

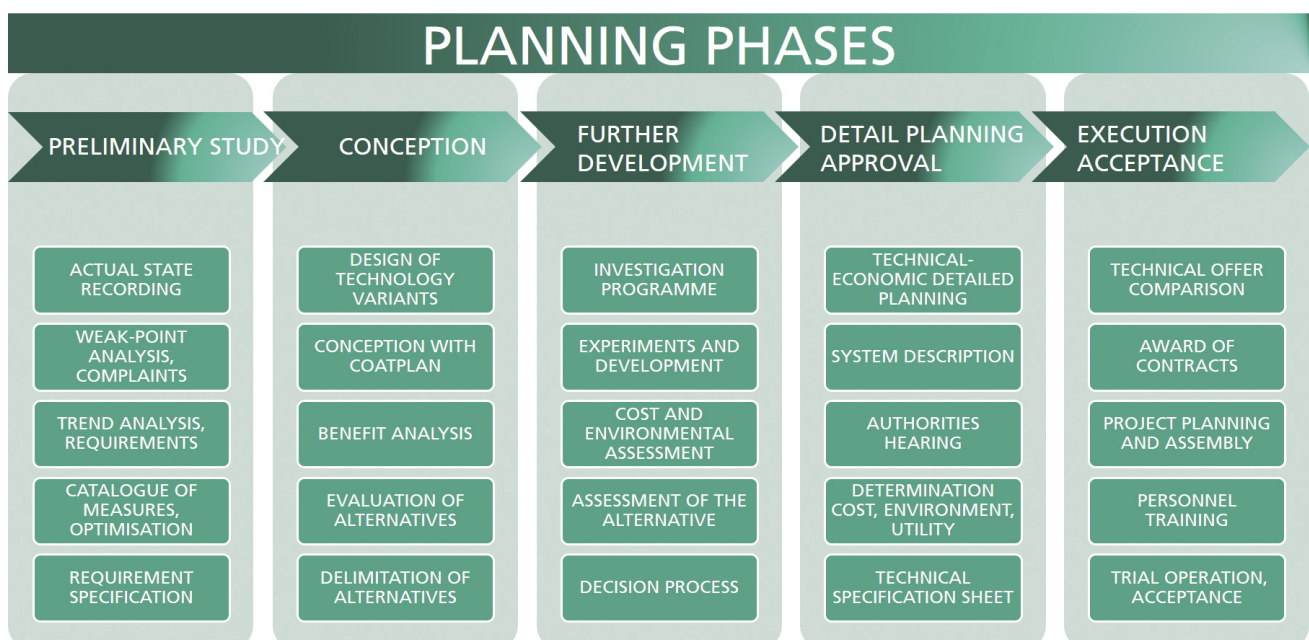
Design of innovative Paint Shops and sustainable Processes

Status quo

Painting technology is experiencing a major innovation push, triggered in particular by digitization, the pressure to rationalize and by new environmental regulations (e.g. 31st ordinance on the implementation of the Federal Immission Control Act BImSchV, REACH directive). Examples include:

- New painting line technologies with faster product implementation
- Energy- and resource-effective processes
- Use of water-based paints, even for high corrosion protection applications
- Substitution of hexavalent Chromium
- Clean pretreatment-concepts
- Use of powder coatings for new applications
- Processing nanomaterials
- Innovative and efficient coating and drying processes

Consequently, opting for pretreatment and painting technologies based only on the state of the art is not always the best course of action. Since painting systems are investment-intensive assets and have an increased life-cycle, the design shows up many obstacles for any company. Regulatory/legal requirements must be considered, such as the limitation of environmental pollution. Tight schedules in combination with limited personnel availability and technical resources make this task even more difficult. Extensive planning and optimization processes need independent consultation in order to meet all the ensuing demands on technological variety and to ensure painting processes efficient and effective when it comes to setup and operation. The complexity rises with coating material technologies and numerous implementation variants, from simple manual processes and semi-automated processes right through to smart, fully-automated coatinglines.



Coating process requirements vary from one product to the next and is nowadays driven by the demand of Lotsize-1 production and the specified surface quality and corrosion protection.

All requirements regarding quality of the paint finish as well as occupational and environmental safety must be fulfilled in alignment of the company's strategy.

Our strategic approach

This is the time, when the engineering team at Fraunhofer IPA steps in, supporting in any field of industrial coatings application. Our experience is based on more than 45 years of experience and a huge variety of industrial projects, which have been successfully executed. E.g. some case-studies: coating systems for micro circuit boards and the construction of machines and components (such as pumps and motors), cranes for assembling wind turbines, right up to various projects for the rail vehicle industry and aviation industries.

Our tool-box is based on innovative evaluation methods in close collaboration with supplying companies in order to verify processes, equipment components and painting results in the production-oriented Fraunhofer IPA coating laboratory. A project procedure that has been successfully implemented for many years to ensure an overview of the numerous interdependent criteria involved. The documentation of knowledge gained in each planning phase and summarize it for you to use as a basis for decision-making. After each milestone, results will be presented and gain the decisions for further steps within the planning process.

From the preliminary study to the finished paint shop

Innovative and new technologies to improve cost efficiency and focus on quality demands bare always a certain risk while implementing to new facilities. Therefore it is essential for the planning to compare and evaluate alternative technologies from a technical and commercial perspective.

With this in mind, the planning team from Fraunhofer IPA uses the established, systematic CoaTway® method work out best-available painting processes for the specific needs of the customers. This approach is computer-aided and can be used to simulate coating processes. The spectrum ranges from the key analysis of the upstream and downstream processes in the paint shop, such as loading and unloading, parts availability, logistics, material flow simulation or ABC-analysis of the parts spectrum. From pretreatment and application technologies to process engineering such as drying or exhaust air/cooling zones and alternative conveyor systems. Based on an analysis of the actual state, several technically viable concepts are developed.

These are analyzed, evaluated to fit as the best concepts are identified and documented as possible solutions.

The core of the strategic planning method is the constant alternation between the assessment of technologies, quality requirements and cost-effectiveness in order to gain best-fitting and innovative processes. By forecasting implementation costs and the anticipated savings potential, CoaTway® can also be used to carry out profitability analyses.

In the advanced development phase, the selected concepts are then tested in the IPA coating laboratory, and specification tests according to DIN EN ISO/IEC 17025:2018 are conducted in the accredited IPA test labs to validate the results of the planning processes in a short time. Summed up by the relevant expertise in lean management and Six Sigma procedures, Fraunhofer IPA ensures optimal and best-practice solutions to meet the company's individual needs.

In the following detailed planning phase, the focus is on the final technical and economic planning of the chosen technology, on the preparation of the technical specifications and on obtaining official approval to operate the paint shop. When it comes to the phase of plant engineering and construction and acceptance process, priority will be given to cope with technical aspects of prior documents. A binding milestone plan for the installation, commissioning and ramp-up phases, including responsibilities, is also crucial to achieve the whole schedule and SOP-timeline.

The final step will be the preparation of the acceptance procedure for the completed paint shop.

We are more than happy to assist you. Please get in touch!

Contact partners

Dipl.-Ing. (FH) Dirk Michels
Phone +49 711 970-3733
dirk.michels@ipa.fraunhofer.de

Dr. rer. nat. Volker Wegmann
Phone +49 711 970-1753
volker.wegmann@ipa.fraunhofer.de

www.ipa.fraunhofer.de/en