Meet the current opportunities
- Create a competitive advantage -

Consulting competence on the field of welding, testing and corrosion protection in combination with Six Sigma and Lean Management

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New strategies, methods and standards

Core competence: Process optimization of processes near to manufacture

powered by SIX-SIGMA GSI SLV

From a long standing experience with our customer over decades we could identify many key factors for successful optimization projects.

Advantages for our customers

- **System provider:** Welding, consulting, optimization and qualification in one hand
- **From practice into practice:** We know exactly which measures lead to optimization.
- **Qualification after consulting:** As an accredited education and training institute we have the possibility to train your staff targeted to meet your expectations.
- **Pragmatic,** target-aimed procedures and implementations
- Concentration on the essentials, **less is more.**
- Create **transparency** with all who are involved
- Assure for short **communication channels**

The GSI SLV Duisburg
as a competent partner for your company

powered by SIX-SIGMA GSI SLV

1

Core welding competence
- For more than 85 years we have been optimizing welding processes for our customers.
- The results of numerous R&D projects keep our practical experience up-to-date for you.
- All of our welding specialists have the qualification as a welding engineer, welding technician or welding specialist.

2

Process competence
- Within the range of lean management and SixSigma, we rely on the wide expert competence of more than 20 Yellow Belts, 12 Green Belts as well as Black Belts and Master Black Belts.
- All of our specialist have additional comprehensive experience in welding, testing and corrosion protection technology.
- Based on this, we guarantee a pragmatic, target-oriented strategy and implementation of your projects.

3

Non-profit system provider
- Welding, consulting, development, optimization and qualification are from one hand.
- We are not a manufacturer, thus being independent from choosing a certain process technology.
- Short communication channels, high transparency while concentrating on the most essential .

4

Certifications
- As an accredited education and training institute we train your staff targeted to their needs.
- By our accredited testing laboratories we can assure for the highest quality standards by means of material testing accompanying the projects.
- As an approved body we may finally certify your company for the most various applications (e.g. DIN EN 1090, DIN EN ISO 3834, DIN EN ISO 9001).

5

More than 4,000 customers from medium-sized companies
- We absolutely know from practice which measures will lead to optimization.

SLV Duisburg

Core competence: Process optimization of processes near to practice

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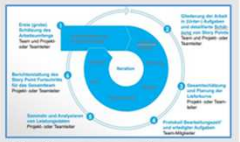
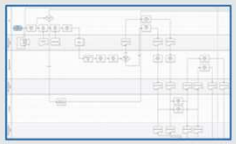
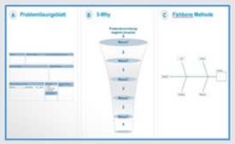
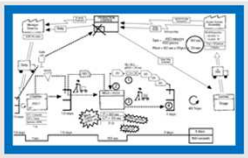
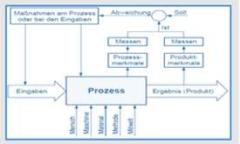
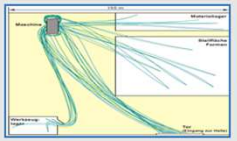
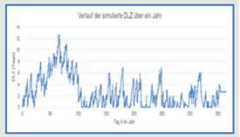
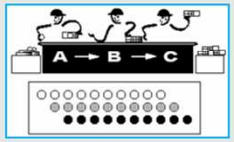
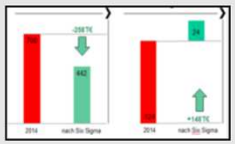
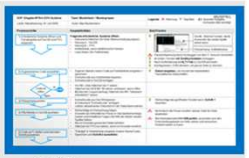
GSI SLV

The SLV Duisburg has a long-standing know-how. All of the methods, strategies, materials and templates used are on the current state-of-the-art concerning consulting and education. Based on continuous projects there is a regular exchange with our customers.

