Polished Edge Consulting LLC

Changing Your Modeling Approach for Better Designs

Dimensioning with Purpose

Synchronous technology will work for you. It will work for your designs. It will work for your engineering team. The key is understanding that you need to LEARN synchronous technology. It is a history-free modeling paradigm that is intuitive to your design intent. That does not mean that it's effort free. The same work you put into becoming a good Ordered user needs to be dedicated to learning synchronous technology.

While you are learning synchronous technology, you can get back to production speed designing in a very short amount of time. The continued learning is done when you practice designing and editing within synchronous technology. Synchronous technology can be used very similar to ordered modeling; however, you won't fully realize the benefits until you understand a key aspect to modeling successfully in synchronous technology: dimensioning with purpose.

When modeling in ordered, most of us tend to lock down all geometry. This has always been a best practice in the ordered environment. In synchronous, things are different. We need to lock the dimensions of all critical fit items. The rest of the dimensions need to remain flexible. That doesn't mean we don't care if they change. It just means we know they will change when edits are made that require them to adjust. One of my favorite ways to keep an eye on dimensions that are important but aren't locked is to use PMI dimensions. This way I'm able to see if there is a change that adjusts part of a model that I didn't want it to.

There is a series of videos that will accompany this book to show the model creation happen. To access the videos, click the video images in each section, or find the links in the endnote on the last page of this paper.

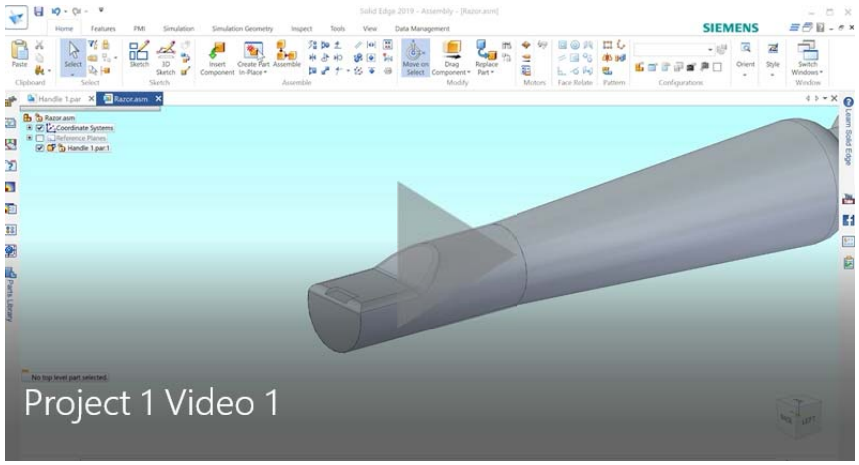
Synchronous Technology Creation and Changes

In this first example, a shaving razor is created using synchronous technology. The razor assembly walks you through creating an initial model that can be altered and changed to allow for several versions of a set of models.

The model is created using a combination of synchronous technology specific tools like Cylinder and traditional sketch driven models like the revolved edge design of the handle. This combination of tools allows you to create quickly without focusing on the necessary steps to make future changes. When changes are made using the Steering Wheel, the input control can incorporate specific dimensions or simply make a change that looks better.

Allowing synchronous technology to speed the initial creation of this model allowed time to make changes along the way to alter the current design to make it better. This is a key to synchronous technology for those that incorporate it into their CAD toolbox. Making models more quickly and changing things as your project dictates, allows you to spend more time making a better product. You no longer need to study the design tree to find the feature that is driving the area of the model you want to change.

