



DIGITAL SOLUTIONS



FINDING CHANGES IN THE ARC BY MEASURING PROCESS DATA

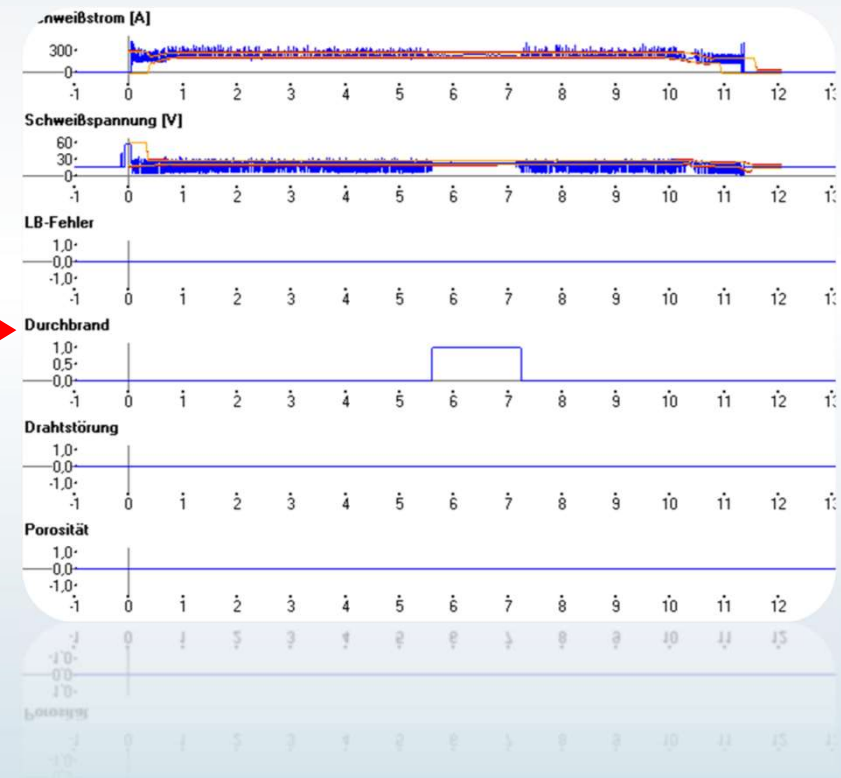
changes in arc behaviour



faulty seam



reflection in welding parameters



WELDQAS

General:

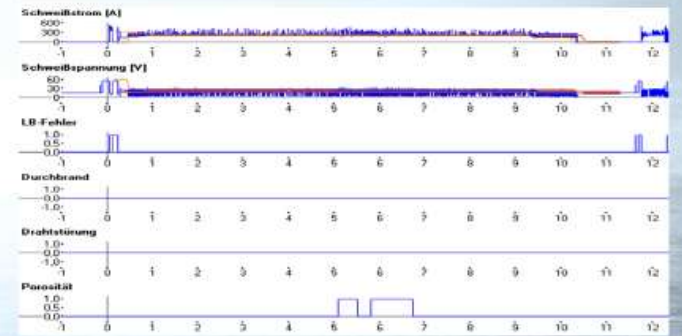
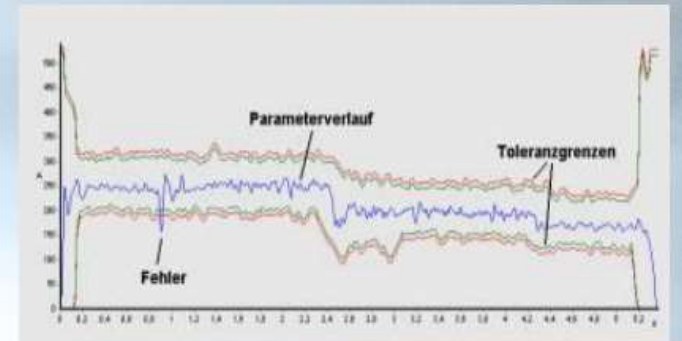
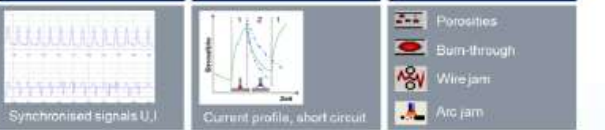
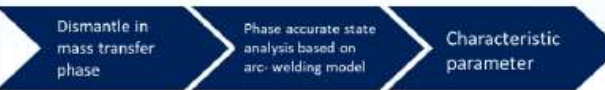
- 100% monitoring and documentation of welding production
- Optimize process and avoidance of rejects
- Procedure specific dynamic real time analysis
- Part identification - complete traceability
- Capable of measuring True RMS and Rectified Average Mean Value
- Special solution for pipe mills
- Automatic recording of weld time and consumption value