Define	**Actions:** • Setting up a project charter (problem, goal) • Developing SIPOC (process focus, customer figures) • Running/documenting interviews • (estimated problem size, goal value, priorities) • Defining team, fixing time schedule & budget • Developing analysis of the potential (on the basis of estimates) **Result:** The scope has been determined and is approved by everybody involved	 Project mission	 SIPOC	 Team board	 Performance values AS-IS and KPI
Measure	**Actions:** • Developing of SWIM lane "AS-IS" (measuring points, spots of influence, steps) • Collecting and prioritizing of Cause/relations of effect • Developing hypotheses for analyses • (process/ sight of data incl. priorities) • Developing of a data collection plan (which data to collect?) • Securing of "reliability" of data (MSA, if appropriate) • Quantifying the "AS-IS" situation **Result:** Problematic size determined on the basis of reliable data	 • SWIM-Lane AS-IS • Flow chart	 • Root cause analysis • 5Why, Ishikawa	 • Pareto chart • Value stream mapping	 • Processability • (cp, cpk, DPMO)
Analyze	**Actions:** • Verifying of collected/formulated hypotheses • Analysing the process on weaknesses • Conducting of a graphical data analysis • Statistic securing of new findings • Collecting of new/supplementary data, if appropriate (e.g. trials) • Summarizing of cause-and-effect relationships **Result:** Root cause analysis	 Spaghetti diagram	 Statistical methods	 Community	 Process analysis
Improve	**Actions:** • Developing/collecting/evaluating alternative solutions • (Cost/benefit/risks/SWIM-Lane GOAL) • Choosing lean management tools • Developing action plan (who, what, what for, until when, how much?) • Receiving release of funds • **Result:** The action plan was approved for implementation by the champion	 Lean tools	 FMEA	 SWIM-Lane TARGET	 Action plan
Control	**Actions:** • Complete implementation of action plan • Initiating/conducting standardization • Developing and establishing of control system • Establishing SWIM Lane TARGET • Conducting feedback and coaching with staff concerned • Performing concluding commercial evaluation **Result:** Pressure is reduced from project leader/team and responsibility of securing the sustainability is transferred to process owner	 • Feedback • Coaching	 • Performance values TARGET • Controlling system	 • Skill matrix • Qualification plan	 • SOP • Processes levels 1-3

SLV Duisburg

Core competence: Process optimization of processes near to practice

powered by SIX-SIGMA GSI SLV

Analyses of the potential

- **Potentials on improving** business and manufacturing processes on **the reduction of costs**

SixSigma- and Lean management methods

- Improving the **communication and transparency on team management**
  ⇒ Team board meeting
- Development and consolidation of **skills and abilities within the teams**
  ⇒ Skill matrix
- Establishment of **process related standard procedures** ⇒ SOP
- **Defect mode and effects analysis** of business processes ⇒ FMEA
- **Process analysis** and –optimization ⇒ Value stream mapping

SixSigma-Projects

- Execution of complete **SixSigma projects in accordance with the DMAIC-Cycle**
- **Assistance in performing projects** by experienced project leaders or project members
- Development of **business cases** as a basis of future SixSigma projects

New strategies, methods and standards

From the planning of the employment of staff to the team board

powered by SIX-SIGMA GSI SLV

Team members…		Leadership role…
• Cannot easily get an insight into the work of colleagues • Cannot celebrate their own success and that of the team	**Transparency**	• Are not informed of operative planning of staff • Do not see all essential problems in everyday‘s work
• Can often not pursue initiatives due to lack of time	**Continuous improvement**	• Must carefully split their capacity for improvements
• Can merely assess whether and who to assist • Stay alone when workload is too much	**Team management**	• Must often prioritize on the basis of little information • Do not have the possibility to a fast reaction to sudden changes
• Are often dependent on the hearsay • Do unnecessary work due to lack of information	**Communi-cation**	• Are often dependent on hearsay • Cannot communicate all relevant information to the team

New strategies, methods and standards

From the planning of the employment of staff to the team board

powered by SIX-SIGMA GSI SLV

Six Sigma can be configured and extended according to the needs of the team

Regular meetings

=

Capacity management

+

Pursuance of performance indicators

+

Structuring of problems

Improved communication (team board meeting)

Your benefit, our proposition

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Your benefit

- High transparency for leader and team members
- Daily, **goal-oriented communication**
- **Daily adjustment** of over and under capacities
- Leader can immediately react to sudden changes
- Potential of **continuous improvements** since problems are dealt with on a daily basis
- Focus lies on the evaluation of the team and not on the individual performance
- **Performance indicators** for managing of e.g. quality, risk and the use of capacities
- For all of the characteristic values goals have been defined whose breach will start a process of finding solutions

