

# Industrialisation: making ideas producible

## From functional sample to production-ready product

During the industrialisation phase, Iftest optimises the PCB design based on Design for Excellence (DFX) criteria. This is made significantly easier by the physical proximity of the development and series production facilities, which ensures rapid prototype manufacturing. As a result, customers can promptly carry out important verification and validation tests, and immediately input feedback for further optimisation, leading to a quicker market launch.

### Advantages of industrialisation with Iftest

What is needed in order to develop a production-ready product from a functional sample with maximum speed and cost efficiency? How long does this process of 'industrialisation' take? What costs are involved and how are product costs affected by scaling up the batch size (economy of scale)? What has to be considered during an industrialisation project in order to ensure a smooth transition into series production? These are just some of the questions that motivate innovative companies looking for the right manufacturing partner for their newly developed product. Many companies want to focus exclusively on the challenge of market entry and thus rely completely on their series production partner.

With a track record of over 35 years in electronics development and manufacturing, Iftest is a reliable partner for industrialisation. In particular, the physical proximity of development and series production facilities under one roof makes Iftest the ideal partner, as each side – development and series production – knows the other well and both are optimally coordinated.

From the start, Iftest consistently uses Design for Excellence criteria to direct each industrialisation project. As a result, from the moment the circuit diagram is established, optimal conditions for later series production are always ensured. This then continues through the subsequent development of the PCB design and prototype manufacturing. Prompt and cost-effective manufacturing and delivery of prototypes enables the developer to carry out verification and validation tests early on.

Overall, Iftest offers customers an accelerated market launch with high cost efficiency thanks to these optimised processes, making the company the perfect partner for industrialisation and contract manufacturing for businesses that want to introduce their new product to the market quickly.



### The industrialisation process

One of the first steps in an industrialisation project is selecting the parts, components and suppliers. Factors informing this selection include long-term availability (Design for Logistics, or DFL), the possibility of setting up a second source as a supplier, as well as cost optimisation (Design for Cost, or DFC) of the product. Iftest offers important expert knowledge in these areas as a result of its access to worldwide component databases. These databases, along with the company's many years of experience in strategic purchasing, are essential for optimal selection of components.

### Printed circuit board design

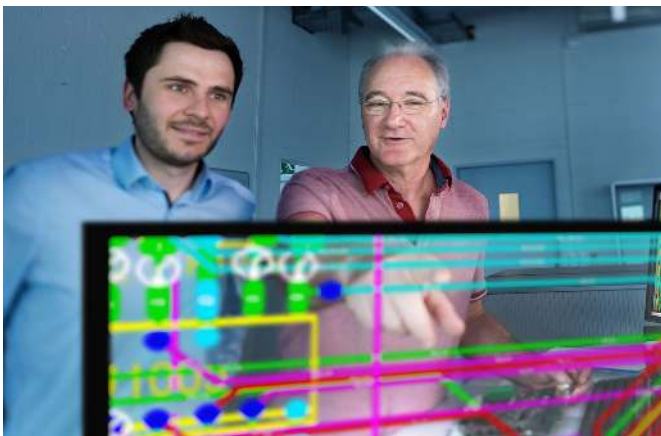
A good PCB design includes developing the optimal testing strategy (Design for Testability, or DFT) and takes into account the important aspect of manufacturability (Design for Manufacturing, or DFM). DFM ensures that knowledge of the entire production process with corresponding process windows informs the PCB design. This results in not just a functional and efficient product, but premium quality with optimised price-performance ratio.

Iftest offers in-depth expert knowledge in PCB design. Especially when it comes to realising complex designs, its comprehensive knowledge of applied production technologies is crucial.

Alongside the PCB design, the testing concept is developed. As part of this, the quality-related values to be measured and the testing equipment for measuring these values are defined and, where necessary, new testing equipment is developed. Thanks to its origins as an engineering firm for developing testing equipment, Iftest can draw on comprehensive knowledge and expertise in this area.

Iftest offers the following standardised testing procedures in production:

- + 3D Automated Optical Inspection (AOI)
- + In-Circuit-test (ICT)
- + Flying-probe-test
- + X-ray inspection
- + Function test
- + Boundary scan test



### Prototype production

Rapid prototype production is an important foundation for any efficient industrialisation project. With its own prototype line and a qualified team, Iftest is specialised in delivering quick and cost-efficient prototypes. This allows the customer to quickly carry out important verification and validation tests. At the end of prototype production, the customer is provided with an initial sample test report.



### Supply chain optimisation and logistics concept

When prototype production has been successfully accomplished, the next step is optimising the supply chain. In order to ensure the long-term availability of parts, agreements are drawn up with suppliers. These include, for example, fixed prices for components, agreements about volume flexibility, and a definition of the planning process throughout the supply chain. These are then recorded in supplier contracts as well as quality assurance agreements.

