Pareto Analysis:

A tool for deciding what to work on

» Used to identify the “significant few” components or portions of a design on which to focus your cost reduction efforts

» Often misquoted as the 80/20 rule (80% of the total effect will come from only 20% of the components)

» Essentially it is the law of diminishing returns (pick the low-hanging fruit first)
Pareto Analysis:

A tool for deciding what to work on

» Rank items in **descending order of cost or value index**

» Attack items at the top of the list first
   They have a **higher probability of payoff**

» Trying to “cost reduce” every single part of a design is not a good design practice
   Better to **think and plan before acting**

» Pareto analysis is also used to prioritize other efforts...weight reduction, etc.
Example of Heuristic (Team Heavy Lifters)

- Problem: System Weight is over specified limit.
  - Trying to reduce weight on every feature would take large amounts of time and be ineffective.
  - Use Pareto Analysis to identify the most important features to concentrate on.
**Step 1**

- Order components from heaviest to least in terms of percentage.
- Calculate the cumulative percentage.

<table>
<thead>
<tr>
<th>Component</th>
<th>% of Weight</th>
<th>Cum. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Base</td>
<td>16.2</td>
<td>34.2</td>
</tr>
<tr>
<td>Wheel Assembly</td>
<td>14.4</td>
<td>48.6</td>
</tr>
<tr>
<td>Cylinders</td>
<td>12.9</td>
<td>61.5</td>
</tr>
<tr>
<td>Motor</td>
<td>11.7</td>
<td>73.2</td>
</tr>
<tr>
<td>Pump</td>
<td>9</td>
<td>82.2</td>
</tr>
<tr>
<td>Handle</td>
<td>7.2</td>
<td>89.4</td>
</tr>
<tr>
<td>Fluid</td>
<td>3.8</td>
<td>93.2</td>
</tr>
<tr>
<td>Valves</td>
<td>2.7</td>
<td>95.9</td>
</tr>
<tr>
<td>Hose</td>
<td>1.8</td>
<td>97.7</td>
</tr>
<tr>
<td>Fittings</td>
<td>1.4</td>
<td>99.1</td>
</tr>
<tr>
<td>Reseveror</td>
<td>0.9</td>
<td>100</td>
</tr>
</tbody>
</table>

Dr. Kremer, ME471, 4
Steps 2-6

Pareto Graph of Component Weight

- Battery
- Base
- Wheel Assembly
- Cylinders
- Motor
- Pump
- Handle
- Fluid
- Valves
- Hose
- Fittings
- Reservoir

Percentage

Step 2
Step 3
Step 4
Step 5
Step 6
Conclusions

• To effectively reduce weight the key features to analyze are:
  – Battery
  – Base
  – Wheel Assembly
  – Cylinders
  – Motor

• Several Options to investigate: redesign, elimination, or purchase from different vendor
More information and examples related to Pareto analysis are available from many sources, especially from the quality, six-sigma and project planning literature

http://erc.msh.org/quality/pstools/pspareto.cfm
Includes a case study and the 6-steps – a good site for “beginners”

http://www.mindtools.com/pages/article/newTED_01.htm
Short Pareto example, but the site includes a lot of other resources for decision making and professional skills