Team board

Procedure
- Clarification of the team board groups
- Clarification of the team board structure
- Clarification of the team board times
- Information meeting
- Start of the daily team boards
- Feedback and continuous improvement program

Duration of the launch
3 weeks

Days of consulting during the launch
5 days

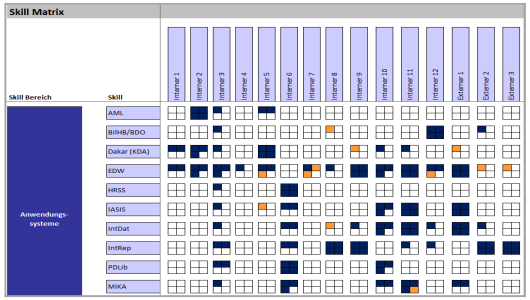
New strategies, methods and standards

From the training plan to the skill matrix

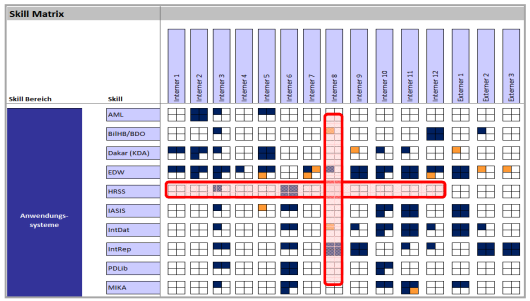
powered by SIX-SIGMA GSI SLV

Steps for establishing and evaluating the skill matrix

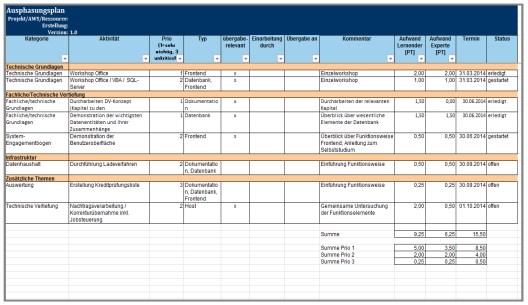
1 Principal set up and completion of the skill matrix



2 Analysis of the skill matrix for identifying knowledge silos and operational risks



3 Identification of measures and setting up of personal development plans



- **The skill matrix shows the level of competence of each member of staff** across core competences which are required within the group
- The **team leader has a detailed version** of the skill matrix while estimating the competences of each member of staff
- **Gaps are identified** on the basis of the
  - criticality of the skills
  - requirement for back up/additional resources
  - knowledge concerning the standards
- **The skill matrix supports the individual development of an employee using an**
  - individual training curve
  - a supporting implementation plan
- **The skill matrix enables the group leader a comprehensive capacity management**, in order to adapt resources on the short run and build them up on the long run
- The skill matrix is regularly adapted (e.g. in a personal dialogue on development), in order to record the set up of knowledge and develop further measures

The method is used for the evaluation of professional competences, not for measuring performances.

New strategies, methods and standards

From the training plan to the skill matrix

powered by SIX-SIGMA GSI SLV

Example

Skill matrix

Skill range	Skill	Internal 1	Internal 2	Internal 3	Internal 4	Internal 5	Internal 6	Internal 7	Internal 8	Internal 5	Internal 6	Internal 7	Internal 8
Qualifications of processes, persons and companies	Flame straightener -CrNi												
	Brazers‘ examination												
	Procedure testing (arc welding)												
	Procedure testing (res. and stud welding)												
	Welder and operator (min. welding spec.)												
	Qualification of shop primers (application)												
	Thermal sprayers												
	Company according to ISO 14922 GTS												
	VT2 (certification)												
	Principals of teaching												

The skill matrix includes the group specific skills for all members of staff. The evaluation of the set skill level is made by the leader. The “as is” skill levels are based on the self-evaluation of the employees in SAP/HR.

