

Phase I: ASIC Design

By courtesy of IMEC

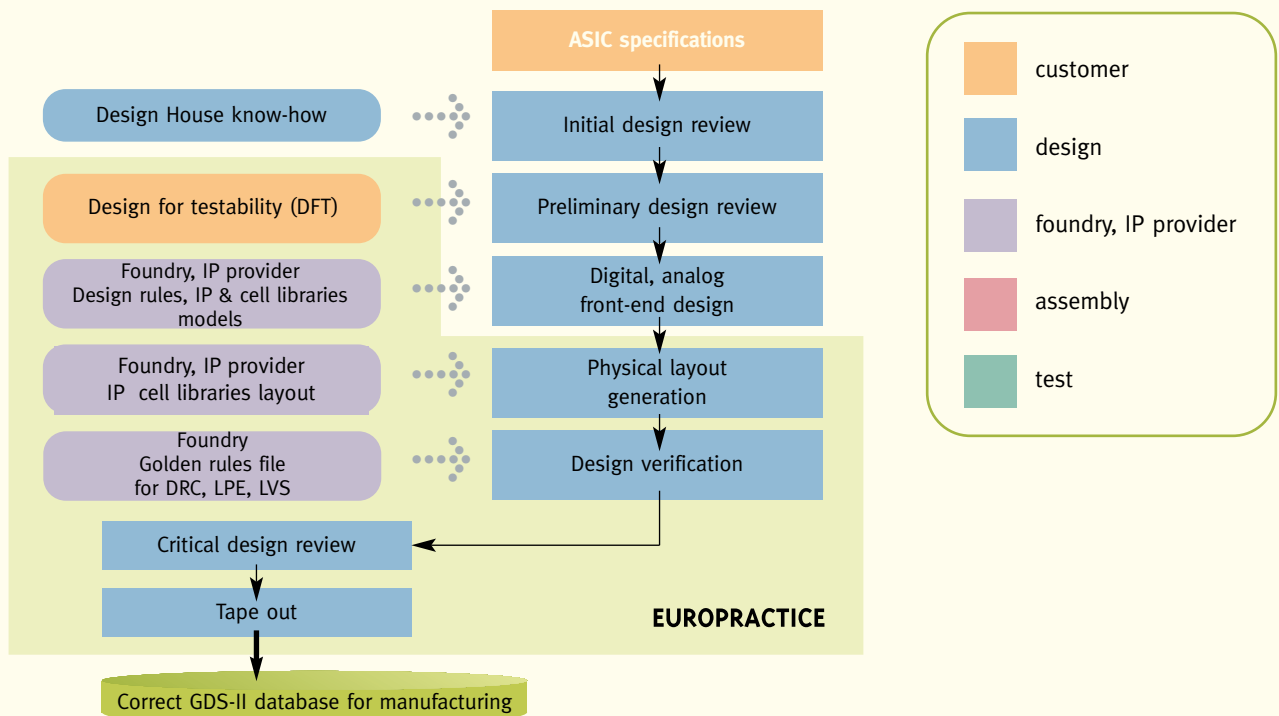
When customers have received design rules, cell libraries, etc., they can start the ASIC design. ASIC design can be split up into front-end design and back-end design. Front-end design covers ASIC specification feasibility study and design including tasks such as schematic entry, VHDL description, scan insertion, simulation and synthesis. The front-end design can be carried out by the customer himself or can be subcontracted to a design house. During this design phase, Europractice offers technical support on technology, test, type of package, etc. Important know-how and feedback from the test house will be used to improve the DFT (Design For Testability). "State-of-the-art" CAD tools are used during the ASIC design phase.



When the netlist is ready the back-end design activity starts including layout generation using state-of-the-art layout tools. Deep submicron digital place & route tasks are in most cases not performed by the customers. For those customers that have not their own layout tools, EURO PRACTICE is offering such deep submicron layout service (see deep submicron layout service on page 7). After initial layout, timing verification

is carried out by the customer using parasitic layout information and layout is iterated until timing is met. Verification of the design needs to be done in all technology corners.

When layout is finished, a final DRC (Design Rule Check) and LVS (Layout versus Schematic) is performed on the GDS-II database in order to deliver a correct GDS-II to the foundry for manufacturing.

