

Testing without test scrap



- ADVANCED TECHNOLOGY
- RETROFITTABLE AT ANY TIME
- MULTICOMPATIBLE

- SPOT WELDING
- PROJECTION WELDING
- Alternating current (AC)
- Direct current (DC)
- Medium frequency (MF)
- Condenser discharge (CD)

Product information
PQS RES software

INLINE
QUALITY ASSURANCE

MADE IN GERMANY



HARMS+WENDE QST GmbH
Qualitätssicherungstechnologien

SECURITY

Your task

Achieving quality requirements with a minimum of personnel and material costs.

Our solution

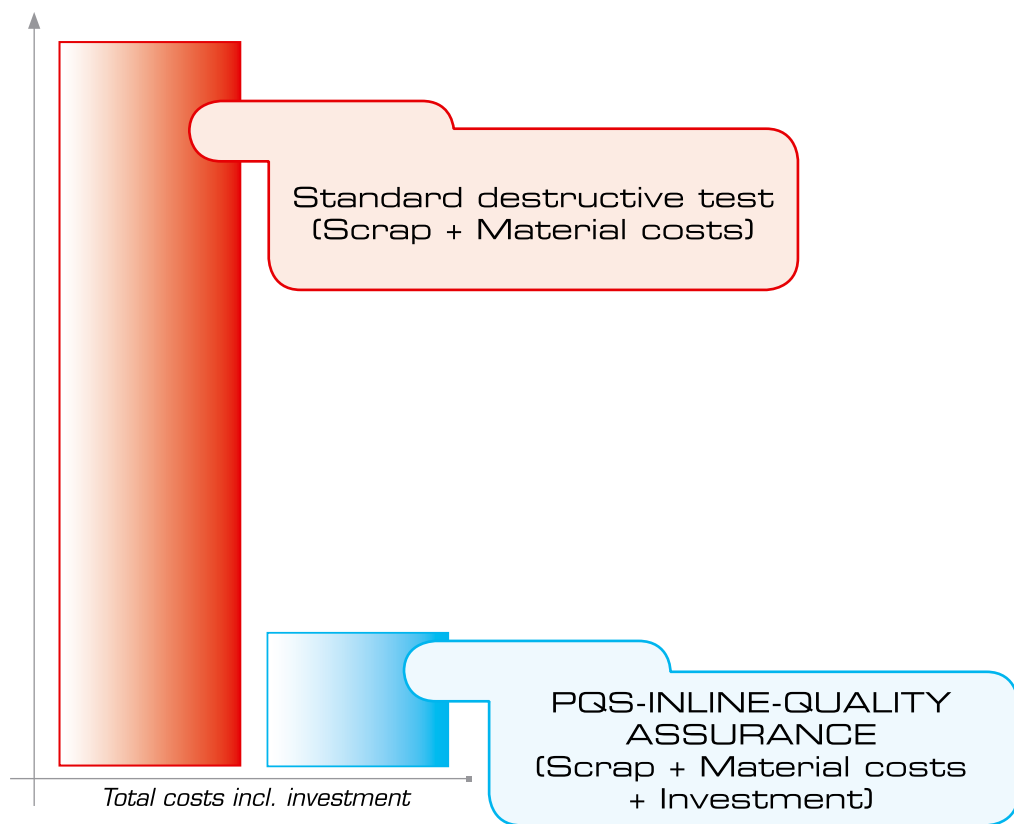
- *System connection PQS*
- *Inline process analysis and optimization*
- *Quality assessment*
- *Inline monitoring*
- *Inline documentation*
- *Income statement*





EFFICIENCY

Effective 6-years cycle
Cost comparison



Sample calculation
(page 24)

SAVINGS > 75%

Hardware

QUADRIGO

*Compact performance
of online metrology and INLINE quality assurance
for your joining processes.
Modular, rugged and intelligent.*



QUADRIGO MASTER

*The data specialist that has no fear
of large data quantities.
Manages your data reliably and offers sufficient
performance reserves and safety too.*



QUADRIGO VISU

*All information at a glance.
Easy, quick user interface
Our monitoring software
packed in an elegant slimline design.*





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Software

HIGHLIGHTS of PQS-RES software

- *Short term reduction of material and labour costs*
- *enables you a fast and safe process optimization*
- *is compatible to any welding control on the market*
- *for spot and projection welding applications*
- *for alternating current, medium frequency, direct current, condenser discharge*
- *approved by Volkswagen group quality assurance (according to PV 6702)*
- *Q-SAVE monitoring technology*



Testing without test scrap

1. System Connection PQS

The universal measuring modules of the QUADRIGO MM line provide maximum flexibility and independence. Designed as an installation module in existing switching and control cabinets, they practically always find a suitable place in the plant layout without requiring extra space.



6. Income Statement

The application of PQS does not only offer you the benefit of comprehensive information, documentation and complete monitoring, but astonishing cost advantages as well.



5. Inline Documentation

PQS permanently monitors all analog process data such as e.g. current, voltage, force and distance as signal curves as well. Moreover, all production data and monitoring and test results are documented. This provides for the prerequisite for an auditable proof of quality and the necessary traceability.





How it will be done

2. Inline Process Analysis and Optimization

No constant quality without process mastering. PQS supports the user actively in the assessment of the current process, in the ascertainment of correct welding parameters, in a fast and efficient optimization.



3. Quality Assessment

Thanks to the targeted sampling by application of destructive tests the verifiability of the PQS inline monitoring is prepared. Measurements achieved can be directly stored in the PQS and allocated to each component part and each joint position. For this purpose, all process data monitored by PQS is permanently available.