WELDQAS

seam faults caused by differences in the welding parameter

measured by HKS-sensors



A	0.0 A	V	0.0 V
	220.0		22.7
	0.0%		0.0%
	0.0%		0.0%

PFD II

00:20
 00:19
 Record no. **5**
 Program no. **1.01.005**
Pore Detection OK
 Job-Nr. **1.5**
 Label
 Roboter 2020

Note

1.5

- pores
- burn-through
- wire faults
- Arc error

Evaluation through a quality rating

In a stable and quality-compliant welding production, the measurable parameters (welding current, welding voltage) vary in stable patterns. Deviating changes indicate problems.

Simple rules of mark creation	
Ideal value – all monitoring parameters matching set values perfectly	→ Note = 1,0
at least one process parameter has reached warning threshold	→ Note > 3,0
at least one process parameter has reach the fault threshold	→ Note > 5,0



PFD II



00:20

00:19

Record no. 13
Program no. 1.01.004

Pore Detection

Job-Nr. 2.4

Kennzeichnung

Roboter 2020

Note

3.1

pores



burn-through



wire faults



Arc error



A 0.0 A V 0.0 V

220.0



22.7



0.0%

0.0%



0.0%

0.0%

PFD II



00:10

00:09

Record no. 9
Program no. 1.01.009

Pore Detection

Job-Nr. 1.9

Kennzeichnung

Roboter 2020

Note

5.0

A 0.0 A V 0.0 V



223.3

25.0



1.5%



0.0%



11.6%



4.2%



Date	Time	Parameter 1	Record	Job	Program	Mark	Channel 1	Channel 2	Channel 6	Channel 7	Channel 8	Channel 5
19/3/2020	9:41:48	At _{ess} 19.7 s	18	2	101009	1.5	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
19/3/2020	9:41:31	At _{ess} 9.4 s	17	2	101008	5.4	123.0 A	20.5 V	0.0 %	28.6 %	7.9 %	0.0 %
19/3/2020	9:41:04	At _{ess} 19.7 s	16	2	101007	1.2	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
19/3/2020	9:40:36	At _{ess} 19.7 s	15	2	101006	3.1	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
19/3/2020	9:40:09	At _{ess} 19.7 s	14	2	101005	1.5	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
19/3/2020	9:39:42	At _{ess} 19.7 s	13	2	101004	3.1	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
19/3/2020	9:39:14	At _{ess} 19.7 s	12	2	101003	1.9	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
19/3/2020	9:38:57	At _{ess} 10.1 s	11	2	101002	5.0	223.4 A	25.0 V	1.5 %	0.0 %	12.1 %	4.2 %
19/3/2020	9:38:29	At _{ess} 19.7 s	10	2	101001	1.6	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
19/3/2020	9:37:50	At _{ess} 10.1 s	9	1	101009	5.0	223.4 A	25.0 V	1.5 %	0.0 %	11.6 %	4.2 %
19/3/2020	9:37:23	At _{ess} 19.7 s	8	1	101008	2.0	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
19/3/2020	9:36:56	At _{ess} 19.7 s	7	1	101007	1.2	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
