As part of the Design Process, each design should be "tested" before it is transformed into reality. One form of testing is "intellectual" evaluation. This sheet can be used to help evaluate mechanical designs based off of various criteria. This should not be used as a checklist, but rather to facilitate the evaluation of common criteria. Additional criteria may be appropriate for the specific design.

Customer satisfaction

- Are the customer's needs well understood?
- Has the proper "problem" been solved with this design?
- Have the proper criteria been applied?
- Does this product provide good value to the customer?
- Will the design perform as desired?
- Will the customer be happy with the end product – does it help him/her?

Failure Modes

- Are the effects of failure mitigated (fail safe)?
- Have all modes of failure been identified and addressed properly?
    - Fatigue (cyclic loads, enhanced by stress concentrations and hard/brittle materials)
    - Impact (or high strain rate loading, materials behave less ductile)
    - Corrosion (many types including galvanic, erosion, crevice, intergranular, pitting, and selective leaching). Corrosion can cause stress concentrations, poor fit, seizing, degraded material properties, etc.
    - Stress corrosion cracking, hydrogen embrittlement a concern (a special concern in hard low ductile materials)
    - Polymer degradation (swelling, weathering, etc.)
    - Wear (will the product continue to function as it wears? Will fit-up with other parts change?)
    - Creep
    - Manufacturing effects
    - Unanticipated loading (expect the unexpected)
    - Thermal effects (changes on microstructure, changes to material properties, thermal stresses)
    - Residual stress, assembly stresses, etc.
    - Others

Manufacturability

- What fabrication and assembly processes could this be made from?
- What are "defects" of "flaws" associated with the proposed manufacturing methods? Can these defects be detected? Can the part perform adequately with such "defects" being present?
- Is the design tolerant of manufacturing variability?
- What are inherent effects of the manufacturing processes on the material (properties, microstructure, distortion/residual stresses, etc.)
- Could details in design or material selection be changed to improve manufacturing?
- Are tolerances reasonable (well balanced between performance on manufacturing capability)?

- Will this part be easy to assemble? Have all assembly issues been consider as a system rather than part level?

Inspectability
- Are all critical features such as dimensions, material specifications, and internal defects, inspectable to assure they meet the engineering specifications?
- Can defects or damage created in service be identified before costly failure occurs?

Testability
- Can changes be made to improve how the device or component could be tested?
- Will testing be adequate to ensure the product performs properly?

Economics
- What are the main elements that increase the cost?
- Manufacturing costs, material costs, part costs, assembly costs, etc.
- Has a holistic approach to cost been considered? Can overall product cost be reduced by modifying detailed parts (even if this adds to the cost of individual parts)?
- Can overall costs be minimized further?

Serviceability
- Can the final product be serviced and maintained easily in the field?
- Can the final product be serviced and maintained quickly in the field?

Environmental/Sustainable
- Are sustainable manufacturing processes and materials to be employed?
- Are there environmental issues associated with the harvesting and refining of materials?
- Have "end of service-life" issues been addressed? Can this product and its parts be recycled?

Ethical
- Have the code of ethics established by professional organizations such as ASME been adhered to?
- Are the design documents accurate with claims not overstated?

Health and Safety
- Have appropriate codes and standards been applied to prevent harm?
- Does the design mitigate harmful effects of failure to prevent injury?

Social and Political
- Are there social or political implications associated with this design?
- Are materials or parts to be imported?
- Would this product be exported or imported?

Other: Are there any changes to be made to improve anything else?