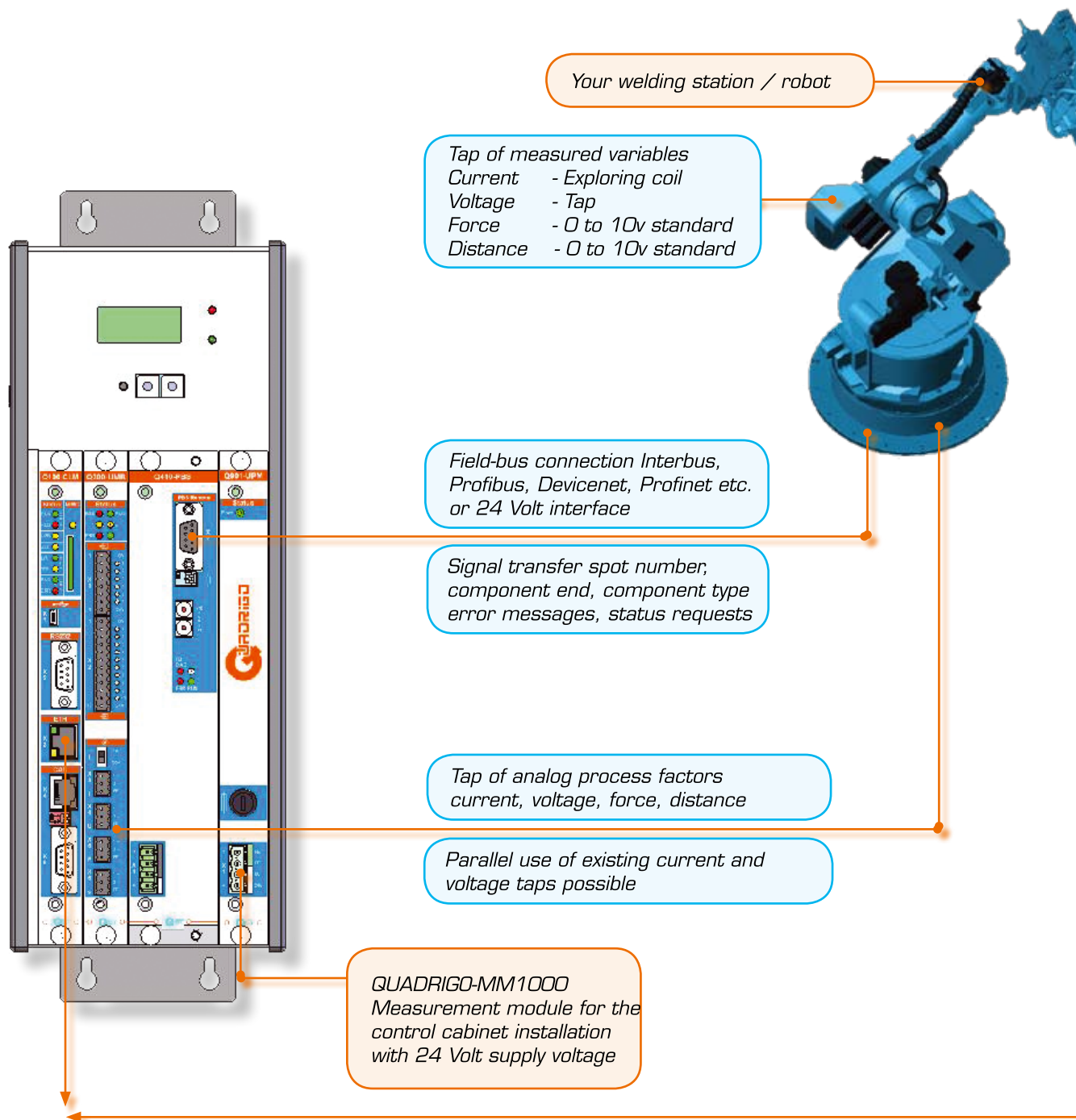
4. Inline Monitoring

The standard cost-intensive sampling inspection as a verification is now planned to be replaced by an automated, verifiable solution. High-value monitoring solution with a maximum error re-cognition.



Step 1

SYSTEM CO



CONNECTION

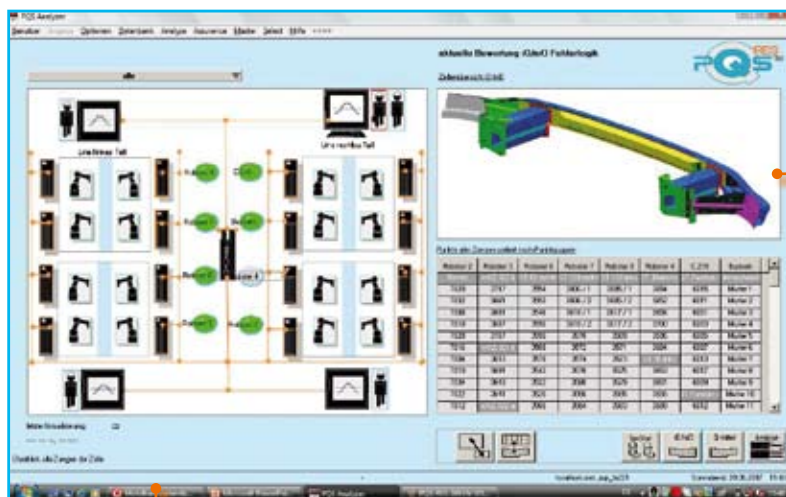
1. SYSTEM CONNECTION PQS

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SPOT WELDING

PROJECTION WELDING



- Alternating current (AC)
- Direct current (DC)
- Medium frequency (MF)
- Condenser discharge (CD)

