used when working with CAD, and will give you some extra tips.

## A through Z with CAD

### 1. Divide your work into stages

So how do you start? What to do first? First thing to be sure to remember is that you cannot do all at once, and that you must start with one thing. You should start with the part that is most likely to stay the same. If there's a part that the whole system is laid on, you might want to start with that.

The rest of the work you divide into groups, perhaps systems, made out of different parts. This division also helps us with the time planning - setting goals to finish a certain group in certain time. This is about the time to make sure you're sure about what system is depending on another system's location or other qualities in general. After a short brainstorming, you should build your schedule - make up time for each system, and be sure to stay on time. When that time is up, all systems must be finished in the computer, with the level of details the time allows.

### 2. Construct the different parts

As we mentioned, you should to organize your time, and not to spent it on little details and get off schedule, so that the final version will be easily connected with the sketches, in witch little things like bolts are unnecessary. So, you have to make up time and details limit, and your goal, is to stay within the time limit, and yet get into the details more then the previously specified level, the level needed to construct the final version. You should keep in mind that even though they are different systems, the parts of the robot should eventually be built into one product, and you should about a simple way to connect them together later. Also, you should make sure they are detailed enough to understand.

### 3. Everything comes together

From my experience, this part may seem quick and easy, but it takes time, discipline, and hard work. This is the time to figure out how to put the pieces together, into one working product. You have to pay attention to limits, such as size and weight, and relations between systems, such as locations. Prepare to make changes in systems. The changes may be tiny, up to changing in system's concept changing, in order to fit the systems together. A lot of problems will come up during this part, you should think and lay out an appropriate time for it.

### 4. Extra checks

After you're done, you might want to use the different functions which are offered by the programs, like finding the center of gravity. Those functions sometimes

require a lot of work, but in many cases it is essential in order to create a realistic demonstration of the product to come afterwards. Potential problems will come up on some of the calculations and simulations, and this is important so that they won't come up on the wrong time.

### 5. Make it pretty

Got time left? Really? Wow... well, now you can work on some details. If the details are more accurate, the test will be as well. The goal now is to make sure no more problems shall come up.

forms, be sure that the systems will be changed, and create them so that changing the dimensions won't force you to redo the whole system. Make sure things are proportional, and that are automatically changed, according to changes in other parts. Well done planning can save you 25%-50% from the work on the final product.

## Useful tips with CAD

For the work to be as fun and efficient, I will give you some tips for those making their first CAD.

SIZES – don't be lazy. Don't tell yourself "this is the right size, more or less." Be sure to get the right size, because being accurate now will be easier then making the necessary calculations later.

TIME – is a valuable product. In order to not be left with half a product made in excruciating details, you should really put yourself a time limit for the constructing of the systems, and think about what is the level of accurateness you want to get to, and what the level you must get to is. Wrong time planning may create a delay with the entire project, because many times the CAD is the bottleneck of the project.

TIME (2) – most of your time will be spent on the final product, as it should. In order not to get disappointed and rebuild the same system again and again in different