Watch the video[i]



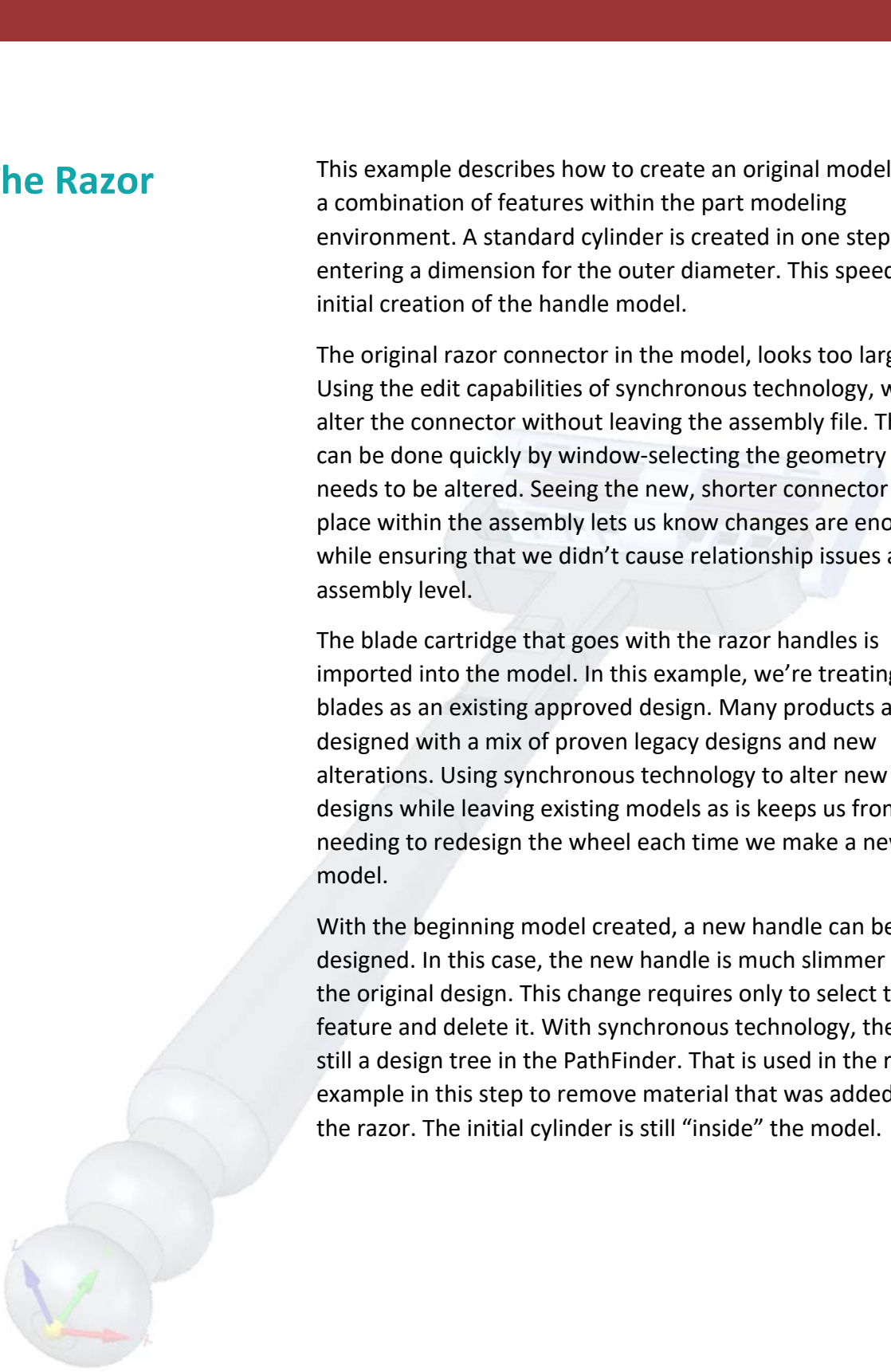
l The Razor

This example describes how to create an original model using a combination of features within the part modeling environment. A standard cylinder is created in one step by entering a dimension for the outer diameter. This speeds the initial creation of the handle model.