19/3/2020	9:36:28	At _{ess} 19.7 s	6	1	101006	3.1	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
19/3/2020	9:36:01	At _{ess} 19.7 s	5	1	101005	1.5	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
19/3/2020	9:35:34	At _{ess} 19.5 s	4	1	101004	5.0	220.9 A	22.7 V	0.0 %	0.8 %	10.7 %	0.2 %
19/3/2020	9:35:06	At _{ess} 19.7 s	3	1	101003	1.9	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
19/3/2020	9:34:39	At _{ess} 19.7 s	2	1	101002	5.0	220.1 A	22.7 V	0.0 %	0.0 %	8.6 %	0.0 %
19/3/2020	9:34:12	At _{ess} 19.7 s	1	1	101001	1.6	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
28/2/2020	12:45:47	It _{ess} 19.7 s	3	1	101002	5.0	220.1 A	22.7 V	0.0 %	0.0 %	8.6 %	0.0 %
28/2/2020	12:45:20	It _{ess} 19.7 s	2	1	101001	1.6	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
28/2/2020	12:32:05	It _{ess} 19.5 s	7	1	101004	5.0	220.9 A	22.7 V	0.0 %	0.8 %	10.7 %	0.2 %
28/2/2020	12:31:38	It _{ess} 19.7 s	6	1	101003	1.9	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
28/2/2020	12:31:10	It _{ess} 19.7 s	5	1	101002	5.0	220.1 A	22.7 V	0.0 %	0.0 %	8.6 %	0.0 %
28/2/2020	12:30:43	It _{ess} 19.7 s	4	1	101001	1.6	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
28/2/2020	12:28:00	It _{ess} 19.7 s	1	1	101001	1.6	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
23/10/2019	3:08:07	Pt _{ess} 19.7 s	7	1	101007	1.2	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
23/10/2019	3:07:40	Pt _{ess} 19.7 s	6	1	101006	3.1	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
23/10/2019	3:07:12	Pt _{ess} 19.7 s	5	1	101005	1.5	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
23/10/2019	3:06:45	Pt _{ess} 19.5 s	4	1	101004	5.0	220.9 A	22.7 V	0.0 %	0.8 %	10.7 %	0.2 %
23/10/2019	3:06:18	Pt _{ess} 19.7 s	3	1	101003	1.9	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
23/10/2019	3:05:51	Pt _{ess} 19.7 s	2	1	101002	5.0	220.1 A	22.7 V	0.0 %	0.0 %	8.6 %	0.0 %
23/10/2019	3:05:23	Pt _{ess} 19.7 s	1	1	101001	1.6	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
22/10/2019	11:30:00	It _{ess} 19.7 s	55	7	101006	3.1	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
22/10/2019	11:29:32	It _{ess} 19.7 s	54	7	101005	1.5	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
22/10/2019	11:29:05	It _{ess} 19.7 s	53	7	101004	3.1	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
22/10/2019	11:28:38	It _{ess} 19.7 s	52	7	101003	1.9	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %
22/10/2019	11:28:20	It _{ess} 10.1 s	51	7	101002	5.0	223.4 A	25.0 V	1.5 %	0.0 %	12.1 %	4.2 %
22/10/2019	11:27:52	It _{ess} 19.7 s	50	7	101001	1.6	220.1 A	22.7 V	0.0 %	0.0 %	0.0 %	0.0 %