Key for skill levels	Current	Planned
-1: Not yet evaluated		
0: No skills		
1: Beginner		
2: Connoseur, knowledge of the basics, needs active coaching		
3: Experienced, knowledge by daily use		
4: Expert, comprehensive, detailed knowledge, is able to coach others		

Human resources development (skill matrix)

Your benefit, our proposition

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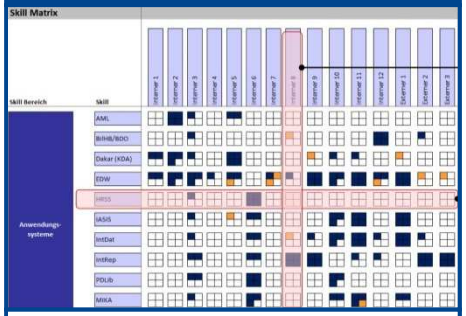
Your benefit

- Support of the individual **development** by determining the need and aims of further development in coordination with the needs of the group.
- Safeguarding the **transfer of group competences** when employees leave.
- Gathering of all **costs** and **saving potentials** in precise euros.
- The methods and tools provided give support to reach the goal on group level while forming a matched framework based on the **strategy.**

Skill Matrix



Approach
- Structuring of the skill matrix
- Capturing of the AS IS skills
- Pronouncing of the SET skills
- Setting up of an action plan

Duration of implementation
3 weeks
Days of consulting during implementation
5 days

New strategies, methods and standards

From the procedure specification to the standard procedure (SOP)

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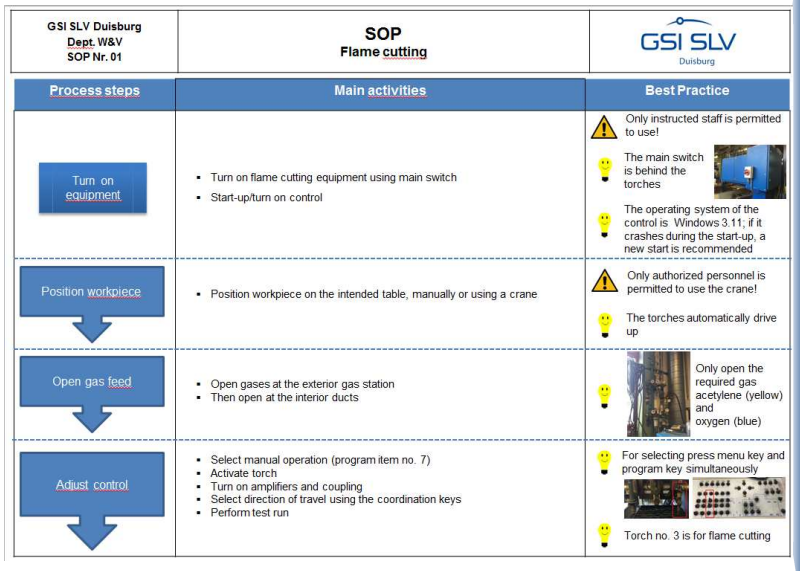

GSI SLV Duisburg Dept. W&V SOP Nr. 01	SOP Flame cutting	GSI SLV Duisburg
Process steps	**Main activities**	**Best Practice**
Turn on equipment	▪ Turn on flame cutting equipment using main switch ▪ Start-up/turn on control	Only instructed staff is permitted to use! The main switch is behind the torches The operating system of the control is Windows 3.11; if it crashes during the start-up, a new start is recommended
Position workpiece	▪ Position workpiece on the intended table, manually or using a crane	Only authorized personnel is permitted to use the crane! The torches automatically drive up
Open gas feed	▪ Open gases at the exterior gas station ▪ Then open at the interior ducts	Only open the required gas acetylene (yellow) and oxygen (blue)
Adjust control	▪ Select manual operation (program item no. 7) ▪ Activate torch ▪ Turn on amplifiers and coupling ▪ Select direction of travel using the coordination keys ▪ Perform test run	For selecting press menu key and program key simultaneously Torch no. 3 is for flame cutting

Tips on setting up the standard procedure

- Standard procedures start by a **draft of the optimum sequence of process steps** and a detailed description of the required activities
- They describe the logic considering **all possible scenarios with the respective counter-measures**
- They can be supplemented by photographs/screenshots leading to more clarity
- They collect valuable tips and tricks and make them available for the team
- For coordinating and accompanying of standard procedures, also new members of the team may be integrated (objective sight and practice at the same time)

New strategies, methods and standards

From the procedure specification to the standard procedure

powered by SIX-SIGMA GSI SLV

Example

GSI SLV Duisburg Dept. W&V SOP Nr. 01	SOP Flame cutting	GSI SLV Duisburg

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Optimization of internal processes (SOP)

Your benefit, our proposition

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Your benefit

- **Pragmatic analysis of your processes** without additional efforts
- **Skills analysis** of the staff in the manufacturing processes
- **Documentation** of all relevant information for processing
- Comparison about different runs (with different members of staff) enable **identification and exchange of best practices**

SOP

Procedure

- Identification of the necessary SOP
- Training of staff
- Setting up of 5 example SOP
- Definition of further SOP

Duration of the implementation
2 weeks

Days of consulting during the implementation
3 days

New strategies, methods and standards

From the technical FMEA to the risk analysis of all business processes

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FMEA stands for Failure Mode and Effects Analysis and is primarily a preventative technique.

