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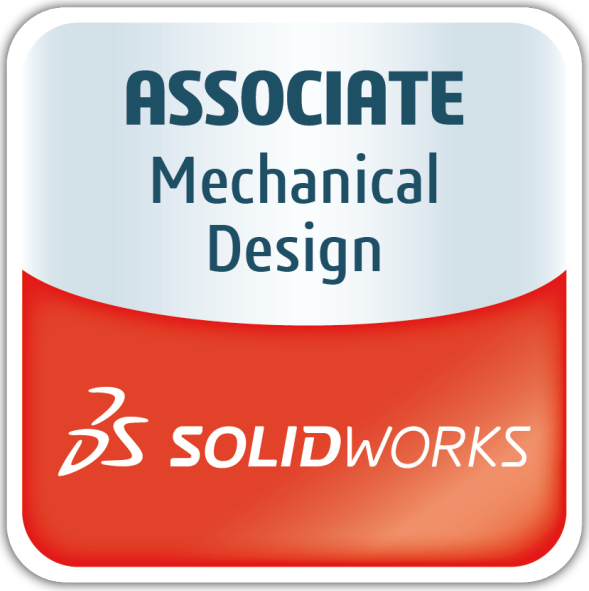

CSWA EXAM PRACTICE PACKAGE

GUIDE TO CREATING PRACTICE PART PROBLEMS

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Introduction

If you are reading this document, then you must be an educator that would like to go above and beyond by creating your own practice problems to use in your classroom. This document will show you the process that we on the SOLIDWORKS Education Team used to create our practice problems in the CSWA Exam Practice Package. This tutorial will aid you in the creation of your own practice problems, and the included templates will make it easy to go from your 3D model to a 2D drawing.

What Materials Are Provided for Creating Problems?

There are multiple templates included to aid in the creation of drawings for your part modeling problems. We have included one template for making parts called "Practice-Problem-Part.PRTDOT" as well as a template for converting that part into a drawing, called "Practice-Problem-Drawing.SLDDRT". These templates will reduce the amount of manual work involved in creating practice problems in the same style as those in the CSWA Practice Package. You will likely need to add a new file location in your system options in order to use these templates, so for more information on how to do so, click this link.

Problem Architecture

The practice problems included in the CSWA Practice Package are designed to be rebuilt in SOLIDWORKS. Once the part is built, instructors can then check if the problem was correct by comparing the mass to the value in the solutions. Each problem contains six vital pieces of information needed to recreate the part. These pieces of information include;

1. Unit System → MMGS or IPS
2. Decimal Places → Typically 2 for MMGS and 3-4 for IPS
3. Part Origin → Typically "Arbitrary" unless specified
4. Material Type → Steel, Iron, Aluminum, Plastics, etc.
5. Material → AISI 1020, Gray Cast Iron, 6061 T4 (SS), PPE, etc.
6. Material Density → kg/m^2 for MMGS or lb/in^2 for IPS
7. Drawings of the part to be built, which contain all necessary dimensions and values

Technical Steps

When creating practice problems, you will likely include global variables. For the instructor/grader's sake, we must make it easy to view the different parts of the solution (i.e. when different values are used for the global variables, thus resulting in a different mass). This is necessary for instructors to easily view each part of the problem by clicking the appropriate configuration.

1. Plan the features or functionality that you would like your students to use in recreating the part for your problem. It is important to plan this out when gathering inspiration for the part you want to create, e.g. if you want to create a problem that uses "Revolve" features, then you probably want to choose a cylindrical or axially symmetrical part.
2. Create a new part using the part template (Practice-Problem-Part.PRTDOT) included. If you choose to make this a multi-part problem, we recommend that you add a new configuration for each part of the problem. Using configurations instead of saving the different parts of the problem will allow you to more easily adjust the problem later and be more organized in storing the file.
3. Set the necessary custom properties that are automatically included from the Practice-Problem-Part.PRTDOT template. You can find these properties by clicking the "File Properties" window on the

top menu in SOLIDWORKS and navigating to the "Custom" tab. The properties will include Unit System, Decimal Places, Part Origin, Material Type, Material, and Material Density. You should populate these items appropriately before you design your part in SOLIDWORKS, that way when you go to make a drawing of your part, all of these values will auto-populate if you use the provided drawing template (Practice-Problem-Drawing.SLDDRT). The necessary custom properties include the following:

a. Unit System
    i. This is the unit system you will use in your part and can be changed by going to "System Options" → "Document Properties" → "Drafting Standard"
    ii. Typically the Unit System is either MMGS or IPS
b. Decimal Places
    i. This is the number of decimal places you will use in all values in your part (which can be changed by going to "System Options" → "Document Properties" → "Units")
    ii. Typically the decimal places used are 2 for MMGS or 3-4 for IPS
c. Part Origin
    i. This is where you make the origin for your part, which is important for finding the center of mass
    ii. Typically the part origin is "Arbitrary" but you can specify one
d. Material Type
    i. This is the type of material you use for the part
    ii. Typically the folder where the material resides in the materials database is what is used for the Material Type, i.e. Steel, Iron, Aluminum, Plastics, etc.
e. Material
    i. This is the exact of material you use for the part
    ii. Typically it is just the name of the material used from in the materials database, i.e. AISI 1020, Gray Cast Iron, 6061 T4 (SS), PPE, etc.
f. Material Density
    i. This is the density of the material you choose to use for the part
    ii. Typically the value for density uses the same number of decimal places as the problem and units of kg/m^2 for MMGS or lb/in^2 for IPS

4. Once you have completed setting up the details of the problem, you can start modeling the part you have in mind. Remember that when you make a drawing of the part later, you can import many of the dimensions you set in the sketches you use to make the part. Ensure your sketch dimensions are neat and organized so you can save time adjusting the drawings later on.
5. When your model is complete, you can start making the drawing of the part for your students use to recreate that part. Use the included template entitled "Practice-Problem-Drawing.SLDDRT", and as soon as you insert the first drawing view, all of the custom properties will auto populate on the drawing. Utilize as many drawing views as necessary to make your practice problems easily understandable. We do recommend not over-defining your drawings, as this could confuse students when they add dimensions.
6. Once your drawing is complete, you can save it as a JPEG, PDF, or whatever format you would like to use for your students to view it. We recommend testing the problem with multiple people before making it an assignment for students to ensure that all necessary pieces of information are present in the problem.