Transfer of monitoring setting via Ethernet to the QUADRIGO measurement module

PQS-RES software package incl. database installed on industrial PC system

Transfer of process data via Ethernet to PQS-software

Step 2



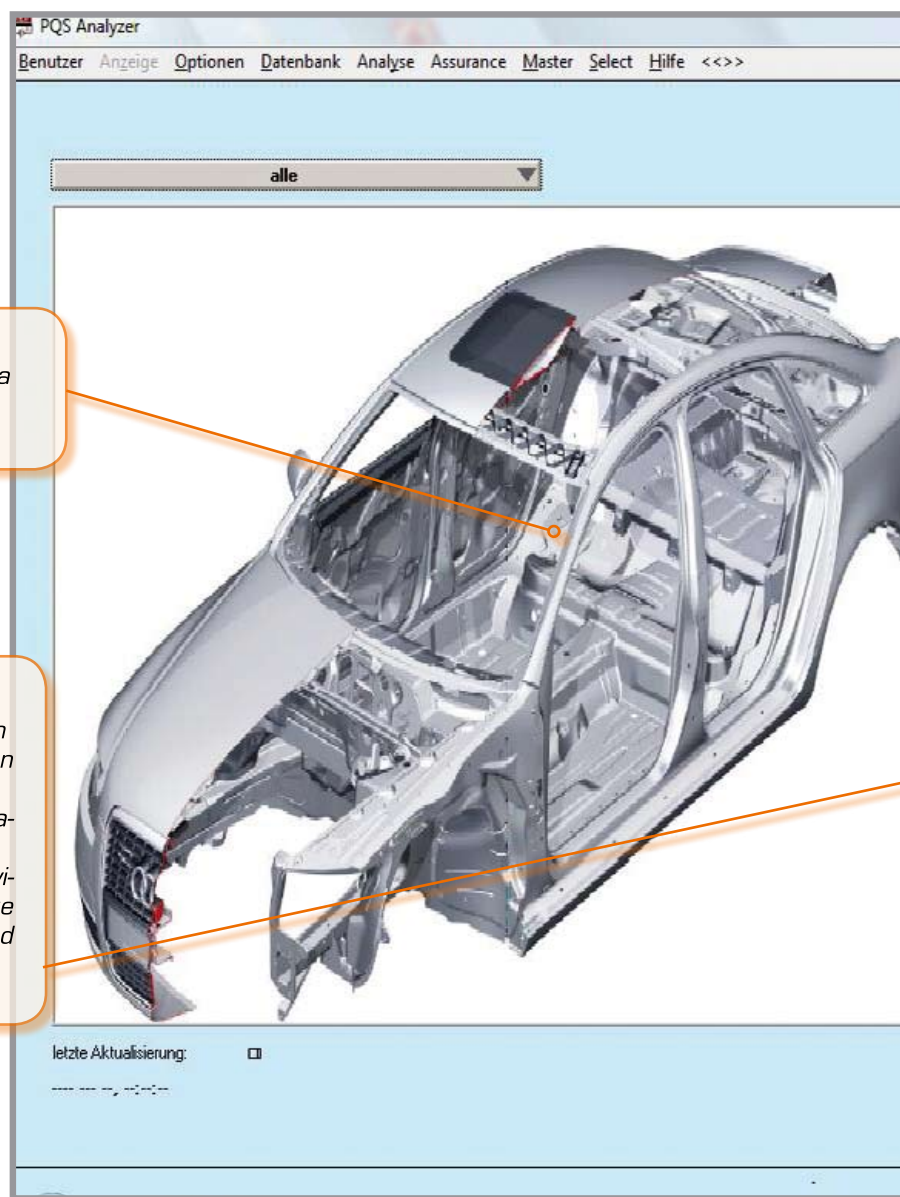
PROCESS ANALYSIS

Component

A photo of the component for or a better orientation.

Detailed information for every single joint position

*Display of welding gun or welding station with the respectively welded joint position of the component.
For each joint position, the data is separately collected and evaluated.
The analysis overview shows all individual data such as current curves, voltage characteristics, force or distance and resistance curves.*





AND OPTIMIZATION



Plant graphics

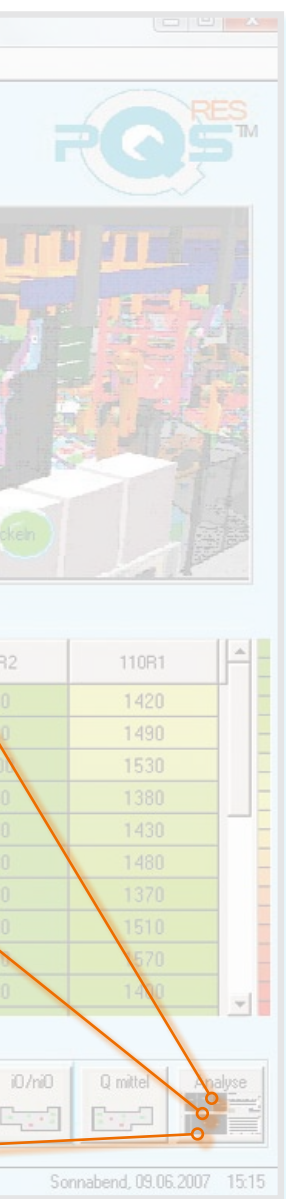
A photo of the welding cell for a better orientation.

Cell overview
with group assigning

All important information of up to
16 robots or welding stations is
demonstrated online at the same time.



ANALYSIS



2. Inline Process Analysis and Optimization

*No constant quality without process mastering.
PQS supports the user actively*

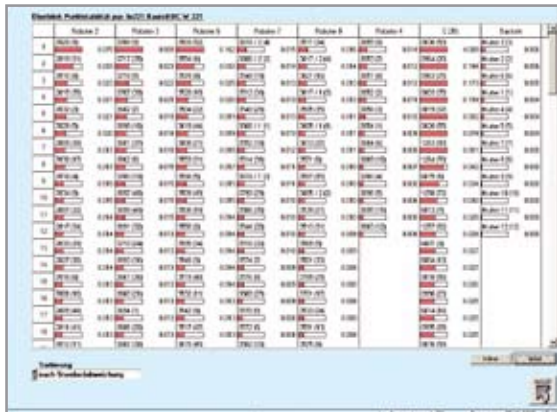
- in the assessment of the current process,
- in the ascertainment of correct welding parameters,
- in a fast and efficient optimization.



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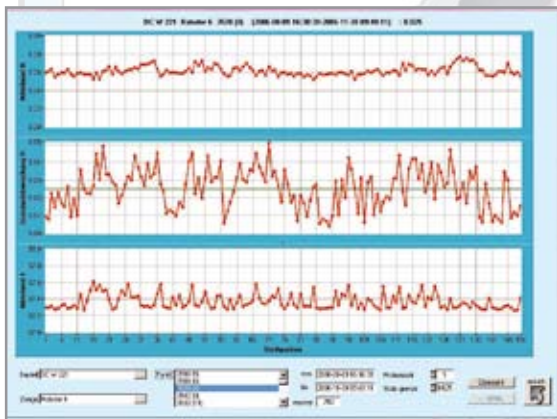
Step 2

PROCESS OF



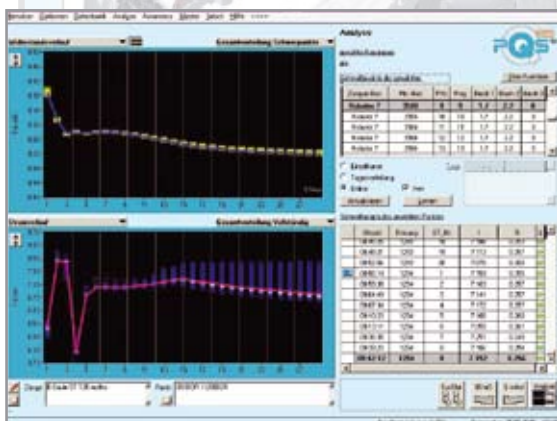
Plant and stability analysis at the push of a button

Based on the data and signal characteristics monitored before, PQS automatically creates a complete stability analysis of all joint positions for you. This makes detection of weak points of the process fast and simple and a targeted optimization can be implemented.



