

# Outsourcing Test without Standards?

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Within the product cycle of a System on Chip (SoC) there are various opportunities to outsource some of the tasks. Since many years the manufacturing process is subject to be separated from the product development.

We identify the integrated device manufacturers (IDM) who develop and manufacture new chips. On the other side there are companies focusing on product design only and their partners the silicon foundries who do the wafer fabrication. This arrangement fits quite well to an well-organized ASIC design methodology. Products are designed using cell libraries qualified by the foundry. This is a kind of standard.

Where do we find the outsourcing in the test arena? Almost everywhere! No IDM does everything regarding test in the own organization. Furthermore the term outsourcing is somewhat fuzzy. There is an established supplier industry serving us with:

- Automatic Test Equipment
- Probe cards
- Design / DFT Tools
- ... and much more

Taking these products and services for integration into internal processes is a typical situation for IDMs. If there is no legacy in the company, there must enough pressure to discuss above topics with respect to a make or buy decision.

Another aspect is contract testing. For IDMs it is a valuable alternative to manage production capacity and handling specialties. Here a fraction of the manufacturing test capacity is located outside the IDM. This is maybe the most popular view of outsourcing in test. It relies on the production standard, which is often represented by the test program. With some exceptions the test program and therefore the critical factor test coverage is provided by the IDM.

From the mentioned situations it is obvious that buy-in or outsourcing is based on agreed standards for the specific elements of the entire test flow. And these de-facto standards exist. It gets much more complicated if external partners should cover the entire test flow including the DFT part.

The task of test program development or transfer of a given test sequence from one platform to another can be delegated to a service provider as long as the test conditions and limits are well defined.

If test development may interact with product design, which is typical for all DFT based test solutions, things are rather complicated. Even within a single company it is a challenge to bring all test disciplines together in a way that the result is convincing. In the ASIC environment with a well-adjusted set of design and test rules specialized service providers can execute test engineering and DFT implementation. The key issue is the golden test methodology as reference provided by the IDM.

For high volume products or special features of the product, which are not state of the art, new solutions have to be found. It is quite open where the new solution is based on. It might be advanced DFT or special test equipment or an intelligent mixture of both. The task is to find new methodologies, which are solid enough for mass production. A test solution provider with overall test competence is necessary because he has to act without given standards. The task looks like: make it better but do not lower our quality standard. All major methodology enhancements need correlation between technologies. As long as manufacturing technology is proprietary to some extent a very close relation between solution provider and customer seem necessary. If such partnership is part of the outsource phrase many things are possible. Where can I order a new test solution for my new product offering 10dpm level at half the cost?

For given test standards and solution methodology involvement of external partners is a reasonable business alternative.