### Setup and verification of the production line

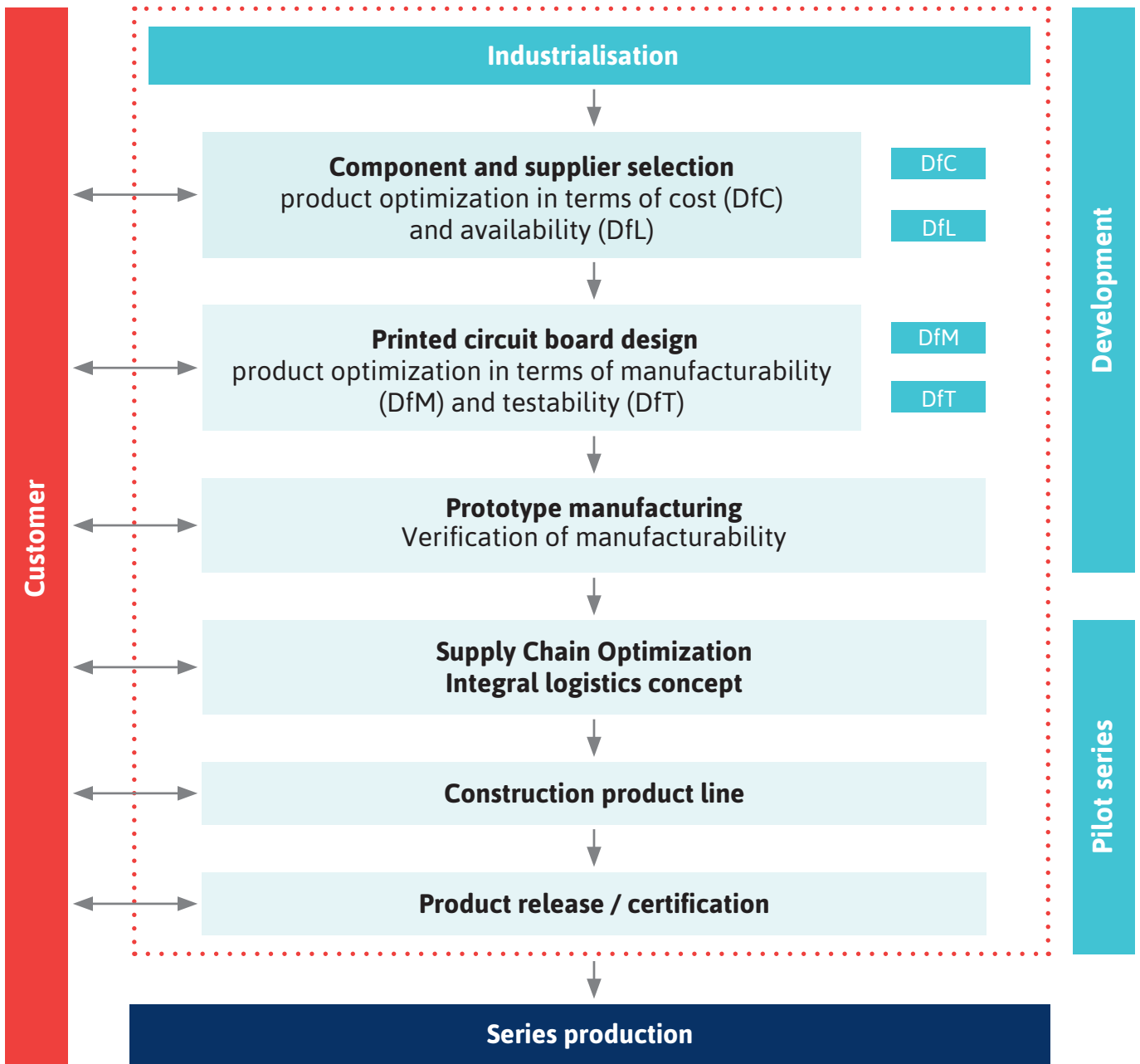
In the next phase, the production and testing concept is implemented in accordance with lean management principles. For the setup of the production process, the relevant machines, tools and aids are provided and the defined manufacturing processes are implemented. The product-specific testing equipment is integrated into the production process. As soon as the entire production line

is ready, a product verification procedure is developed and documented under series conditions. Finally, a process FMEA (P-FMEA) is carried out, to verify process capability and minimise risk.

energy supply. Iftest supports the customer with their validation through the appropriate compliance documentation. For new products that require certification, this is an important step when aiming for a quick and cost-efficient market launch.

**Release and certification**

Many of Iftest’s customers work in regulated environments and have to comply with applicable standards. These include such areas as medical technology and



**DfC** Design for Cost    **DfL** Design for Logistics    **DfM** Design for Manufacturing    **DfT** Design for Testability



### Use case: industrialisation of smart watch electronics

Smart watch boards manufactured by Iftest are currently used in the watches of various well-known Swiss brands. The foundation for this was laid by the successful industrialisation of smart watch electronics on behalf of a notable watch supplier. An important aspect of this industrialisation project was the optimisation of the PCB design as well as the introduction of a production process that enables ultra-thin PCBs with thicknesses up to 300 micrometres to be continuously processed. A specially introduced milling process makes it possible to adhere to the mechanical tolerances of below 50 micrometres required by the watch industry. The automated optical inspection system (AOI) of the latest generation (3D), which is used for quality control, plays a central role in the process. This optimised production process facilitates a production capacity of over 10,000 smart watch boards per day.

#### Project highlights

- + Introduction of a milling process that adheres to mechanical tolerances <math>< 50 \mu\text{m}</math> of the watch industry
- + Production capacity of over 10,000 smart watch boards per day
- + Creation of a test concept and setup of test systems with a test time of <math>< 3</math> seconds per smart watch board

### Use case: industrialisation of a smart grid module

The production of electricity from renewable energy sources is changing demands when it comes to electricity networks. Electricity produced from solar and wind power is difficult to plan for and is subject to major fluctuations. Smart grids have been designed to overcome this challenge. The electricity grid uses a combination of information and communications technology to give it the intelligence and flexibility required. Iftest industri-



alised one such smart grid module for a leading energy provider. The company was chosen specifically on the basis of its experience in industrialisation and series production.

#### Project highlights

- + Further development of software from CTI project and industrialisation of hardware
- + Printed circuit board design
- + Prototype production
- + Industrialisation and series production

#### Iftest AG

- + EMS partner for medical and industrial electronics
  - Hardware development
  - Software development
  - Printed circuit board design
  - Prototype manufacturing
  - Test engineering
  - Printed circuit board assembly (SMT and THT)
  - Cable assembly
  - Module and device assembly

Factsheet | August 2018

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