Consumption

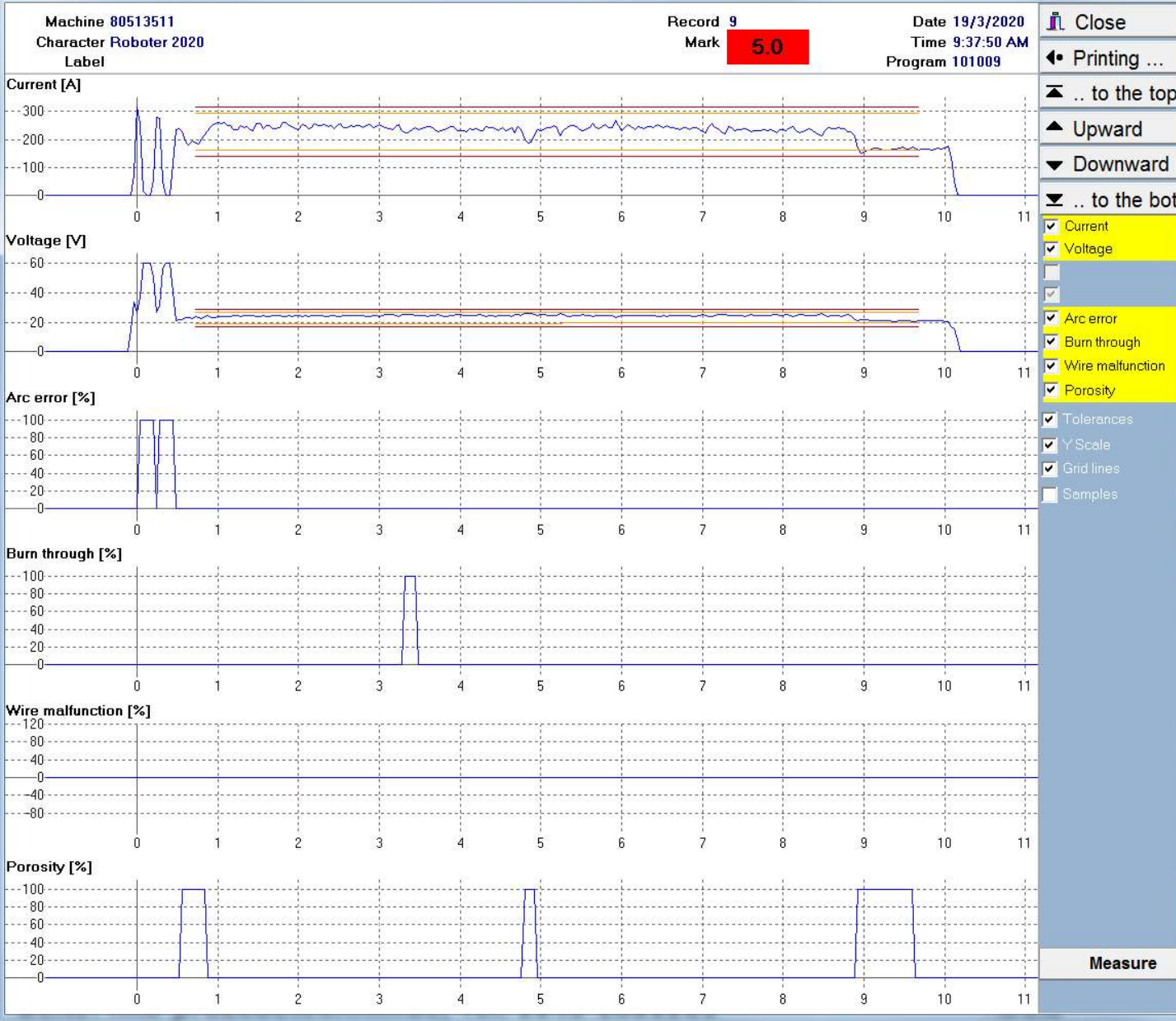
Seams	Σ n	Seam length	Σ n mm	Duration	Σ nn:nn	Enerov	Σ n.000 k.J

- Close
- New results 1
- Refresh
- Filter
- Filter ...
- Select all
- Curves
- Several curves
- Data
- Fill in ...
- Results
- Configuration
- Print



Results page-
Where all the measured records are stored accordingly by- Date & Time



