

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

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

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