The original razor connector in the model, looks too large. Using the edit capabilities of synchronous technology, we can alter the connector without leaving the assembly file. This can be done quickly by window-selecting the geometry that needs to be altered. Seeing the new, shorter connector in place within the assembly lets us know changes are enough while ensuring that we didn't cause relationship issues at the assembly level.

The blade cartridge that goes with the razor handles is imported into the model. In this example, we're treating the blades as an existing approved design. Many products are designed with a mix of proven legacy designs and new alterations. Using synchronous technology to alter new designs while leaving existing models as is keeps us from needing to redesign the wheel each time we make a new model.

With the beginning model created, a new handle can be designed. In this case, the new handle is much slimmer than the original design. This change requires only to select the feature and delete it. With synchronous technology, there is still a design tree in the PathFinder. That is used in the razor example in this step to remove material that was added to the razor. The initial cylinder is still "inside" the model.



Assembly Level Edits with Synchronous Technology

In the razor example, we used synchronous technology commands and the steering wheel to create an initial design that needed to incorporate an existing piece of legacy data. Without that legacy data changing in the context of our assembly, synchronous technology proves it can cooperate with your existing CAD library and still provide the benefits of quick initial creations and fast edits.

Making changes to the models at all phases of the design process is what synchronous technology is all about. Using the edit speed to make your designs better is a huge benefit that should be realized by all engineers. Stop focusing on the CAD step by step and allow yourself to focus on the product.

History Free is not Feature Free

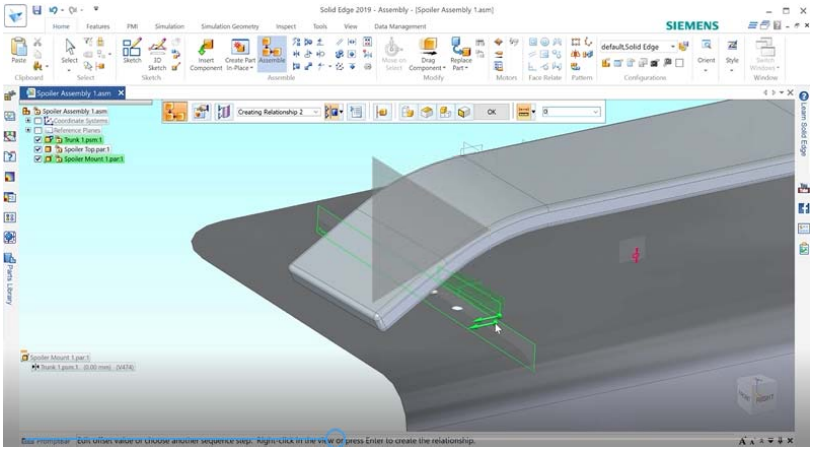
In this second example, a spoiler is created for multiple car trunks. The spoiler is shaped like π. This math-fun spoiler is created quickly with closed regions of geometry and uses peer level parts to finalize the spoiler posts to match the trunk and spoiler faces.

Synchronous Feature Tree

This automotive spoiler is created by using features that remain editable in the PathFinder. Synchronous technology is "history-free" CAD. That does not mean it is "feature-free". Changes can be made to features that we used to create solid bodies.

If you want to learn synchronous technology, the best approach I've found is to use it for everything you can. Don't revert to ordered modeling until synchronous technology doesn't work for a modeling task. (A known synchronous technology limitation is complex surfaces.) Knowing when to use the Face or Part Priority in the Select menu has a bit of a learning curve and will take practice and become second-nature, much like the Design Intent panel.

Watch the video[ii]



l The Spoiler

Creating the initial spoiler was accomplished by using a common Solid Edge command: Swept Protrusion. The swept path was sketched as well as the rectangle to protrude. This can be done with the model in the synchronous technology mode. Not only will you create an identical feature to what would be in ordered, you have the freedom only synchronous technology can offer with future edits being single-step.

