

# Memo



To:  
From: Hans Manhaeve  
CC:  
Date:  
Concerns: The quest for Cost Reduction – Training class description

---

## Preamble

The “Quest for Cost Reduction – How IDDQ can serve” training class is intended for Project Managers, Design engineers and Test engineers.

Increasing quality and cost reduction demands require a close interaction between the Design & Test departments to reach the target product quality at the lowest cost. To achieve these targets a proper understanding of the different aspects that make up the product development flow, looked at from both the design and test perspective, is mandatory. An equally important factor is the establishment of a proper interaction between the design and test teams. This requires that the design teams have knowledge on the test capabilities and limitations, enabling the proper introduction of design-for-test methodologies and the fruitful execution of test preparation tasks, that the test teams and project managers are aware of the impact of certain design-for-test strategies on the design work and that all are aware of the impact of certain design-for-test and test preparation actions on the ability to optimize the test and overall product flow.

The objective of this training course is to provide the proper knowledge to bridge the gap between Design and Test and provide a better understanding of the factors involved in reaching an optimized cost - quality level.

## Training class content

The training class addresses the following topics.

At the start a global situation of the test problem and the need for test will be given. The training class is built around three main topic areas and focuses on the role current testing is playing for each of them. The first one is the Test perspective, the second bridges Design and Test by focussing on the test preparation activities and the third addresses the Design perspective and focuses on design-for-test implementation and application. Before approaching final conclusions test optimization and a number of case studies are reviewed.

The objective of the “Test perspective” section is to provide a deeper insight in the capabilities, limitations and requirements of test and the test flow. This will be done at first by situating simulation, verification and test in the product design, manufacturing and test flow. Next the role of Test and the different aspects that make up a test flow and a test program will be reviewed. Following that the different ways to test a circuit (test approaches) will be discussed from a methodological viewpoint as well as from a test parameter viewpoint. The methodological viewpoint will explore the path from Functional over Structural to Defect oriented test, thereby looking at the definition and application of fault models and how these can help to guide and improve the test process. The test parameter viewpoint will focus on the difference between voltage (logic) and current (IDDQ) testing and zoom in to IDDQ testing.

Having a proper insight in “What is Test all about and how can it be done” enables to built the bridge between Design and Test.

In the "Bridging Design and Test" section that bridges the Design and Test world, the design task that are done in function of test preparation will be looked at, leading to the discussion of topics like test vector generation, fault simulation and fault grading. Once these aspects are mastered, a second theme that will be addressed is the difference between fault coverage and test coverage, putting meaning to the figures provided by the ATPG tools. Jumping back and forward between Design and Test the link will be made between "fault detection" and "defect detection", answering the question "how efficient are tests driven by fault models in detecting real life defects?". This will be elaborated further and underlined with practical data in the section "test quality and the quest for Oppm" that will address fault coverage and test coverage requirements for a Oppm goal. Looking at the relation between DPM figures and device reliability will conclude the "Bridging Design & Test" section.

The focus of the "Design perspective" section is to focus on the measures that can be taken during the design phase to ease and anticipate the test tasks. A well-selected design-for-test strategy is crucial to be able to meet quality and reliability targets as well as to anticipate test economic factors. Attention will be paid to the "IDDQ design for Test" requirements and implementation considerations.

Looking forward as well as compiling the gathered knowledge a number of IDDQ application strategies will be reviewed, followed by the discussion of a number of case studies and related test economics.

The training class is concluded by a set of global conclusion.

Upon completing this training class the participant will have acquired a proper understanding of the capabilities and limitations of Test as well as a proper understanding of the DFT measures that can be taken to improve the test process and reduce product costs. With this knowledge the participant will have the proper knowledge to take the appropriate decisions that help to bridge the gap between Design and Test and have a better understanding of the factors involved in controlling the test costs.