FMEA is a method which is conducted in a team while avoiding and removing possible defects or already existing defects in the **business processes.**

The application of FMEA means

- **Collecting existing defects within the process** and evaluating their effect on the customer (internal, external).
- Determining possible causes of **failures.**
- Evaluating test methods and **corrective action** with regard to recognizing and avoiding of failures.
- Performance of **risk assessments** for
  - the occurrence of a failure cause and a failure, respectively.
  - the importance of a failure for the customer (internal, external).
  - the detection of the cause of failure before delivery to the customer (internal, external).
- Calculating the **risk priority indexes (RPZ)** for evaluating the risk potential for the causes of failure.
- Determining appropriate measures for avoiding and removing, resp. of failures with the highest **risk potential**.
- Determining **action plans** for implementing the measures.

New strategies, methods and standards

From the technical FMEA to the risk analysis of all business processes

powered by SIX-SIGMA GSI SLV

Example

Process designation	Possible defects	Possible consequences of a defect for the customer	Possible causes of the defect	Current state				
				Control measures	Occurence	Importance	Detection	Risk priority index (RPZ)
Consultion of the customer	Wrong consulting	Annoyance of the customer	Lack of qualification, wrong initial information	-	2	8	9	144
Setting up of quotation	Wrong information on the quotation	Annoyance of the customer	Different quotation patterns	Quotation approval	4	7	4	112
Submittal of the qutation	Wrong adress	Slight dissatisfaction at the customer	Wrong data reception	-	1	3	7	21
Tracing of the date of appointment	No contact with the customer	Slight dissatisfaction at the customer	Vacation, illness	-	2	2	1	4
Agree date for appointment	Appointment not kept	Annoyance of the customer	Unauthorized repriorisation	-	3	8	9	216
Control of examination	Intervention into examination	Annoyance of the customer	Unauthorized action by the control person	-	3	7	10	210
Filling in of test order welders' test	Wrong data in order for testing	Delay of test results	Careless mistake	Subsequent testing steps	3	4	2	24
Control of examination	Wrong data, missing information	Delay of test results	Lack of qualification, wrong entry information	-	4	4	1	16
Entering an order into DIVA	Wrong data input into DIVA	Wrong test results	Careless mistake	Subsequent control steps	1	9	2	18
Setting up/sending of order confirmation	Acceptance with wrong AGBs	No effect for customer	Wrong qulification of the quotation originator	Approval of order confirmation, verify AGB	1	1	3	3
Entering an testing order into DIVA	Wrong entering of data into DIVA	Wrong test results	Careless mistake, wrong data in order for testing	Subsequent test steps	1	9	2	18
Development of a barcode	Wrong classification	Wrong classification of the test results	Careless mistake	-	4	6	3	72
Performance of VT	Wrong weighting	Wrong test results	Wrong qualification, defective vision acuity	Subsequent test steps	1	9	2	18
Filling in evaluation form	Wrong entering of data into DIVA	Wrong test results	Careless mistake	Subsequent test steps	2	9	4	72
Performance of radiographic testing (RT)	Wrong performance	Wrong test results	Wrong qualification, defective equipment	Subsequent test steps	1	9	2	18
Evaluation of radiographic image	Wrong evaluation	Wrong test results	Wrong qualification, defective vision acuity	-	2	9	8	144
Turning	Weld reinforcement turned to deep	Wrong test results	Careless mistake	Subsequent test steps	1	9	1	9
Drilling	No bore	No effect for customer	Careless mistake	Subsequent working steps	1	1	1	1
Sawing	Parts not sawed	No effect for customer	Careless mistake	Subsequent working steps	1	1	1	1
Pressing	Parts not pressed	No effect for customer	Careless mistake	Subsequent working steps	1	1	1	1
Cutting	Parts not sawed	No effect for customer	Careless mistake	Subsequent working steps	1	1	1	1
Planing	Weld reinforcement planed too deep	Wrong test results	Careless mistake	Subsequent test steps	1	9	1	9
Breaking	Sample not broken	Wrong test results	Wrong qualification, missing machine skills	-	6	9	10	540
Applying barcode to samples	Wrong barcode labels	Wrong test results	Careless mistake	Subsequent working steps	2	9	4	72
VT Break	Wrong evaluation	Wrong test results	Wrong qualification, defective vision acuity	-	2	9	9	162
Filling in of evaluation form	Wrong entering of data into DIVA	Wrong test results	Careless mistake	-	2	9	9	162
Setting up customer documents	Wrong data on the certificate	Wrong certificate	Careless mistake	Approval of total-evaluation, n.e. approval of certificate, approval of report	2	9	1	18
Invoicing	exorbitant price	Dissatisfaction at the customer	Wrong initial information	four eyes principle	1	4	7	28

