

## Design for Reliability (DFR) Committee Aims to be the Rule Breaker

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The current state-of-the-art in global competition is going through rapid changes. As we are all aware, some companies have built up a strong and long-lasting reputation for reliability. Raytheon has established a culture at the highest level in the corporation for providing customers Mission Assurance through “NoDoubt™” mindset. Bill Swanson, Chairman and CEO of Raytheon says, “there must be no doubt that our products will work in the field when they are needed” (Raytheon Company: Technology Today, 2005, Issue 4). Hyundai offering a ten-year warranty is another example of a company establishing reliability as a key differentiator to separate itself from its competitors. Toyota built its world leadership mostly because of high reliability. Chrysler with its new lifetime power train warranty was the only auto maker to have sales up in the fourth quarter of 2007. The companies that achieved its high targets did it by breaking the rules. Most of the industry is still struggling and will continue to struggle until they learn to think outside the box. Such is the task of the Design for Reliability committee.

At the AdCom meeting in 2006, Dev Raheja, proposed three areas where we need to break away from the normal rules. First, we must not assume that we need to only meet the requirements. *We need to write requirements that identify many customer needs usually missing in the requirements.* For example: A NASA Challenger requirement was that the shuttle shall not be allowed to launch below 40 degrees F. Someone should have questioned why not? The answer: the oil ring seal freezes. The new requirement should have been then “the seal shall not freeze at any external temperature”, which is the way it is now, after the catastrophic failure. How come no one thought about this? This principle illustrates the basic art and science of design for reliability: *Fix the failure before it becomes a failure.*

The second area was about failure rates. Industry has traditionally accepted an agreed upon level of failures. We agreed this is not acceptable for critical failures. The DFR committee proposes that we must design for zero failures for no failures of critical consequence is acceptable. The group agreed that *if we know the failure mode on paper, we can design it out while still on paper.*

The third area was to understand that a design cannot perform well if it is infested with latent manufacturing and workmanship flaws. *We must try to anticipate as many manufacturing mistakes and anomalies as we can and design the products such that the critical manufacturing mistakes cannot be made.* For example, if a wire could be routed to a wrong destination, we could color code or choose the wire length such that it can only go to the right place.

The AdCom accepted the proposal overwhelmingly. Sam Keene, Lou Gullo, Bob Stoddard, and Dev Raheja became the founding members of this revived committee. Since then some more members have joined the committee. The plan is to develop this Out-of-the-Box thinking combined with real examples, and publish this knowledge in a book. Fragments of the chapters of the book will also be published in IEEE newsletters and journals prior to book publication. This will ensure that the body of knowledge on DFR is distributed to a wide audience to carry the message on breaking the rules in design methods where it makes sense to ensure reliability.