Plant and stability analysis in detail

For every single joint position and welding station a detailed stability analysis can be carried out. Dependencies and coherences can be recognized.



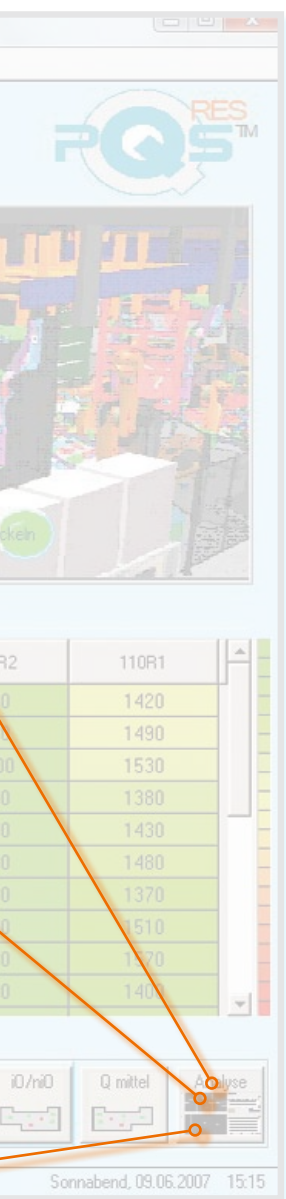
Plant and stability analysis of joint position

The push of a button makes available all process data for the joint position that needs to be analysed. This facilitates e.g. the optimization of the parameterisation or the setting of controllers.



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OPTIMIZATION



2. Inline Process Analysis and Optimization

*No constant quality without process mastering.
PQS supports the user actively*

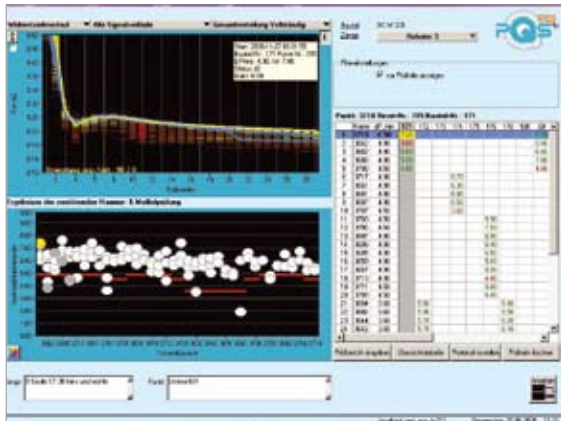
- *in the assessment of the current process,*
- *in the ascertainment of correct welding parameters,*
- *in a fast and efficient optimization.*



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Step 3

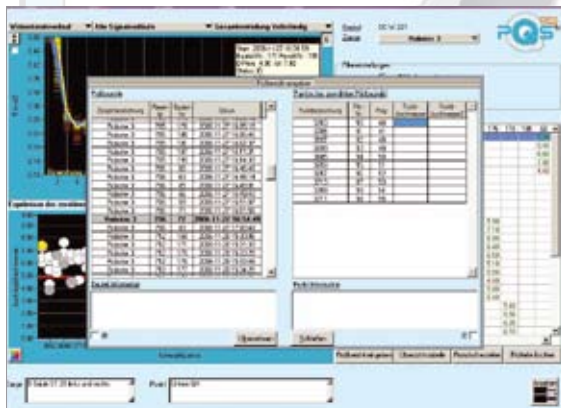
QUALITY AS



Documentation of test results

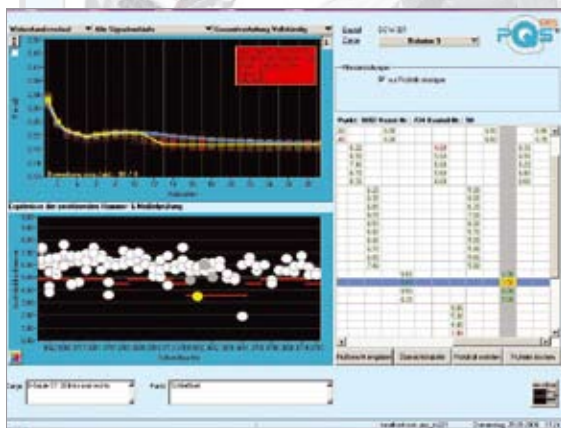
Under "Enter test report" the mask for the documentation of test results opens. Here you find a list of all components marked as a test part.

Zellenbericht ID/n0



Entering actual values ascertained

Here quality parameters ascertained (e.g. spot diameter, torque) are entered. In addition, further remarks (e.g. test force, type of breaking etc.) can be entered in the window "component information" and "spot information".

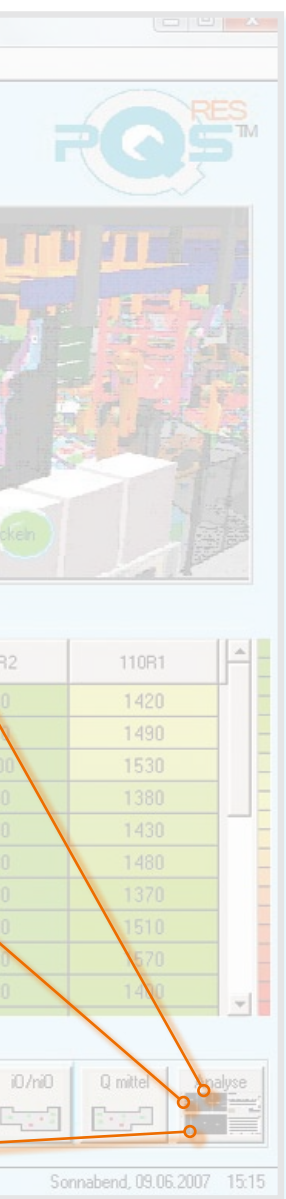


Test part analysis

The corresponding course of resistance in comparison to the total allocation of all weldings of the corresponding spot is displayed.