Next, the first spoiler piece is combined into an assembly with the downloaded copy of the first trunk. Now, all work will be done in the context of the assembly by editing into new parts within the model. The posts are made by using the Steering Wheel and 2D sketched geometry. The Replace Face tool means we can extend the new rectangle region to the faces of the top of the trunk and the bottom of the spoiler. This region was used to create both extrusions.

Holes were added to match the mounting holes that already exist in the trunk model. These holes can be changed in size or type all at one time, or individually as needed by selecting them and altering their properties.

By using Design Manager a new copy of this assembly can be created and a different trunk can be imported into the new assembly. This allows us to alter the existing spoiler and still reuse much of the design.

The new spoiler is too narrow for the second trunk. Using the Steering Wheel, the geometry can be window-selected, inside the assembly, and a distance to extend by can be entered. Note that we could have “eyeballed” the design instead of entering a set value. Both have their place in engineering and are supported with synchronous technology in Solid Edge. If the original length of the spoiler had been dimensioned and locked, we would not have been able to make the change in one step. Using an unlocked PMI dimension allows you to see the value and remain flexible if changes are necessary.

Synchronous is NOT Dimension Free

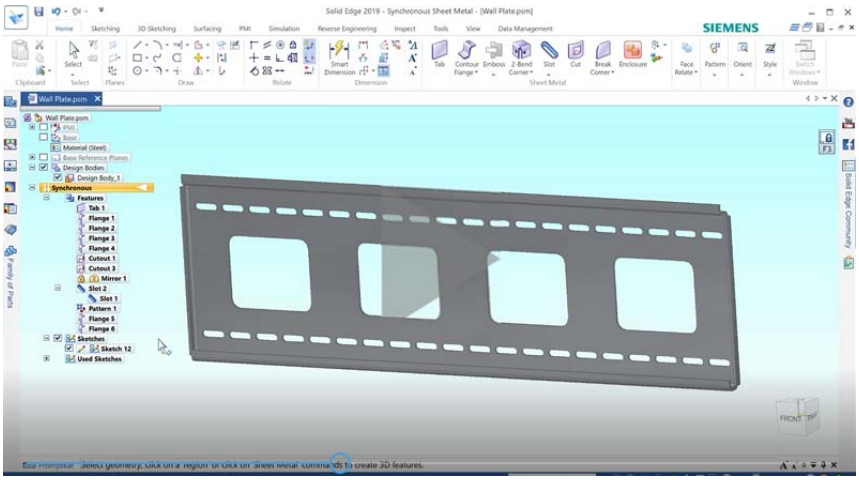
Often when we think of direct-edit CAD, we tend to think that models have no dimensions and are not well controlled. Synchronous technology is far from that. It offers engineers the perfect balance of precision and freedom. Push yourself to attempt every feature with synchronous technology, and you will see the benefit of smaller files sizes and faster edits. You will also see that the features you create with synchronous technology can be dimensionally edited and controlled if they are critical to form, fit, or function.

To Dimension or Not to Dimension

This is the question… With most models, there are dimensions that are critical to Form, Fit, and Function. These dimensions can't change. While in synchronous technology, parts can change in relationship to each other. Yet, they don't have to. All features can be changed within synchronous technology. Changes can be made by selecting a dimension and entering a new value. The same change can be made by selecting a component and pushing or pulling the geometry by using the steering wheel.

In this model, we will be using many dimensions. Dimensions are helpful when creating a part that must fit with another part like the ones on the television mount.

> [Watch the video][iii]



l The TV Mount

This television mount is likely similar to one you have in your own home. As televisions get flatter, so do their mounts. This is a low-profile mount that will keep the TV close to the wall. It will still offer flexibility based on the television it is being used on or the stud configuration in the wall it is being hung on.

This model is being created in the Sheet Metal environment. synchronous technology excels here. During the model creation, edges that are clicked on offer a directional arrow that creates a flange in the chosen direction. The flanges aren't limited to 90° extensions. Any angle can be entered, and the corner treatments can be edited as in ordered.