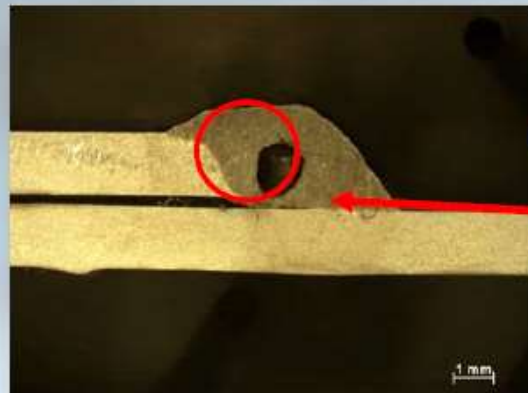


Double clicked into the welding seam result to see detailed info:



Dynamic Process analysis //

Detecting irregularities by current and voltage



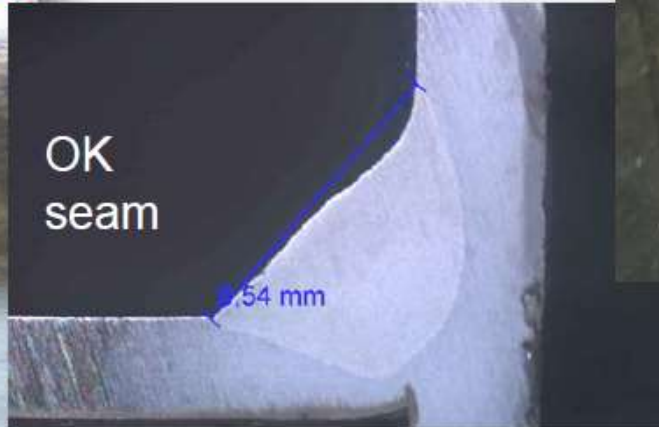
detectable irregularities

Porosities

Seam length

Seam interruption

Burn-through



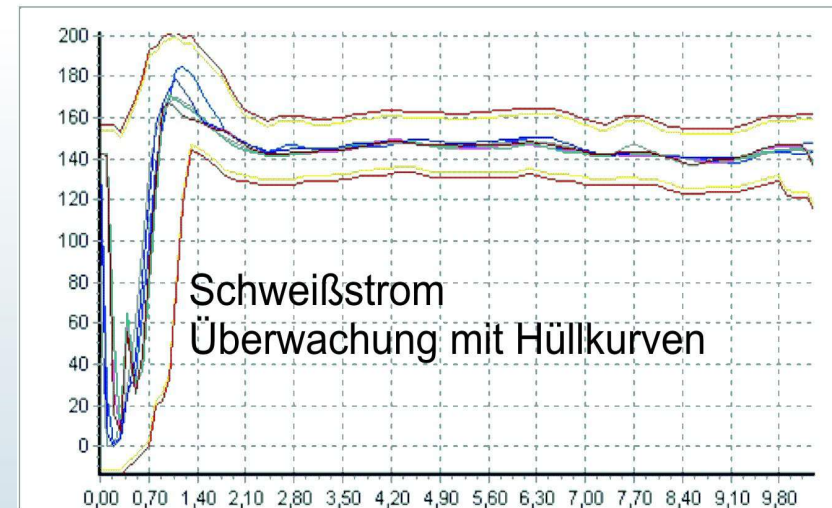
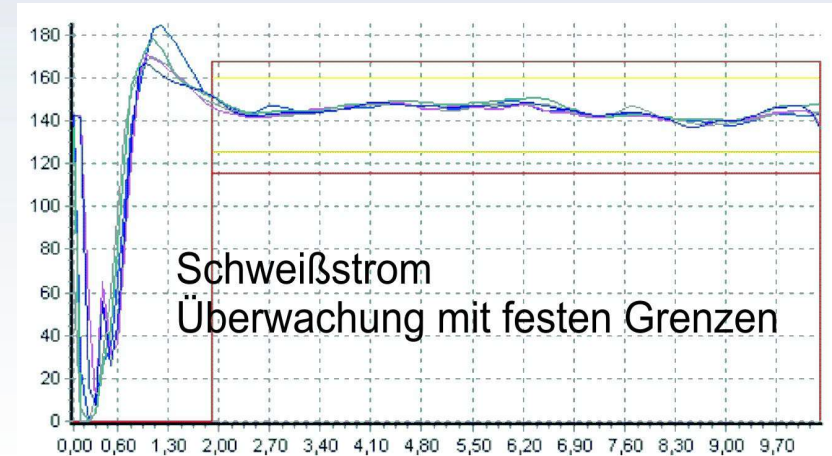
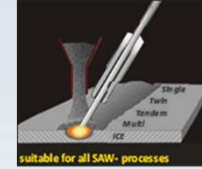
WELDQAS FOR SAW