ASSESSMENT



3. Quality assessment

Thanks to the targeted sampling by application of destructive tests the verifiability of the PQS inline monitoring is prepared. Measurements achieved can be directly stored in the PQS and allocated to each component part and each joint position. For this purpose, all process data monitored by PQS is permanently available.

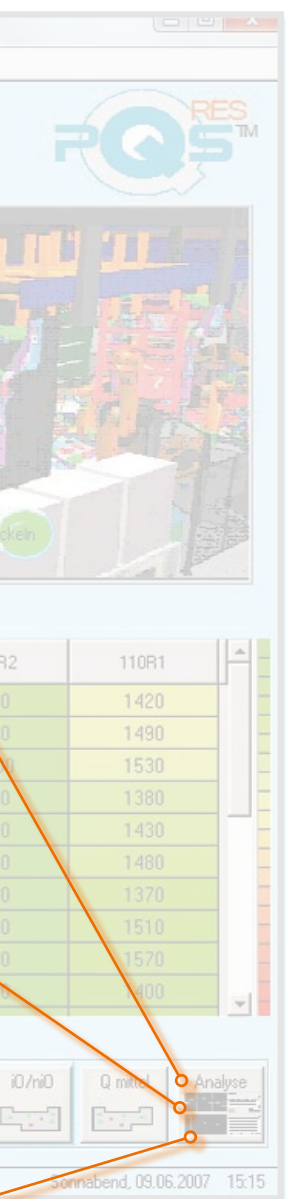


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MONITORING



4. Inline Monitoring

The standard cost-intensive sampling inspection as a verification is now planned to be replaced by an automated, verifiable solution. High-value monitoring solution with a maximum error recognition.



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Step 4

ERROR EX

SPOT WELDING

aktuelle Bewertung iO/niO Fehlerlogik

Zellenübersicht iO/niO

8	2	9	5	90R1	100
890	1240	1820	1870	98	98
930	1110	1820	1870	92	92
810	1110	1820	1870	100	100
760	1110	1820	1870	93	93
790	1110	1820	1870	85	85
850	1110	1820	1870	85	85
925	1110	1820	1870	86	86
900	1110	1820	1870	84	84
990	1110	1820	1870	87	87
1170	1110	1820	1870	95	95

Callouts:

- All right** (Positive callout)
- Poor fit and spot too small** (Negative callout)
- Force too high and spot too small** (Negative callout)
- Poor fit, insufficient bond and inner spillings** (Negative callout)
- Circular weld** (Negative callout)