The first piece created is the wall mount plate. This is done by sketching a rectangle and clicking it to create the first tab. The rectangle is dimensioned as are the flanges that extend off the plate. This part must meet specific size requirements, so they are entered on creation. Note that no PMI dimensions are added after the model is complete. They aren't necessary unless we are making changes to the model and need to monitor the size of a feature. The Design Intent settings also help clarify what is being changed during an edit and why it is changing.

Sketches drove cutouts on the plate and slots were added. With the addition of a few more flanges, the wall plate model is complete. Now an assembly can be created to place the wall mount in, and the next piece can be created in place. More sketches are used after the u-shaped model is created from a tab and two flanges. These sketches will remove the material that will hang these brackets on the wall plate.

The top cuts are different shapes than the lower cuts, but they share some identical geometry. Using the Ctrl and Steering Wheel command to copy the geometry allows us to quickly reproduce the sketch and use its region to remove material. Using this combination will allow you to make rapid copies of geometry or features in models.

Dimension Driven Synchronous Technology

In this model, we used fully constrained sketches that created regions to remove material from sheet metal models. Just because we are using synchronous technology doesn't mean we're not creating a mechanical model. Editable patterns were created to copy the slots and holes in both sheet metal pieces. synchronous technology isn't only about organic looking or aesthetically pleasing parts. It can be used on dimension driven models like this example.

Knowing the right number of dimensions to place will take practice. History-free doesn't mean that synchronous technology is thought-free. synchronous technology, when used correctly, will give you extra time to focus on your product and not a set of steps in your CAD program.

Conclusion

The examples in this book are representative of some common advantages synchronous technology can offer. The razor showed the ease of creation and editing with a draft involved. The spoiler demonstrated the ease of alterations at the assembly level. Finally, the wall mount walked through the speed of initial creation in the sheet metal environment.

In all these examples, we used specific tools in synchronous technology like the Box and Cylinder commands. We also created sketches and used dimensions. The flexibility that synchronous technology gives you the time to focus on your design rather than laying out the correct CAD steps.

Knowing what needs to be locked and what should remain flexible requires a small learning curve. Using unlocked PMI dimensions will allow you to see the size of your part while making alterations. The locked critical dimensions can remain locked, so they don't change unless done purposely.

When changes to component parts are done at the assembly level using synchronous technology, there is additional peace of mind knowing all affected parts changed as well. This allows the designer to be more confident when they release their design for manufacturing. I urge you to continue to familiarize yourself with synchronous technology. Visit the Learn Solid Edge menu to find tutorials.

Synchronous technology can give you dimensional control and allow fluid edits. Time spent learning how to maximize these benefits is time that offers a valuable return on investment.

Want to try the examples from the book for yourself? Download your free trial of Solid Edge, then click the links in the endnote to access the step-by-step tutorials.

Try Solid Edge for Free: https://www.plm.automation.siemens.com/store/en-us/trial/solid-edge.html

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[i] https://blogs.sw.siemens.com/solidedge/changing-your-modeling-approach-for-better-designs-part-1/
[ii] https://blogs.sw.siemens.com/solidedge/changing-your-modeling-approach-for-better-designs-part-2/
[iii] https://blogs.sw.siemens.com/solidedge/changing-your-modeling-approach-for-better-designs-part-3/

About
Polished Edge Consulting, LLC

Polished Edge is a Solid Edge Administrator/Consulting business that Melissa Schultz formed in the fall of 2018. The primary purpose of the business is to help people use Solid Edge. With nearly two decades of experience in Solid Edge, Melissa is offering CAD Administrator services to all Solid Edge customers. Whether your business is too small to pay a full-time admin or your full-time admin is too busy with daily support to write training, Polished Edge Consulting has a solution for you. With Polished Edge Consulting, all Solid Edge using companies have access to tailored training, custom problem resolution, proven best practices and synchronous technology.