Product Specifications

Topic 5

ME4000 course website

mech.utah.edu/senior_design/07

Today

- Get back in-class papers from last time
  - Give your paper to someone else in the group to read over
- Review Customer Needs
- Discuss Product Specifications

- Due in class next Wednesday
  - Please read chap. 5 – specifications for Today/Friday
  - We will finish product specification and discuss benchmarking on Friday
- Due in class Friday
  - HW #1 – Planning & Scheduling

- Put your signed exec. summary in your team folder
- Put your 1-on-1 papers in your folder

Review 5 Steps of Customer Needs Gathering

1. Gather raw data from customers
2. Interpret the raw data in terms of customer needs
3. Organize the needs into a hierarchy of primary, secondary, and (if necessary) tertiary needs
4. Establish the relative importance of the needs
5. Reflect on the results and process

Source: Ulrich K, Eppinger S, *Product Design and Development*

Early Heads-up

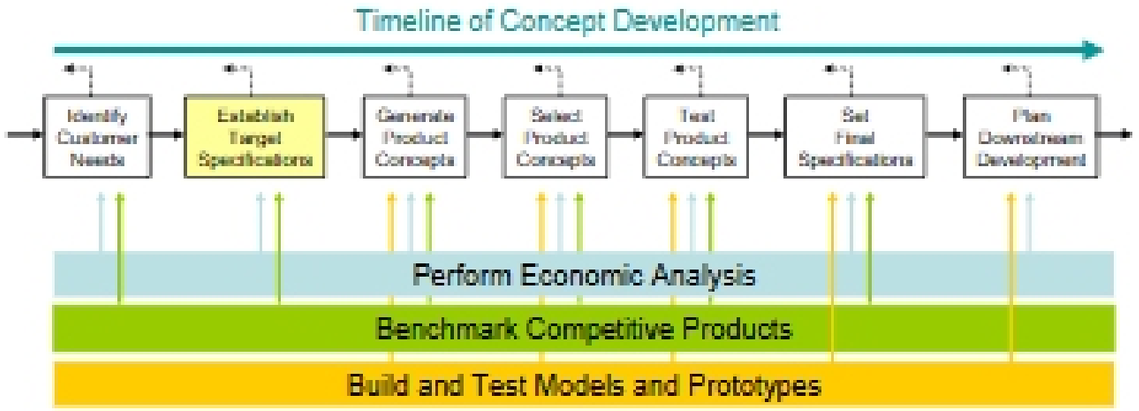
Next week you will have HW #2 assigned

HW #2 will include
- List customer needs
- Organize needs into hierarchy
- Prioritize needs

This should be listed in table format listed in a similar format to examples in Chapter 4

Source: Ulrich K, Eppinger S, *Product Design and Development*

Target Specifications in Relation to Concept Development Activities



Source: Ulrich K, Eppinger S, Product Design and Development

Customer Needs: Specialized Suspension Fork

No.	The suspension …	Imp.
1	is lightweight.	4
2	enables high-speed descents on bumpy trails.	5

- **Customer needs are formulated using the language of the customer**
- **Needs are subjective**
- **Customer needs don't provide specific enough information**

Source: Ulrich K, Eppinger S, Product Design and Development

Product Specifications

- **Unambiguous agreement of target (metric) that needs to be achieved (value)**
- **Translation from customer to engineering language**
- **Does not specify how the need is achieved**
- **Example:**
  - Need: the suspension is lightweight
  - Spec: the weight of the suspension is less than 3 lbs

Metric — Value with unit

Source: Ulrich K, Eppinger S, Product Design and Development

Target Specifications

- **Represent the goals the development team believes are describing a product that is likely to succeed in the market**
- **Example:**
  - Weight: 3 lbs
  - Cost: $ 80
  - Speed increase over bumps: 15 mph

Source: Ulrich K, Eppinger S, Product Design and Development

But who is your customer?
Pair-up with a team mate

In upper right of your page
- Names of students
- Project Name
- TA Name

- Discuss and write down:
  - Aspects of your project that should be defined with specifications
    - Define the metrics
    - Take a WAG at the unit or unit range of each metric

4 Steps of Setting Target Specs

1. **Prepare the list of metrics**
2. **Collect the competitive benchmarking information**
3. **Set ideal and marginally acceptable target values for each metric**
4. **Reflect on the results and the process**

Source: Ulrich K, Eppinger S, *Product Design and Development*

Step 1: List of Metrics

- **Relationship between metrics and customer needs are central to the concept of specifications**
- **The most useful metrics describe directly a single customer need**
  - **Assumption: an exact metric can be found for every need**
  - **Assumption: meeting the specifications of every metric will result in customer satisfaction**

Source: Ulrich K, Eppinger S, *Product Design and Development*

Guidelines for Metrics

- **Metrics should be complete.** Ideally each customer need would correspond to a single metric and the value of that metric would correlate perfectly with satisfaction of that need.
- **Metrics should be dependent, not independent variables.** Dependent variables allow designers more flexibility in achieving a metric.
  - Dependent: mass (allows designer the freedom to determine a combination of geometry and material)
  - Independent: material (removes one of the above mentioned degrees of freedom – only geometry can be chosen)
- **Metrics should be practical.** The effort of quantifying a metric should be justifiable.
  - Example: long-term durability testing: $50 million
    - Aircraft: yes
    - Suspension fork: no

Source: Ulrich K, Eppinger S, *Product Design and Development*