localhost:root_pqs_br221

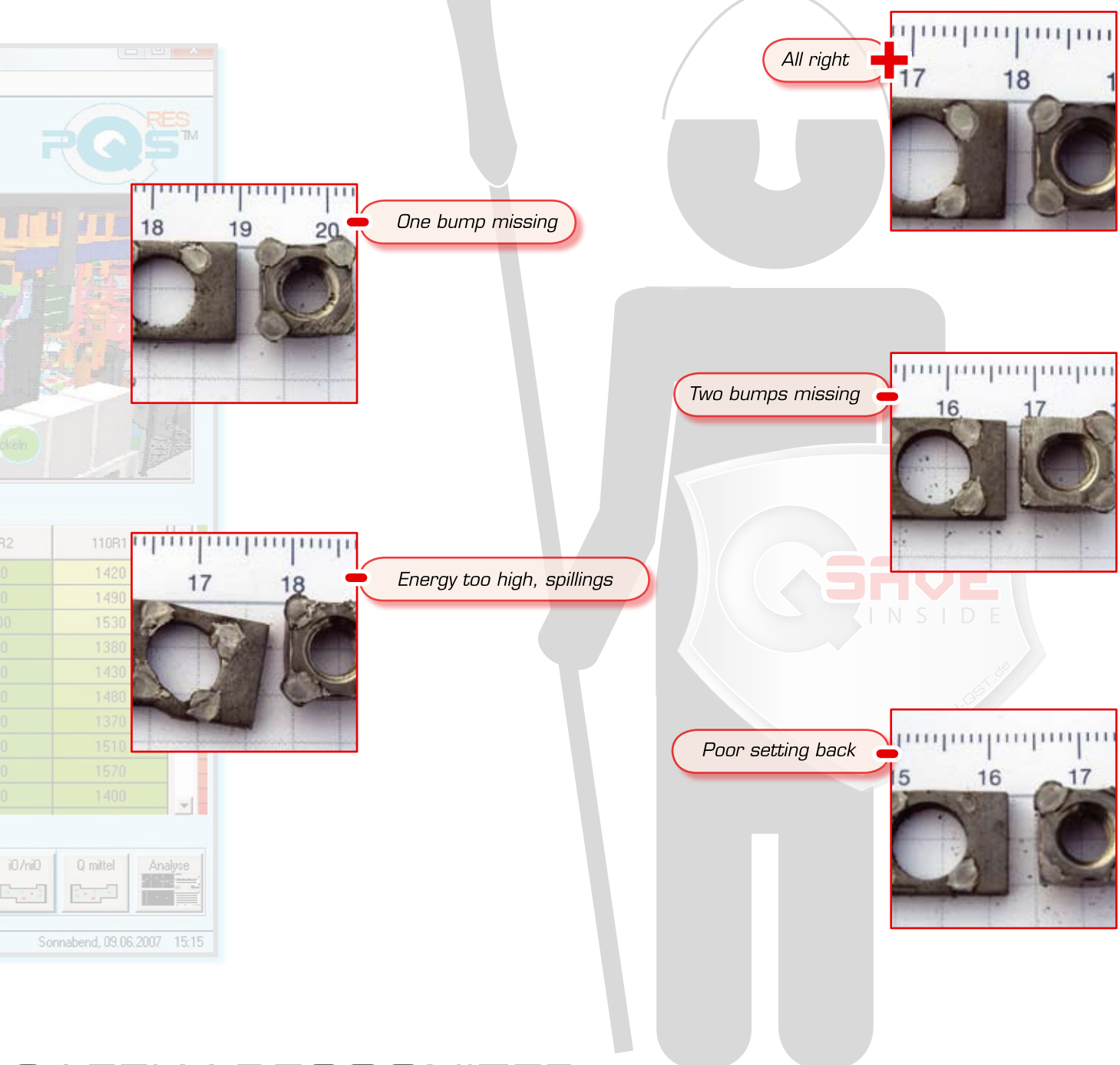
THANKS TO THE PQS



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EXAMPLES

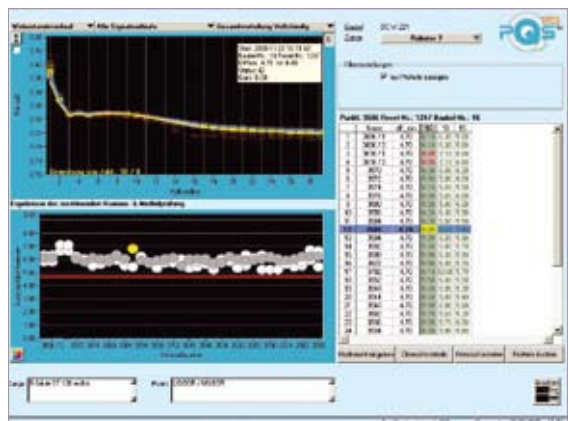
PROJECTION WELDING



SAFELY RECOGNIZED

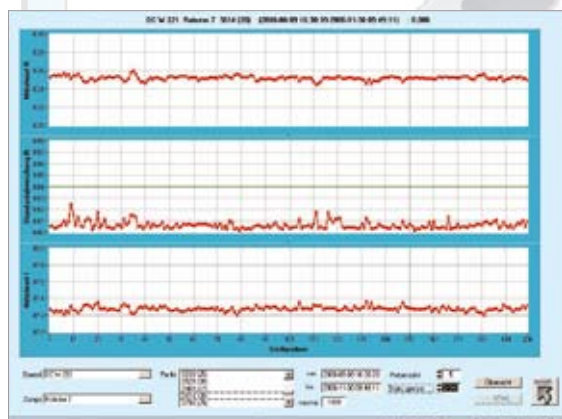
Step 5

INLINE-DOCU



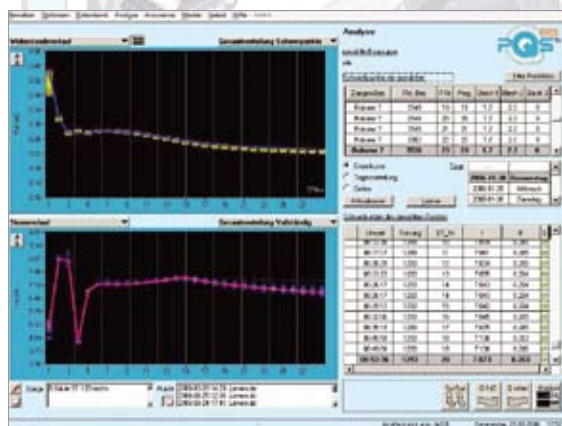
Test data

The control samples taken for verification and their test results are managed in the PQS system and thus offer the basis for a complete proof of quality. On this occasion the Q-SAVE technology offers you greatest possible protection against lacking product quality.



Process stability

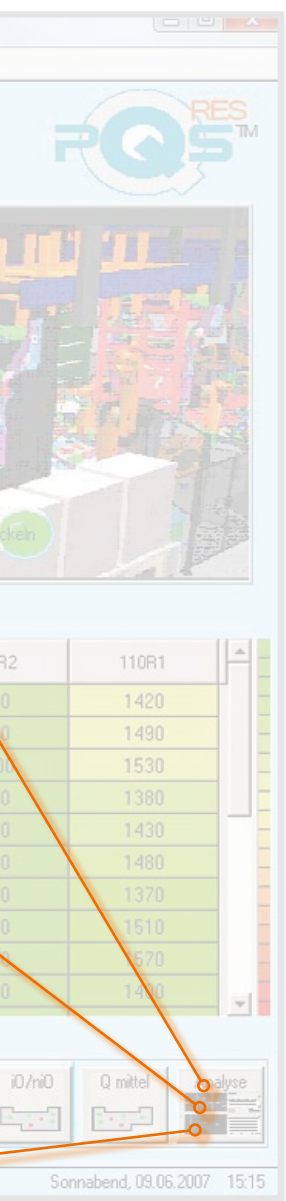
You can ascertain the current status of the process stability at any time and permanently investigate your joint processes regarding further optimization potentials.



Component documentation and evaluations

All process and quality data is permanently monitored and stored. This is how you can get a complete documentation and you can be relaxed and calm about any customer audit.

DOCUMENTATION



5. Inline-Dokumentation

PQS permanently monitors all analog process data such as e.g. current, voltage, force and distance as signal curves as well. Moreover, all production data and monitoring and test results are documented. This provides for the prerequisite for an auditable proof of quality and the necessary traceability.



Step 6

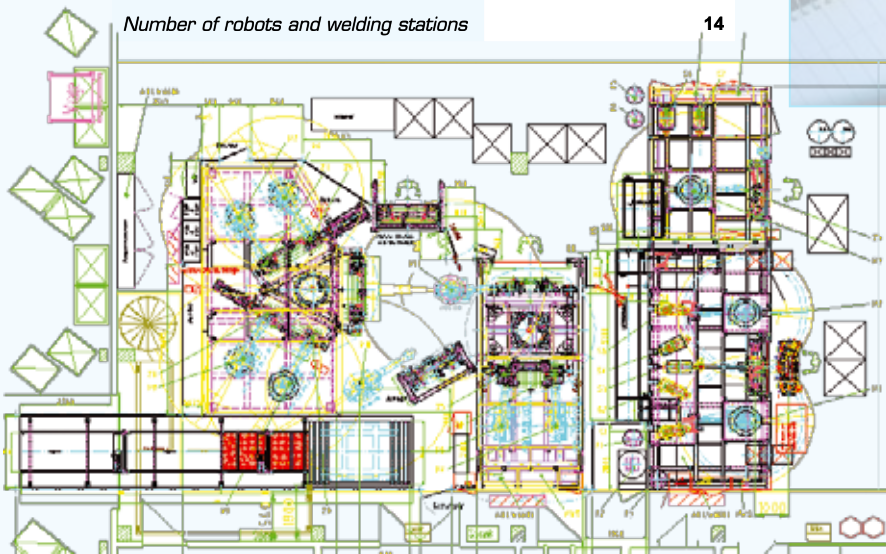
Your task

Achieving quality requirements with a minimum of personnel and material costs.