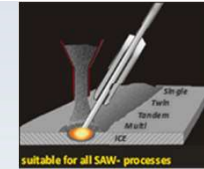
Advantages over other monitoring systems

1. Monitoring using envelope curves

Unlike the monitoring using fixed limits (for processes that can be defined chronologically - masking of start and end times), monitoring using envelope curves allows up to 40% better detection of welding faults due to:

- i. Monitoring of *all* sections of the welding process (including ignition and crater fillings)
- ii. Precise adaptation of monitoring as per the “natural” progression of welding process parameters.
- iii. Especially suitable for fully automated welding processes (robot welding)
- iv. The WeldQAS system supports the tolerance specifications with fixed limits (e.g. for extremely long welding seams or in the UP area) as well as monitoring using envelope curves



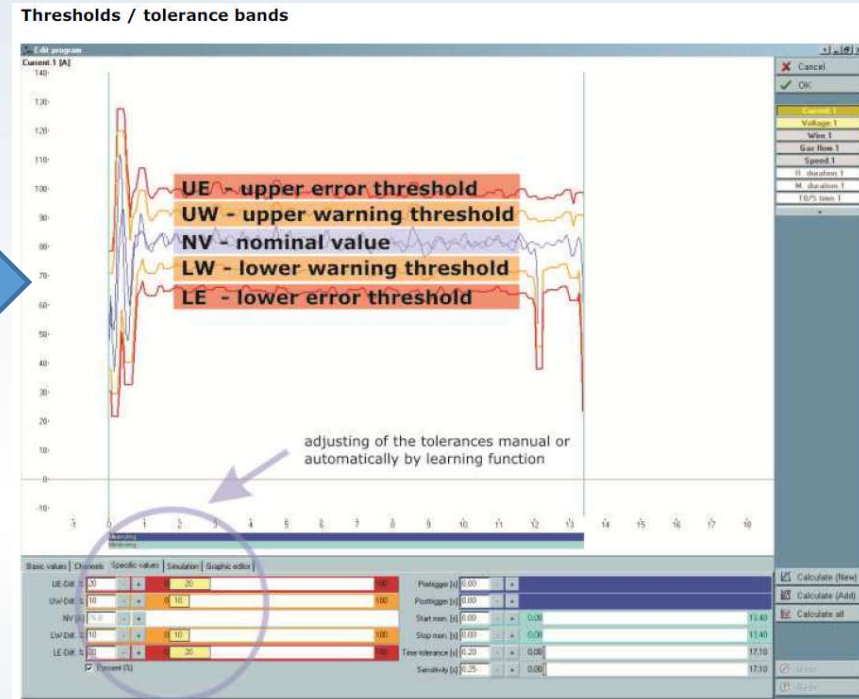


WELDQAS

Advantages over other monitoring systems

2. Automatic statistical learning process (AI)

The WeldQAS system is an unique system that offers options of an automatic learning function from the recorded data parallel to the ongoing production. The signal behaviour is statistically analysed and abnormal sequences are automatically ruled out.