Risk analysis (FMEA)

Your benefit, our proposal

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Your benefit

- Analysis of your risks with all relevant performance indicators such as **probability of occurrence** etc.
- **Documentation** of all relevant information for risk analysis
- Analysis of your **customer risks** and their degree of fulfillment

FMEA

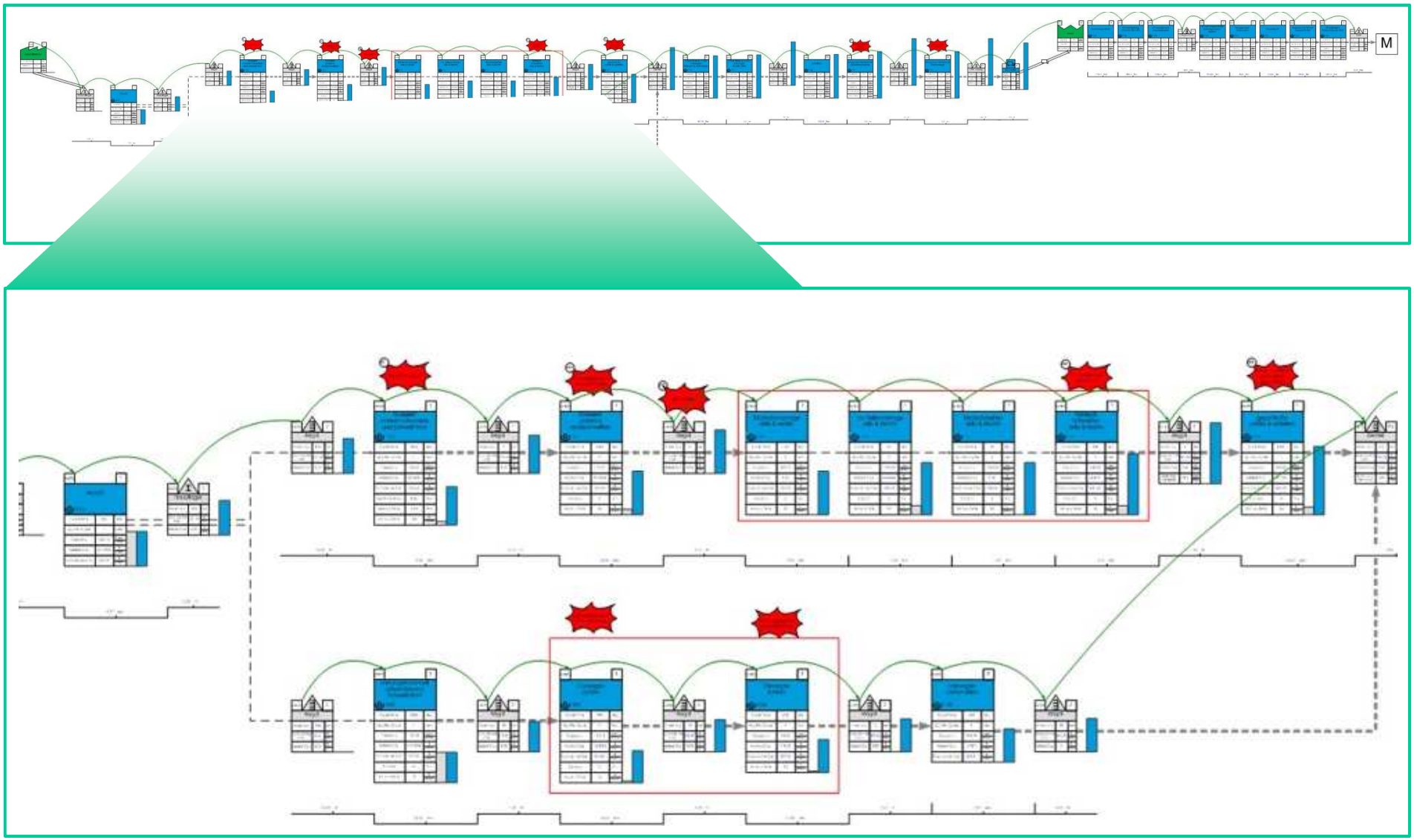
Procedure
- Identification of the necessary risks
- Training of the staff
- Setting up of 1 example of FMEA
- Definition of further SOP

