Project Team 1
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Ryobi Reciprocating Saw

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Computer Aided Drafting
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Objective:

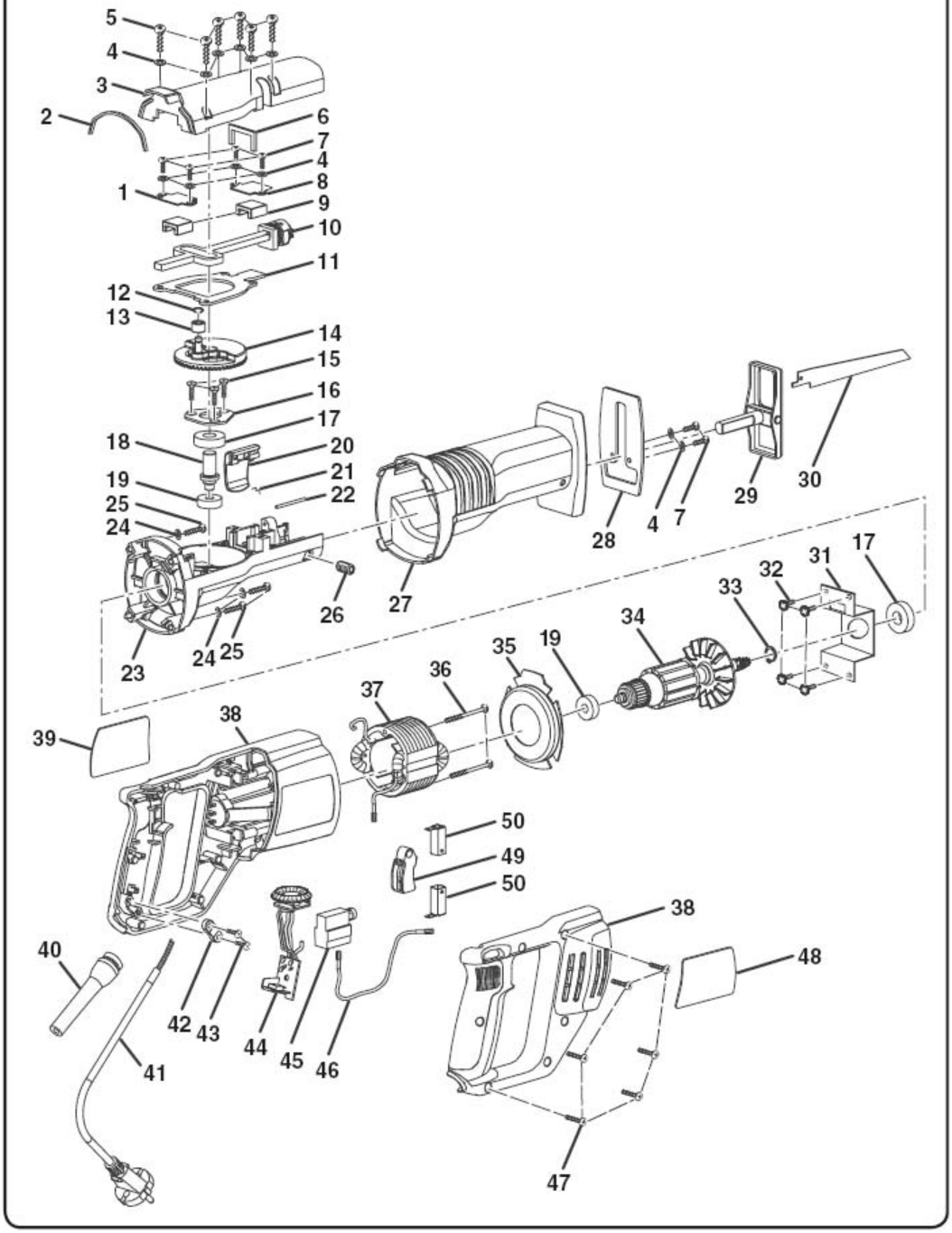
In this project, our main objective is to effectively model the Ryobi ® Variable Speed Reciprocating Saw. It runs through normal 120-V alternating current power. When on, the saw blade has a stroke of 19/16 inches moving at a maximum speed of 2800 strokes per minute. The entire assembly, including the removable blade, weights 6.3 pounds. The saw has 6 speed settings, a trigger which determines whether the saw is on or off, and interchangeable blades. After completing the model and assembling it, we will attempt to animate several aspects of the construction and functions of the saw. Finally, we will end with an ANSYS analysis of the saw to determine certain limits, for example under what load the blade would break, and what would be the strongest material through which the blade can cut.

Challenges:

In undertaking our task, there are many difficulties that arise. First, the saw is designed for maximum user comfort. That means that the external shell is contoured for the human hand, with different grips and conveniences. These, as a whole, may be difficult to model in ProE. A second complexity will be precisely measuring the size of the pieces to ensure that our assembly comes together correctly. Because of the odd external shape, some of the internal components are also oddly designed. We must also take care in disassembling the model so that we do not damage any of the pieces. Finally, there are approximately 50 different parts to be modeled. Having that many parts to assemble creates complexities in and of itself.

A schematic of the saw follows

RYOBI RECIPROCATING SAW – MODEL NUMBER RJ162VK



Part Number	Name
1	Cover Plate
2	Gear Case Seal
3	Gear Case Cover
4	Spring Washer
5	Screw (M4 x 18mm)
6	Seal
7	Screw (M4 x 10mm)
8	Cover Plate
9	Guide Block
10	Saw Bar Assembly
11	Yoke Plate
12	Retaining Ring
13	Roller Bearing
14	Gear Assembly
15	Screw (M4 x 16mm)
16	Shaft Mounting Plate
17	Ball Bearing
18	Gear Shaft
19	Ball Bearing
20	Blade Release Lever
21	Spring
22	Pin
23	Gear Case
24	Lock Washer
25	Screw
26	Screw
27	Rubber Boot
28	Guard Plate
29	Shoe Assembly
30	Saw Blade
31	Bearing Retainer
32	Screw (M3 x 8mm)
33	Retaining Ring
34	Armature
35	Baffle
36	Screw
37	Field
38	Housing Assembly
39	Logo Plate
40	Bend Relief
41	Power Cord
42	Cord Clamp
43	Screw (M4 x 16mm)
44	Speed Control Board

45	Switch
46	Lead Assembly
47	Screw
48	Data Plate
49	Trigger
50	Brush Tube Assembly
51	Carrying Case

Expected Results:

After modeling all the parts in ProE, we expect to be able to assemble the pieces together and animate them to show how the saw operates. Hopefully, we will animate the creation process, the normal function of the saw, and the removal/addition of a blade. After that, we hope to be able to use an ANSYS analysis to see the forces acting on different portions of the saw, focusing specifically on the blade and casing. Hopefully, we will be able to find the yield stress of the blade and the maximum hardness of the materials through which it can cut.

Work Distribution:

Christopher Clark: Outer Casings
Writing Assignments/Presentations

Danielle Launay: Gears/Bearings
Screws

Jonathan Lin: Switches
Speed Control Mechanism
Power Cord

John Sequeira: Saw Blades
Blade Retainer Mechanism

Rishi Wadhera: Plates/Washers
Shafts

We will all be equally responsible for the assembly and animation of the pieces, and for the force analysis portion of the project. We do, though, reserve the right to change these responsibilities as necessary, or to suit a particular members strongest abilities.

References:

http://www.ryobi.com
http://oneworld1.inetu.net/manuals/ryobi/RJ162VK_628_r.pdf
The Ryobi ® Variable Speed Reciprocating Saw from which our models will be created.