Current.1 [A]

Measuring
Monitoring

Basic values Channels Specific values Simulation Graphic editor

Exclude Filter 5 19.03.2009 20:00:00

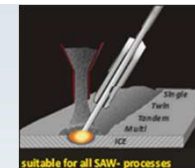
Date	Time	No.	Mark	Error
07.07.2009	14:29:50	2	1.9	
07.07.2009	14:25:26	1	2.7	
30.06.2009	15:46:35	7	6.7	▲▲ Current.1 6,33 s
30.06.2009	15:39:13	6	8.8	▲▲ Current.1 4,33 s
30.06.2009	15:35:16	5	6.7	▲▲ Current.1 7,68 s

Calculate (New)
 Calculate (Add)
 Calculate all
 Undo
 Redo



Simulation of the monitoring based on the adjusted values

User has the options of **“Exclude”** poor welding seam from the Automatic Learning.



WELDQAS FOR SAW

Advantages over other monitoring systems

3. Pioneering Fault Detection (PFD)- Patented fault detection by evaluating the electric arc dynamics

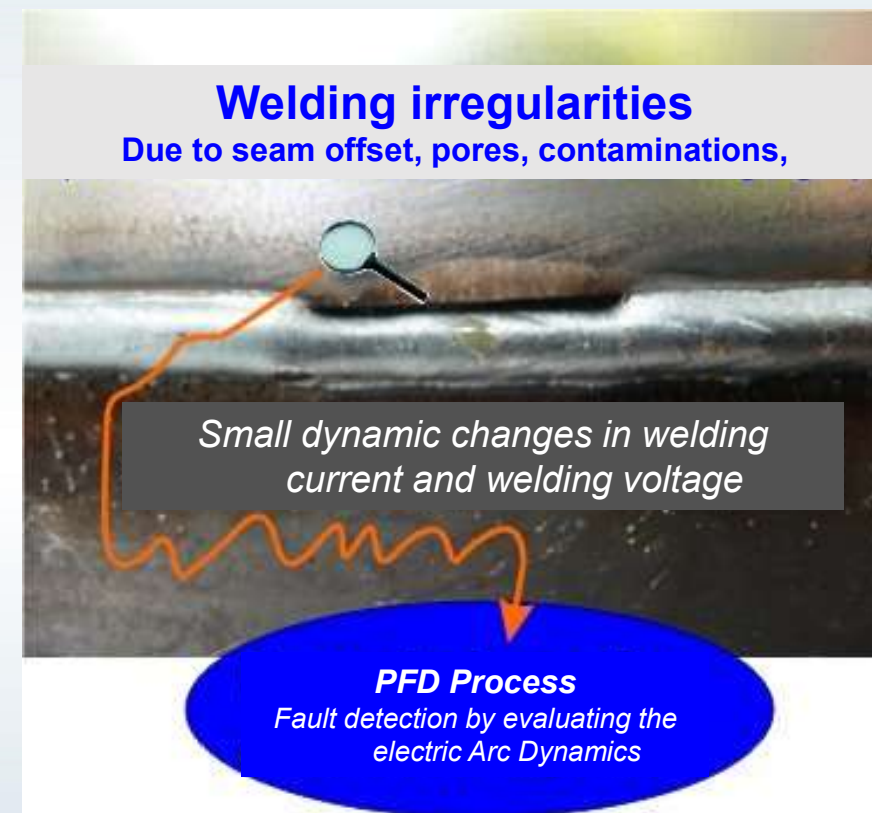
The PFD process is based on determining a process index and detects minor dynamic changes in the welding current and welding voltage in case of welding irregularities such as Pores, holes, contaminations, Seam offset, incomplete fusion, weld penetration faults due to the effect of gas and wire

The process index is calculated online only from highly dynamic progressions of current and voltage.

