

# 3-D Modeling Project

## Stapler—Disassembly of the Stapler

One of the best ways to learn engineering design graphics principles and to use 3-D modeling tools is to use a real object to simulate the process. When the author first learned CAD, he used this technique using a road bike. Each chapter in the textbook will have a special problem related to creating a 3-D model of an assembly. There are a number of inexpensive products that could be used for this exercise that can easily be purchased at stores, such as a disposable camera, mechanical pencil, or various tools. For this exercise you will be using a stapler like that shown in Figure 1A. The stapler in the figure is a Swingline Desktop Stapler #81800 that can be purchased at popular retail stores, such as Walmart, Kmart, and Staples. If you wish to avoid having curved surfaces, Swingline Desktop Stapler #74700 can be used. You will be assigned to teams to purchase a stapler, disassemble the item, measure the parts, create the design sketches, make simple design changes, model the parts, create working drawings for manufacturing, perform simple assembly analyses, and create rendered models of the assemblies.



**Figure 1A**

Desktop stapler for design project

### Chapter 1: Stapler Modeling Project

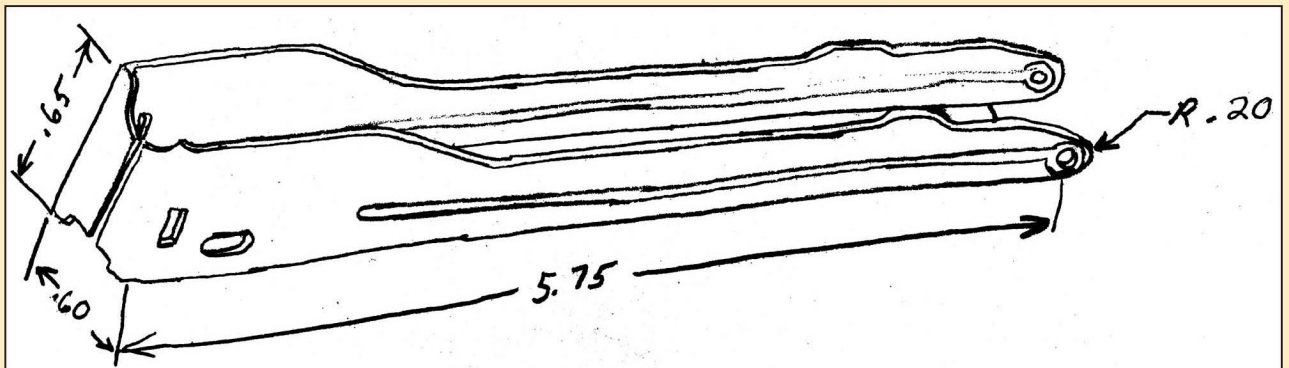
To start on this assignment the stapler must be reverse engineered by disassembling the stapler and measuring all the parts using a caliper and a micrometer. As each part is measured, design sketches are made of each part with dimensions. This would be a good opportunity to start your own designer's notebook as described in Chapter 11.

So your first assignment is to disassemble the stapler, taking careful notes that describe the sequence so you can assemble the stapler again after taking measurements. Take one of the simpler pieces (Figure 1B) and make a sketch with dimensions showing the width, height, and depth of the piece (Figure 1C). Label the part, and on a separate sheet of paper, begin a parts list by listing all the parts, including the material, basic dimensions, and the part name. Design and create your company drawing sheet using the dimensions for standard drawing sheets in Problem 2.11.