Model calculation

Product and process safeguarding of spot and projection weldings at a complex component.

Basic data (example)	
Number of connections per component	150
3-SchThree-shift operation capacity per year	210.000
Daily capacity	800
Efficiency per year in days	263
Plant operators per shift	2
Joint positions to be tested per year	31.500.000
Joint positons to be tested over six years	189.000.000
Number of robots and welding stations	14





INLINE Quality Assurance



6. Income Statement

The application of PQS does not only offer you the benefit of comprehensive information, documentation and complete monitoring, but astonishing cost advantages as well.



Smart investing

Step

6

INCOME ST

Model calculation
Destructive test

Personnel costs	
Testing period in hours per component for 130 weld spots and 20 weld nuts incl. result documentation	5
Number of test parts per day in three-shift operation six days per week	3 pcs.
Number of testing hours per day	15
Costs per testing hour	35,00 €
Personnel costs destructive test per day	525,00 €
Personnel costs destructive test per year	138.075,00 €
Personnel costs destructive test over 6 years	828.450,00 €
Testing scrap	
Number of test parts per day in three-shift operation	3 pcs.
Costs per component	15,00 €
Total quantity test parts per year	789 pcs.
Testing scrap destructive test per year	11.835,00 €
Testing scrap destructive test over 6 years	71.010,00 €
Total costs destructive test per year	149.910,00 €
Total costs destructive test over 6 years	899.460,00 €

- Model calculation -

Number of tested connections in pieces over six years

Number of tested connections

Number of documented connections

Costs per tested connection

Savings per year thanks to PQS

Savings over six years thanks to PQS

destructive	InlinePQS
708.750	189.000.000
0,0037 %	100 %
0,0037 %	100 %
1,266 €	0,0011 €

0,00 €	113.567,00 €
0,00 €	681.405,00 €

ARMORTISATION

1,238 years

- Model calculation -

Permanently reduce costs

STATEMENT

Model calculation PQS Verification

Personnel costs

Testing period in hours per component for 130 weld spots and 20 weld nuts incl. result documentation	5
Number of test parts per day in three-shift operation six days per week	1 pc.
Number of testing hours per week	5
Costs per testing hour	35,00 €
Personnel costs destructive test per day	175,00 €
Personnel costs destructive test per year	7.700,00 €

Personnel costs destructive test over 6 years 46.200,00 €

Testing scrap

Number of test parts per day in three-shift operation	1 pc.
Costs per component	15,00 €
Total quantity test parts per year	44 pcs.
Testing scrap destructive test per year	660 €

Testing scrap costs over 6 years 3.960,00 €

Total costs destructive test per year 8.360,00 €

Total costs testing scrap 50.160,00 €

- Model calculation -

Model calculation PQS Investment + Integration + Qualifications

Cost consideration PQS system

Investment costs PQS system technology for 14 measuring points	98.000 €
14 pieces QUADRIGO MM1000 TYP IF4 Interbus optical	
1 piece QUADRIGO-MASTER M1600	
1 piece PQS-RES software package type SWL-RES-01400-GER	
Use of PC systems provided by customer, switch cabinet installation	

Integration costs PQS system technology fieldbus connection, Ethernet, supply	7.000 €
---	---------

Initial equipment, database, system configuration,	5.000 €
--	---------

Total costs PQS system costs up to handing-over ready for operation 110.000 €

Qualification costs PQS system / process consultant	5.920 €
---	---------

Number of system consultants incl. 1 substitute = 4 persons	1
---	---

Total qualification costs in three-shift operation and four system consultants	5.920 €
--	---------

Total invest incl. qualification of system consultant 115.920 €

Process support costs per shift caused by maintenance / person in charge of process	
---	--

Number of support hours per shift	0,20
-----------------------------------	------

Number of shifts	3,00
------------------	------

Number of support hours per day	0,60
---------------------------------	------

Costs per support hour	55,00 €
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Personnel costs system support per day 33,00 €

Personnel costs system support per year 8.662,50 €

Personnel costs system support over 6 years 51.975 €

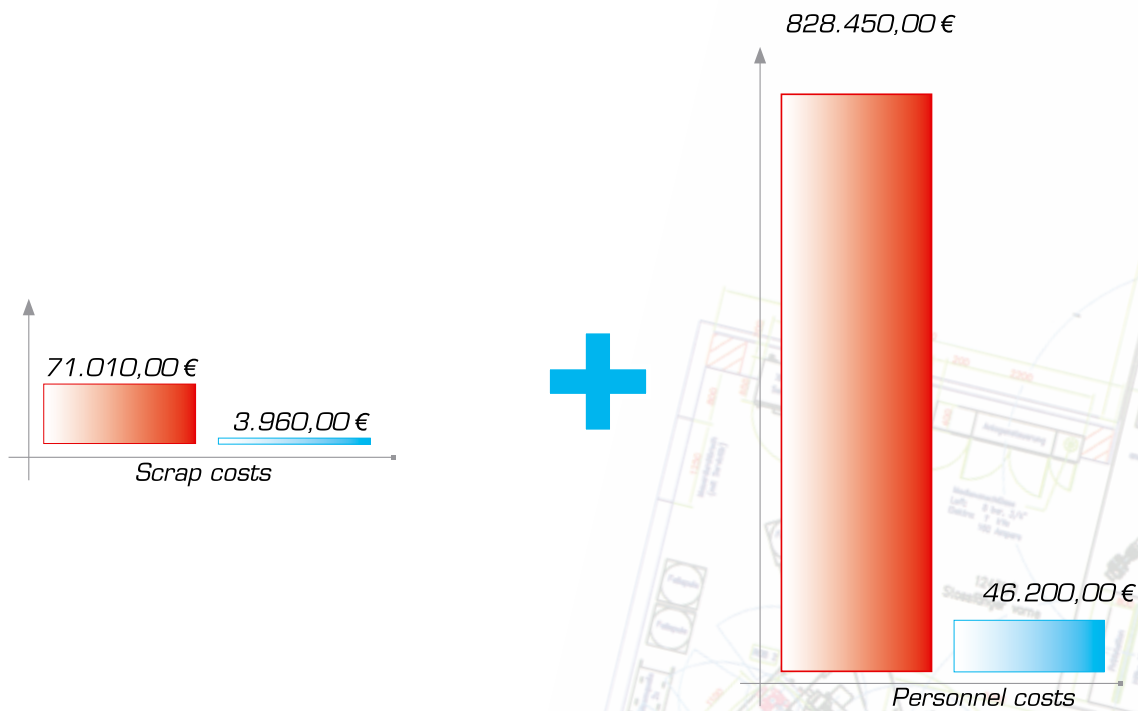
Total costs PQS-System per year 27.982,50 €

Total costs PQS-System over 6 years 167.895 €

- Model calculation -

Step 6

INCOME STATEMENT



Classic destructive test

+ Advantages

The sampling inspection (torque, shear tension, spot diameter) delivers very exact measurements if treated with the corresponding care.