Duration of implementation
2 weeks

Days of consulting during the implementation
4 days

New strategies, methods and standards

Value stream mapping: Visualization of the process



Value stream mapping

Our approach: Visualization of the actual condition and the vision

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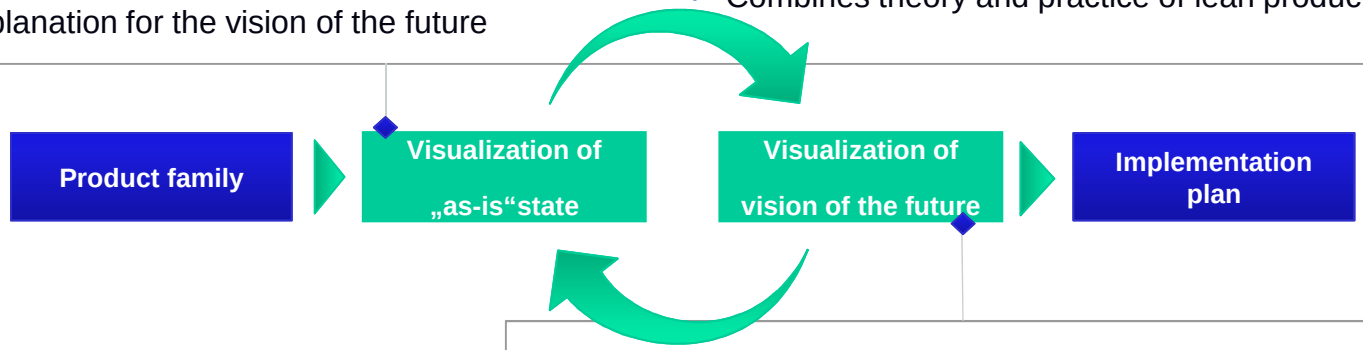
How does production currently take place?

Flow of material and information

- ✓ Use the visualization symbols
- ✓ Start using the flow from „door to door“
- ✓ Follow the production flow collecting information firsthand
- ✓ Explanation for the vision of the future

Visualizing the value-added process

- Shows the entire process – not only single steps
- Combines the flow of material with the flow of information
- Creates a common understanding
- Is a blueprint for targeted improvement processes
- Is easier to use than quantitative tools or „columns of figures“
- Combines theory and practice of lean production methods



Goal: Developing the lean production process

The potential of the visualization method can only be accessed through the vision of the future!

- 70% solution and continuous updating
- Flow of material & information
- Basis for systematic improvement processes: Start with the “as-is” state
- Improving the existing processes and setups using KAIZEN methods

Process analysis and optimization (value stream mapping)

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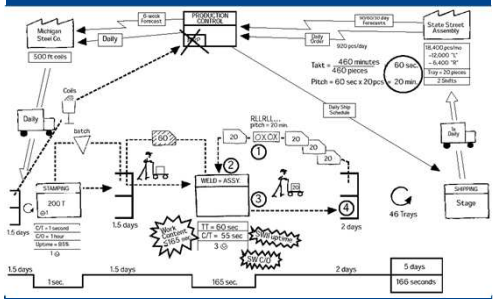
Your benefit, our proposal

Your benefit

- Analysis of your manufacturing processes with all relevant performance indicators such as **cycle time, process costs, set-up times, standby time, warehouse sizes** etc.
- **Process capability analysis** of the staff in manufacturing
- **Documentation** of all relevant information for processing
- Analysis of your **customer requirements** and their degree of compliance
- Collecting of all relevant **cost** and **saving potential** in **euros**.