It is independent of the welding current to a large current

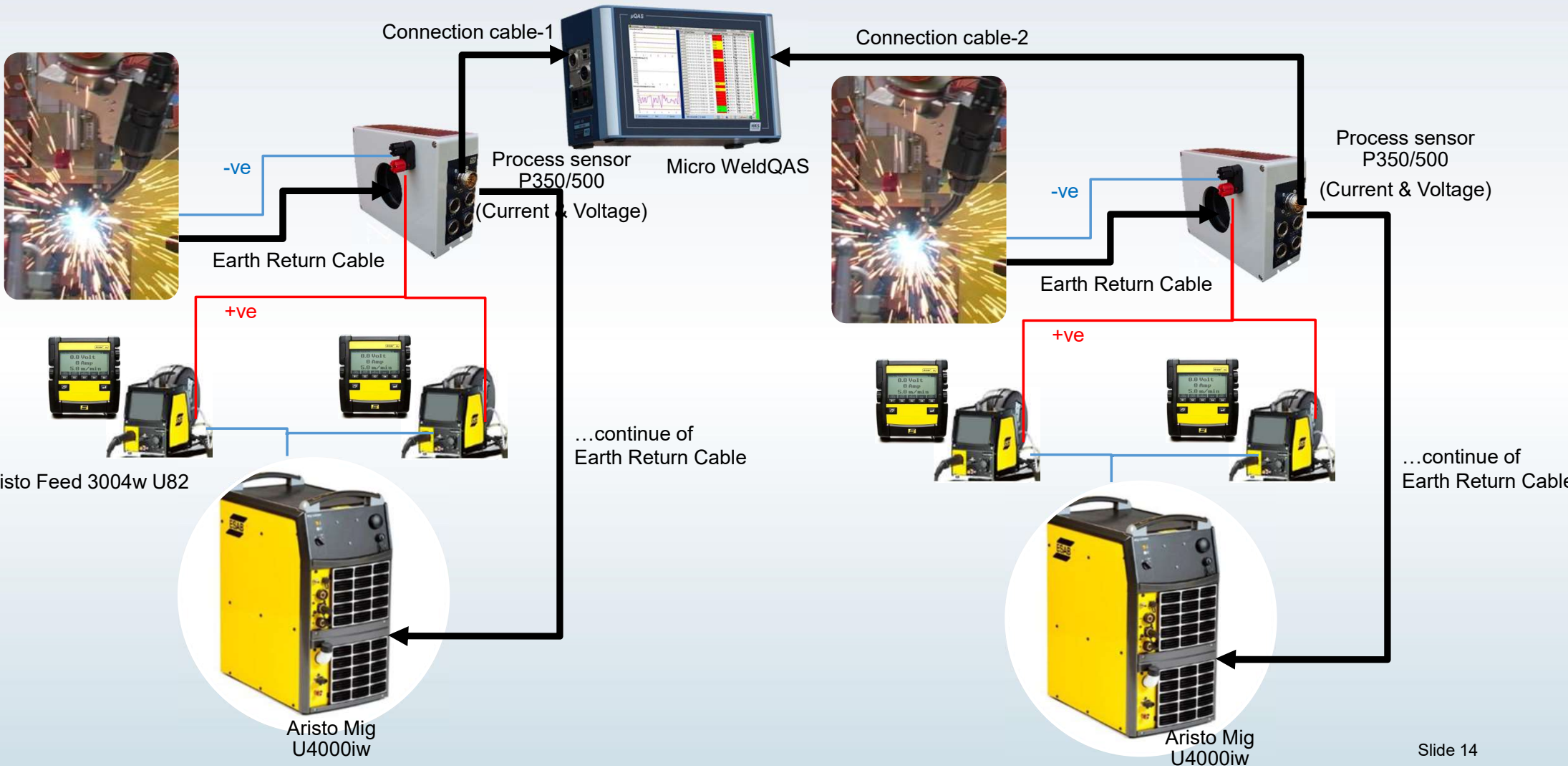
It does not require any learnable pattern.

This results in a comparison value for monitoring the automated production an indicator for electric arc analysis





WELDQAS - INSTALLATION SCHEMATIC





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