**Figure 1B**

Parts to be sketched



**Figure 1C**

Sketched part with dimensions

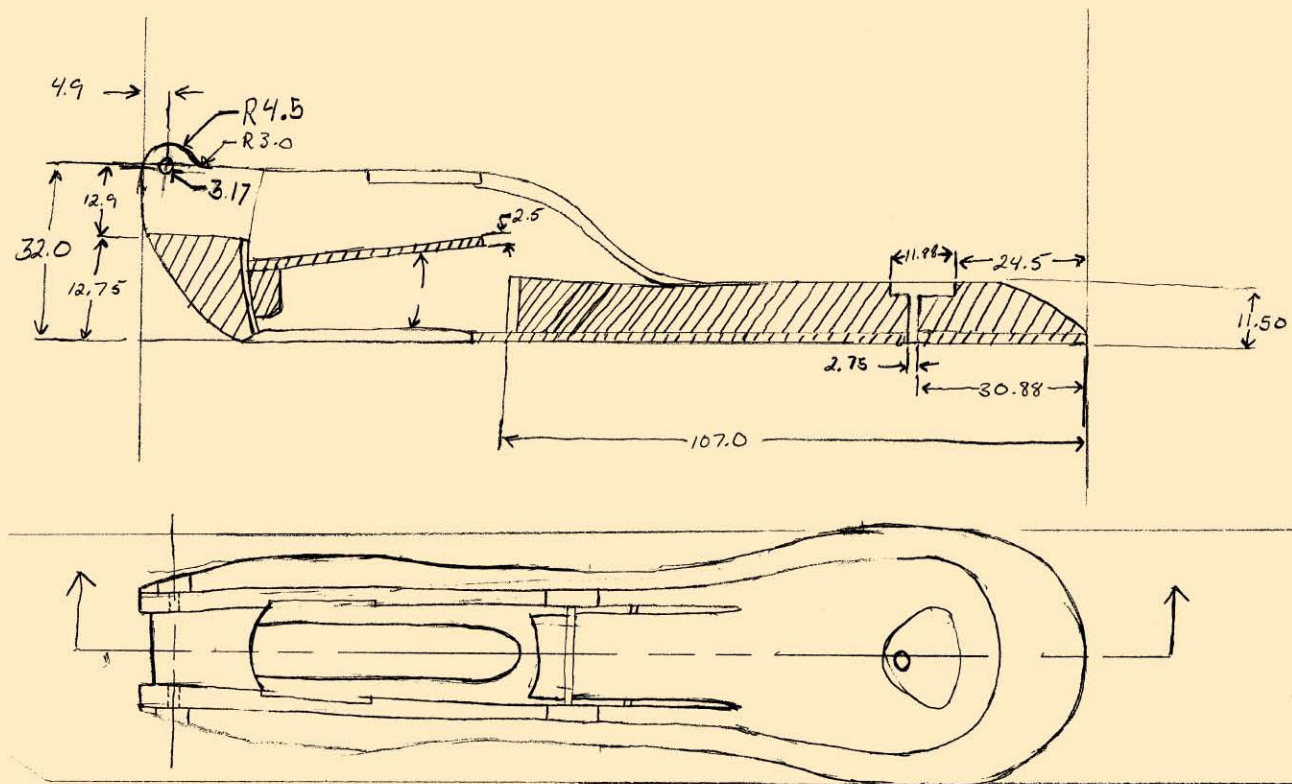
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## Chapter 2 Stapler—Sketching the Parts

Complete the disassembly of the stapler, taking careful notes that describe the sequence so you can assemble the stapler again after taking measurements. Make a sketch of all the parts with dimensions showing the width, height, and depth of the pieces. Label the parts and on a separate sheet of paper, complete a parts list by listing all the parts, including

the material, basic dimensions, and the part name. Begin a designer's notebook for this project by including all the sketches, notes, and parts list (Figure 2A).

Redesign the plastic housing so that the stapler can stand on end by creating design sketches of various design ideas.



**Figure 2A**

Design Sketch

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## Chapter 3: Stapler Modeling Project

All sketches of each part of the stapler should be completed along with a parts list. The plastic housing that encloses the metal parts that actually do the stapling are quite complex, giving the stapler both aesthetic and functional design elements. Redesign the plastic housing so that the stapler is not

only aesthetically pleasing but has improved functionality by allowing the stapler to stand on its hinged end in addition to its current flat base. Create design sketches of your new design ideas; then refine the design you select through more refined sketches.

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## Chapter 5: Stapler Modeling Project

After you have created 3-D models of the parts, create multi-views using CAD. Depending on your CAD software, you will either be able to automatically extract the views or will have

to create the views yourself. If the views are automatically created, make sure that the CAD-generated views conform to ANSI standards.



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## **Chapter 7: Stapler Isometric Sketches**

Create isometric pictorial sketches of each part of the stapler. Make an isometric pictorial sketch of the redesign of the plastic housing you created in Chapter 3.

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## **Chapter 8: Section Views**

Create a full-section sketch or 2-D CAD drawing of the stapler housing.

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## **Chapter 9: Dimension Parts**

You should have created multiview drawings of each part in Chapter 5. For this chapter, dimension and tolerance all the parts using decimal inches.

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## Chapter 10: Assembly Drawings

You should have created detail drawings of all the parts in previous chapter assignments. You now need to create a pictorial exploded assembly drawing of the stapler with

parts list. Use sections where needed to clarify the assembly. Create a photorealistic pictorial assembly rendering of the stapler.



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## Chapter 11: Redesign of the Stapler Plastic Housing

The plastic housing of the stapler serves a functional purpose, giving an elegant form as well as the dimensions necessary to serve its primary function of stapling paper. In this exercise, you are to redesign the plastic stapler housing so that it retains its elegant form but also will allow the stapler to

stand on its end on a table top. The rear or hinged end of the stapler housing will have to be redesigned so that it is flat and large enough to support the stapler on end when it is placed on a flat surface. Create design sketches first, then use those sketches to build your computer model of the new housing.

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## **Chapter 12: Geometric Tolerancing**

You should have created multiview drawings of each part in Chapter 5 and dimensioned views in Chapter 9. Choose one of the simpler parts and apply geometric tolerancing symbols.