

# Engineering Design Specifications (EDS) or Product Design Specifications (PDS)

An Engineering Design Speciation (EDS) is a list of *measurable* parameters that are critical to a product's success. In order to properly design a product, your team will need to correctly identify the parameters and their appropriate maximum and/or minimum values. The EDS you develop now will help guide you in the engineering decision making process. An EDS is a constantly evolving document, and is subject to change as the project progresses and as more information is learned. However, changes to the EDS do need to be approved by any relevant stakeholders. Some specifications are consumer driven, while other specifications are driven more by engineering capabilities of the manufacturer, yet other specifications may be derived from your competition's performance characteristics. In short, EDS should be: user-driven, quantifiable, solution-neutral, and specific.

As much as possible, the metrics should be objective and numeric with units. Some metrics maybe need to be binary (meets a specific code, or standard), and a few metrics may be subjective. Metrics should be expressed as:

- Exact (2.5 inches)
- Less than (< 3 inches)
- Greater than (> 2 inches)
- Range (2.0 – 3.0 inches)
- A set of discrete values (2.0, 2.25, 2.5, 2.75, 3.0 inches)

The design requirements must:

- Reflect customer need
- Differentiate the product from the competition
- Be technically and economically feasible

Sandy Cutler, CEO of Eaton, asks his engineers:

- Is the customer asking for it?
- What differentiation does it offer Eaton?
- What value does it offer the customer?

The following is a list of elements that might appear in a product design specification. It is not intended to be all inclusive, nor do you need to address each of these.

**Intended market****Product cost(s)****Operating environment:**

Temperature (stable/variable?)  
Atmospheric pressure (stable/variable?)  
Humidity (stable/variable?)  
Contamination potential  
Corrosion

**Static physical characteristics:**

Envelope (dimensions)  
Weight  
Shape

**Dynamic (active) environment:**

Vibration  
Acceleration  
Deformation  
Imposed loading

**Performance requirements:**

Force  
Speed  
Power  
Torque

**Others:**

Product operators / users  
Ergonomics  
Materials  
Product life  
Reliability  
Installation  
Regulatory environment (federal, state, local)  
Safety  
Shipping and storage

**Tips:**

When creating your EDS, arrange the specifications in a table of columns. List the specification, establish metrics (units) if possible – some may be yes/no, and define a target value or at least a range.

Determine the relative importance of the requirements. Use a scale of 1 to 10; with 10 being a “must have”.

Finally, try to include a comment on where the specification came from (customer needs, governmental regulation, competition, etc.)

Try to be comprehensive, even if you may have to ignore the requirement later due to time constraints. Remember that specifications will overlap and conflict (e.g. high strength vs. low weight). Don't worry at this stage; they will sort themselves out as design decisions are made.

**To define specifications, look to:**

Customers (first and foremost)  
Competing products (use reverse engineering)  
Analogous products  
Patents  
Trade magazines (identify the driving technology of the product)  
Published standards (ASME, Mil-Spec, ASTM...)  
Engineering handbook and textbooks  
Experience  
Experts

Adapted from: [http://homepages.cae.wisc.edu/~me349/lecture\\_notes/product\\_design\\_spec.pdf](http://homepages.cae.wisc.edu/~me349/lecture_notes/product_design_spec.pdf)