- Disadvantages

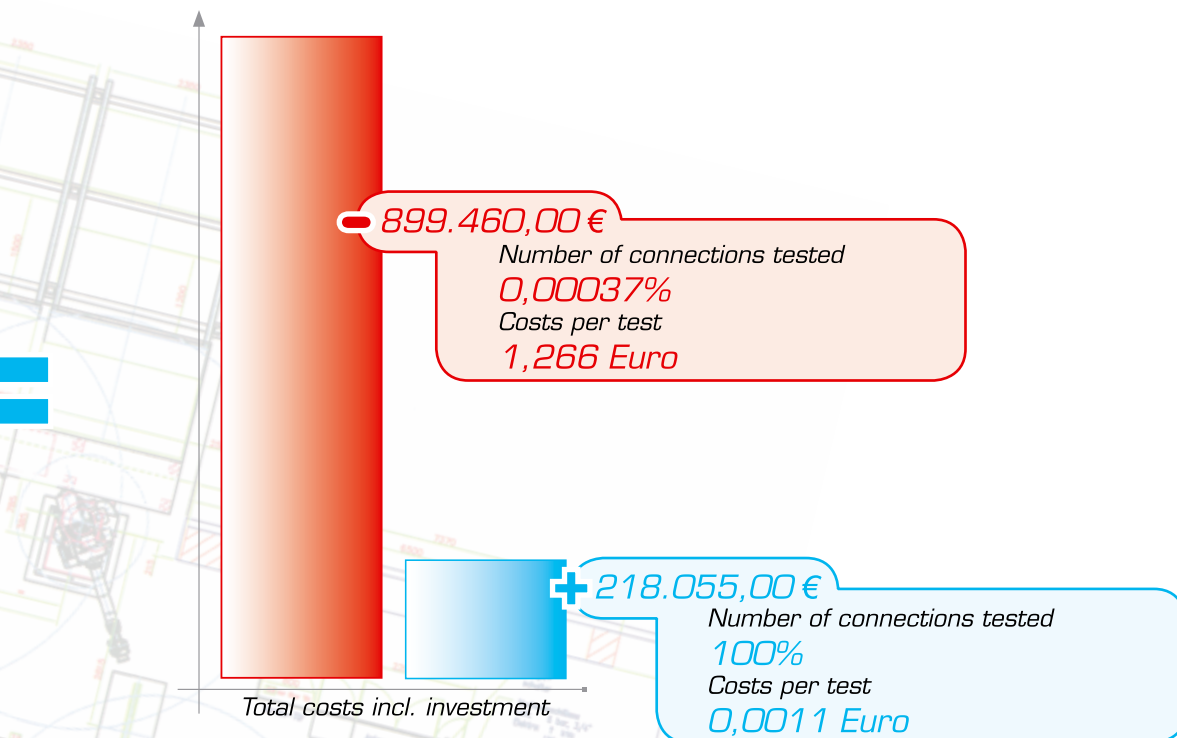
*Very high appraisal costs
Very high personnel costs
Very low inspection rate
No process information
Restricted possibility of traceability
Provides only snapshots of previous conditions
Very high effort with poor accessibility of testing place
Risk restrictions in case of an error only hardly possible*

Conditions:

Data achieved this way is only meaningful, if it is a self-controlled process (free of systematic interferences between sample taking) and a capable process (process that statistically is absolutely within the specification limits).

Permanently reduce costs

STATEMENT



Advantages

- Very low testing costs
- Very low personnel costs
- 100% inspection rate
- Permanent process information
- Trend detection possible
- Permanent safeguarding of product quality
- Sampling serves for verification only
- Risk minimization thanks to permanent traceability
- Applicable even in case of hidden joint positions
- Permanent documentation



Disadvantage

consequent system support required

Conditions:

- Consequent process control and guidance
- Dealing open with process problems
- Qualified personnel for process control

Notes

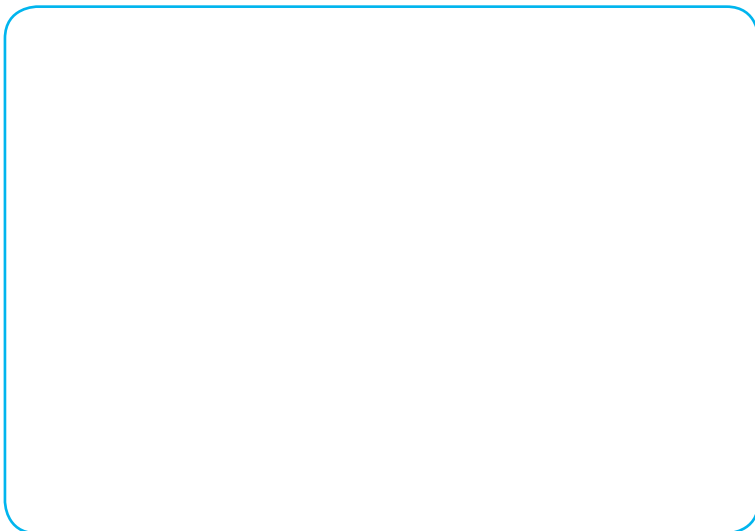




Permanently reduce costs



Handed over by:



Disclaimer:

Calculations stated in this prospect, particularly information in the model calculations regarding investment and support costs are independent of local circumstances and a variety of individual factors, which for this reason are required to be individually ascertained for every single use case.

Should you be interested in a corresponding offer, please do not hesitate to contact your HWH QST system analyst.

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