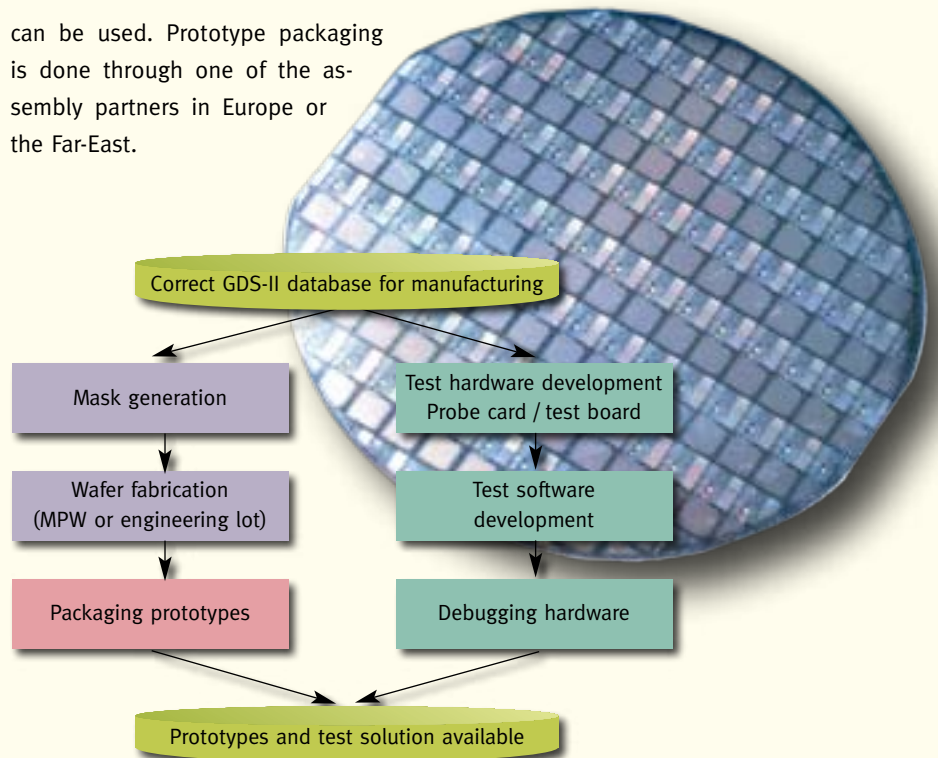


Phase II: Prototyping and test development

After all the checks have been performed and the GDS-II database is correct for manufacturing, Europractice sends the database to the foundry for prototyping. Masks will be generated by the foundry and first silicon will be produced. Prototyping can be done on MPW (Multi Project Wafer) runs or SPW (Single Project Wafer) pilot runs (see Low Cost IC prototyping on page 8).

In parallel with prototype fabrication and prototype packaging the test solution including test hardware and software is developed. EUROPRACTICE will generate bonding diagram and assembly instructions. For prototyping ceramic packages as well as the production plastic packages

can be used. Prototype packaging is done through one of the assembly partners in Europe or the Far-East.

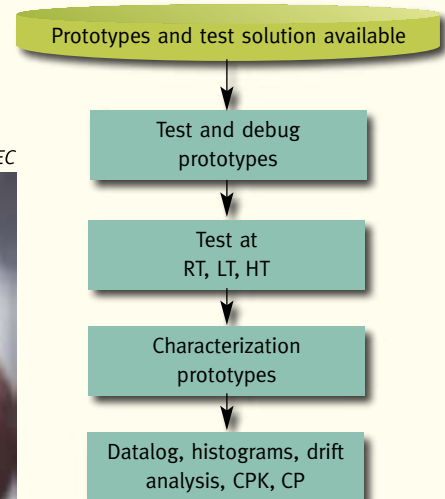


Phase III: First test & Characterization of prototype

When packaged prototypes are available, they will be shipped to the test house for debugging. Debugging includes continuity and leakage tests, ATPG test and test of the different analog blocks (when available on the ASIC) at room (RT) temperature. When prototypes are working correctly according to the ASIC specification, low (LT) and high (HT) temperature are performed. The next stage is a full characterization of the ASIC at the corners of the voltage supply and frequency at LT, RT and HT.

During each test a datalog is generated of the measured values and histograms and cpk reports are sent

to the customer. In case of specific problems, failure analysis can be done to determine the reason of the failing.

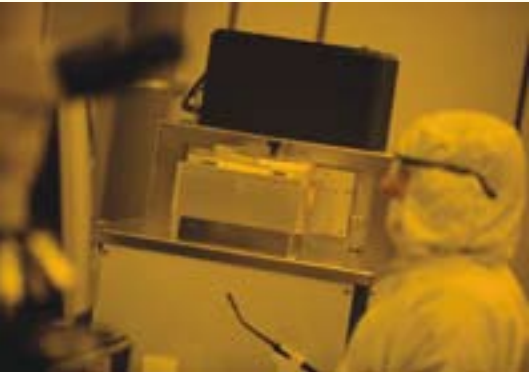


Phase IV: Qualification of the ASIC

When customers only need prototypes of their ASIC, qualification is not needed.

However when prototypes are working correctly and the customer would like to have volume production it is the right time to think about the “product qualification”.

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Qualification requirements:

Medical
Industrial
Space
Consumer



Start new batch of wafers

Packaging

Development of qualification procedure

Qualification hardware development

Qualification software development

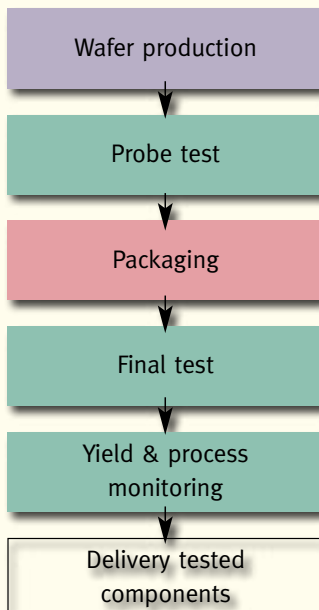
Datalog, histograms, CPK, CP

Europractice offers within their test solution service a full qualification through one of the test house partners. The qualification procedure can range from Consumer, Industry and Medical till Space qualification according to the Military, JEDEC standards...

The qualification procedure will be discussed between Europractice, customer and test house and a full qualification flow will be prepared. To speed up the procedure, most of the tests are running in parallel. Special burn-in boards will be developed for reliability tests.

Phase V: Volume production & test activities

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Once the ASIC has been qualified, the ASIC is ready for volume production. During the ramp-up phase, yield and process will be monitored. Once the ASIC runs into higher volume, the test solution can be transferred to test houses in the Far East. In that case the test boards are copied, the original test board will remain in our European test houses so that yield and process monitoring is still possible.

