

Overview Training:

Optimization of Production Processes Methods of Quality Control

Our training offers an introduction to the most efficient techniques to optimize and control production processes.

Target group: All persons that are directly responsible for production and have to select methods to improve and control product quality:

Technical managers, heads of production, quality managers, as well as engineers in production, quality control, research and development.

Contents: The training offers an introduction to the *logic of carrying out optimization projects* and to the *methods of optimizing production processes* and the *methods of quality control*.

We explain the methods of systems engineering, mathematics, statistics and soft computing, which form the core of all management philosophies on quality improvement. While these philosophies changed - from Deming via Taguchi, TQM, EFQM to Lean Six Sigma - this core always remains. And additionally we explain powerful new methods that did not yet become part of any management philosophy.

From our consulting experience we know that all these methods are still widely unknown, and even less practiced. With this training we want to ensure that they are included in the everyday practice of companies and are not only applied when consultants solve crucial problems.

Prerequisites: For the training we presuppose some elementary knowledge in statistics (Notions of frequency and probability, basic familiarity with the normal distribution).

Individual Programs: We can put together a training matching your specific needs by selecting from the following topics:

1. Preparations for the Optimization of Production Processes

1.1. Selecting the Best Projects

- Definition of objectives
- Methods to identify profitable projects:
Analysis of constraints, rough project planing, estimation of profitability
- Methods to select the best projects:
Detailed project planing, feasibility (calculation of profitability)

1.2. Preparatory Works

- Analyzing the performance of measuring instruments
- Theoretical and scientific investigations
- Determining the variance of a process
- Determining the constraints and limits of a process

2. Procedures and Methods to Optimize Production Processes (Overview)

- Management philosophies dealing with the optimization of production processes:
Deming, Taguchi, Shainin, TQM, EFQM, Lean, Six Sigma
- The logic of proceeding in optimization projects
- Model building from available data versus model building from newly generated data
- Model building from available data:
Statistical methods and methods of soft computing (Fuzzy logic, neural nets, etc.)
- Model building from newly generated data:
Basics of design of experiments, advantages compared to other traditional techniques of experimentation, some alternatives to design of experiments (EVOP, etc.)
- Some special methods for optimizing processes:
Simulation, Genetic algorithms, controller performance assessment
- Realization of the optima derived from the models
- Selection and application of appropriate methods of quality control
- Optimizing the flow of production:
Lean, FPM

3. Deriving Models from Available Data

3.1. Statistical Methods

- The basic principle: Gauss' law of the propagation of error
- Analysis of Variance
- Regression and multi-variant Regression
- Cluster analysis

3.2. Fuzzy Logic - Fuzzy Control

- The basics of fuzzy logic
- Application to optimization of production processes:
From operator know how to process control
- Selected suppliers of fuzzy control

3.3. Rough Set Theory

- The basics of rough set theory
- Application to optimization of production processes:
Generating rules from only a few data sets, from rules to process control
- Selected software tools

3.4. Neural Nets

- The basic principles of neural nets
- Application to optimization of production processes:
Generating models from available production and quality data, application of these models to simulate and control processes
- Selected suppliers of software tools

4. Systematically Generating New Data to Build Models: Design of Experiments (DoE)

4.1. Preparations for the Design of Experiments

- Determining all relevant process parameters
- Shainin methods to localize problems
- Selecting parameters and determining their levels

4.2. The Application of Design of Experiments

- Full - factorial designs
- Partial - factorial designs and Taguchi methods
- Second order designs
- Optimal designs
- Interpretation of the results of designed experiments
- Confirmatory experiments

4.3. Software tools

- Overview on available software tools

5. Systematically Generating New Data to Build Models: Alternative Methods

5.1. Hill-climbing Methods

- Searching step by step to find optima in running plants
- The methods and their logic:
Simplex - and XPLEX - method, method of the steepest ascent
- Combination with design of experiments

5.2. Evolutionary Operation (EVOP)

- Application of EVOP:
Scale up of processes (laboratory - pilot plant - production) or optimization of critical or expansive processes during operation
- Proceeding in projects using EVOP

6. Special Methods of Process Optimization

6.1. Simulation

- Basic principles of simulation
- Overview on selected methods for simulation
- Application to optimization of production processes:
Building models from given constraints and limits as well as known scientific relationships, plus eventually available production and quality data
Application of these models to lay out, improve and control plants
- Selected suppliers of software tools

6.2. Design of Experiments and Simulation

- Design of experiments as base for simulation

6.3. Genetic Algorithms

- The basics of genetic algorithms
- Advantages and possible applications of genetic algorithms

6.4. Controller Performance Assessment

- Switching acts of controllers - too intense, too fast or uncoordinated - as reason for variance in complex, automated plants
- Overview on controller performance assessment

6.5. Pinch Technology

- Determining of all heating and cooling energy flows within a plant
- Determining the pinch point
- Calculating the cost-optimal use of the energy flows
- Application of the pinch technology for process integration

7. The Application of the Models: Realization of Optima and Methods of Quality Control

- Validation of the models and the predicted optima in confirmatory experiments
- Determination of new set points for process parameters to realize the optima
- Actualizing SPC:
Selection and application of appropriate process control charts
Determination of control warnings and control limits
- Elaboration of out of control action plans
- Determining static, dynamic and anticipatory indicators
Aligning the indicators of all levels of the organization, i.e. the process level, the divisions and the whole company
- Training the personnel

8. Optimizing the Flow of Processes

8.1. Optimizing the Flow of Production Processes: Lean

- The 8 ways of wasting
- Evaluation of production processes:
Processes with / without adding of value (customer value added, business value added, non value added)
- The value stream map:
Planned versus real flow of production („hidden factory“), determining time traps
- Optimizing the flow of the production:
Ranking the processes in regard to value added and time traps, elimination of non value added processes and time traps

8.2. Optimizing the Flow of Test Processes: The Fault - Process - Matrix (FPM)

- Application of the fault - process - matrix
- Determining locations of fault occurrence and fault detection
- Determining faults, that may get into products
- Determining costs for faults (costs for rework, scrap, warranty, etc.)
- Ranking faults according to height of caused costs
- Minimization of total costs for faults and testing

9. Introducing Methods of Process Optimization to the Shop

- Design of experiments and model building as paradigm change in knowledge management:
From personal knowledge and experience to knowledge expressed in data based models
- Process optimization with external consultants
- Process optimization as fulltime job
- Process optimization as a systematized team process
- Selecting team members
- Training team members
- Usual resistance when introducing design of experiments and model building and how to overcome it

Selecting from the named topics we can put together one to three day seminars matching exactly your demands.

In addition to the introduction to these “hard“ facts of process optimization we offer, too, an introduction to the “soft“ facts of efficient communication, methods to efficiently run meetings and lead teams. These “soft” facts are especially important, whenever new methods of process optimization are introduced to the shop. You can find more about this training program at:

www.nechansky.co.at

Or contact us directly: + 43 / 1 / 817 58 63.

As an ideal we see the training in all these “hard” and “soft” techniques within an optimization project we carry out mutually. So we can train your team members in all these techniques.

Please contact us, so that we can put together a program satisfying your specific needs.