Detailed Design Review
Key Objectives?

- Catch mistakes and improve design
- Verify readiness to spend money and build prototype:
  - Specs (needs) are addressed
  - Risks are addressed
Participants?

- Guide, TA, and all team members
- People who can help you satisfy your objectives
  - Expertise in each area (and from each discipline) that will be reviewed
  - Challenge your design and your assumptions
  - Attendance may change with agenda
Preparation

• Your expectations and critical focus areas
• Design input – specifications
  – Complete, unambiguous, testable
  – Traceable to customer needs, systems architecture, and test plan
Preparation

- Design output – evidence that design will meet specs (through inspection, analysis, or reference to something proven)
  - System architecture – subsystems address all specs (concept update may be helpful)
  - Detailed drawings, schematics, flow charts – everything needed to physically and functionally realize your design, from component to subsystem to system
Example design documents by discipline

- ME: 3D CAD drawings, mechanical simulations
- EE / CE: final ORCAD schematics, detailed SPICE, Matlab simulations.
- ISE: factory layout, process flow diagrams, workflow maps, supply chain maps, ergonomic drawings, lean analysis, inventory analysis, coupled with implementation plans
- All: step-by-step plan to fully characterize system against all specs
Preparation

• Design output (…continued)
  – Feasibility analysis – simulations, engineering analysis, prototyping (if appropriate)
    • Evidence that your design **will** work
    • Focus on technically challenging (high risk) areas
  – BOM – long lead items and vendors identified, review against budget
Preparation

• Preliminary test plans – evidence that your design does work
• Updated risk assessment
• Agenda with timeline by discipline
• Distribute as much as possible before the review
• Review prior project documentation
• PRACTICE!!
### Postulate Questions

<table>
<thead>
<tr>
<th>Function</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function</td>
<td>Will customer needs be satisfied as defined/measured by target values (specs)?&lt;br&gt;Will the architecture and functions be fulfilled? Will they produce the desired effects?&lt;br&gt;What other supporting functions are needed?</td>
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<tr>
<td>Layout, geometry &amp; materials</td>
<td>Will the chosen layout, component shapes, materials, and dimensions provide adequate robustness, adequate durability, permissible deformation, adequate stability, impact resistance, unimpeded expansion and heat transfer?</td>
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<tr>
<td>Energy &amp; kinematics</td>
<td>Will the chosen layout and components provide acceptable transfer of energy, adequate transient and steady state behavior, and appropriate motion, velocity, and acceleration profiles?</td>
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<tr>
<td>Safety</td>
<td>Have all factors affecting the safety of the user, components, functions, operations, and the environment been taken into account?</td>
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<tr>
<td>Ergonomics</td>
<td>Have human-machine relationships been fully considered?&lt;br&gt;Have unnecessary human stress or injurious factors been predicted and avoided?&lt;br&gt;Has attention been paid to aesthetics and the intrinsic “feel” of the “product”?</td>
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<tr>
<td>Quality control</td>
<td>Have standard tolerances been chosen (not too tight)?</td>
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<td>Assembly</td>
<td>Are assembly operations defined and can they be performed simply, repeatedly, and without ambiguity? (not due yet)</td>
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<tr>
<td>Operation</td>
<td>Have all factors influencing operation (such as noise, vibration, handling) been considered?</td>
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<tr>
<td>Costs</td>
<td>Will stipulated cost limits be observed?&lt;br&gt;Will additional operational costs arise?</td>
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<tr>
<td>Schedules</td>
<td>Will delivery dates be met?&lt;br&gt;What design modifications might reduce cycle time and improve delivery?</td>
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Test Plans

• Documents how you are going to **verify** satisfaction of specs – how to test the features and functions that constitute your design implementation

• Important components:
  – What you’ll test (and what you won’t test)
  – How you’ll test: equipment and materials needed, test configurations and procedures, pass/fail criteria
  – Responsibilities and the approval process
  – Risks and contingencies

• See mycourses for more detailed format, links to samples, and a template

• Preliminary plan now, finalize early next quarter
Logistics

- 2-hour block scheduled, but may need multiple reviews
- Invite participants in advance and distribute materials; highlight times for specific attendees
- All material on laptop, hardcopy of appropriate documentation
- Discussion format – focus on improving design and catching problems
- Allocate time to most critical areas
- PM manages agenda, team members responsible for sections
- Document action items, issues, decisions (see templates)
- Update EDGE with notes and all design documents