Value stream mapping



Duration of the actual analysis
3 - 5 days

Duration of the target concept
2 - 4 days

Assistance in the implementation of measures
3 - 5 days

1. Define

- Compiling the project team
- Setting up a project charter
- Defining and demarcating a scope
- Determining possible specific values
- Estimating the project benefit

2. Measure

- Understanding the as-is process
- Process inspection
- Discussions with those involved in the process
- Collecting all process documents

3. Analyse

- Analysing the process
- Analysing the root cause
- Risks in the “as-is” process
- Analysing the performance values

4. Improve

- Defining the goal process

5. Control

- Implementing the goal process
- Training the staff
- Measuring the process (New specific values)
- Measuring the success (Process new against old)
- New action plan, if appropriate

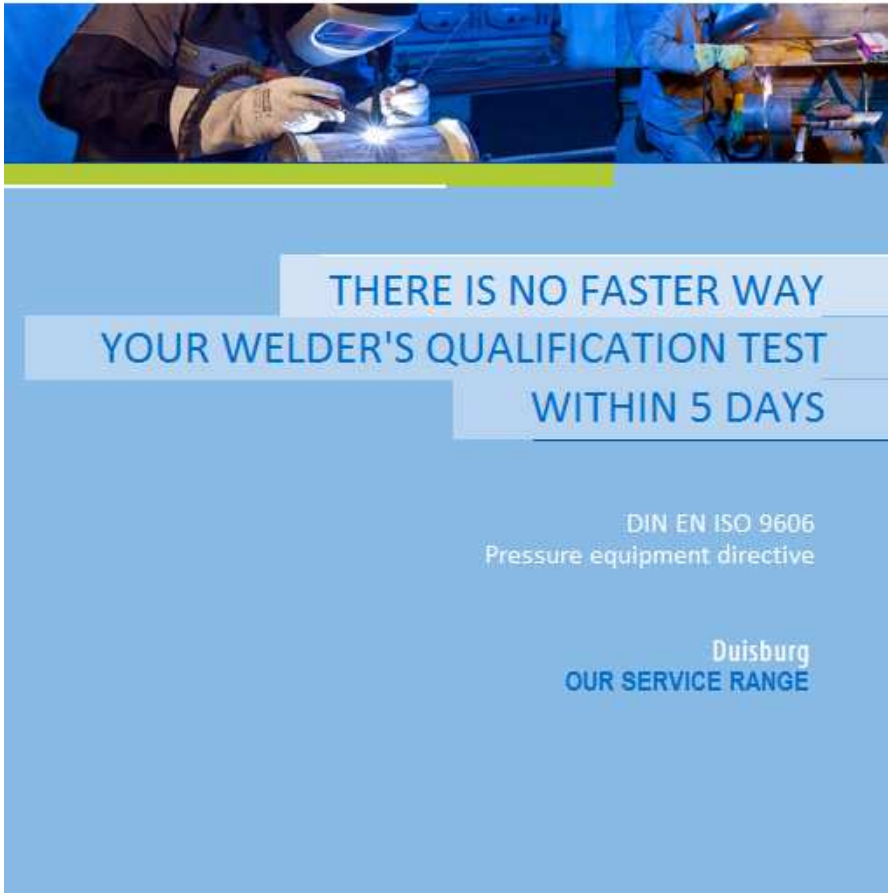
Project duration: max. 6 months
Benefit: min. 20 %

Benefit for your company

Example: Internal process – Our customer promise

powered by SIX-SIGMA GSI SLV

DVS GSI SLV Duisburg



YOUR WELDER'S QUALIFICATION TEST WITHIN 5 DAYS

We guarantee the submittal of the certificates within 5 working days after receiving your test pieces and the relevant documentation.

GOOD OVERVIEW BY 4 PRICES

In combination with our customer promise we offer you a clear price structure:

- Fillet weld pipe and plate € 149.00/test piece
- Butt weld plate € 219.00/test piece
- Butt weld pipe € 259.00/test piece
- Butt weld plate/pipe (VT/RT only) €149.00/test piece