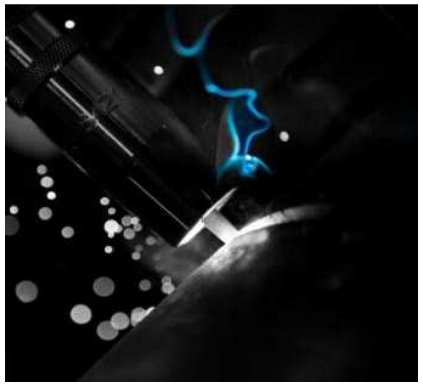
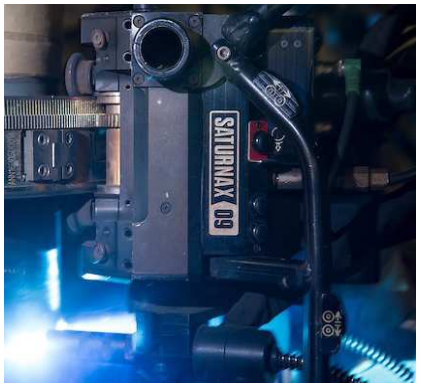
Latest Innovations in Pipeline Construction and Integrity Management



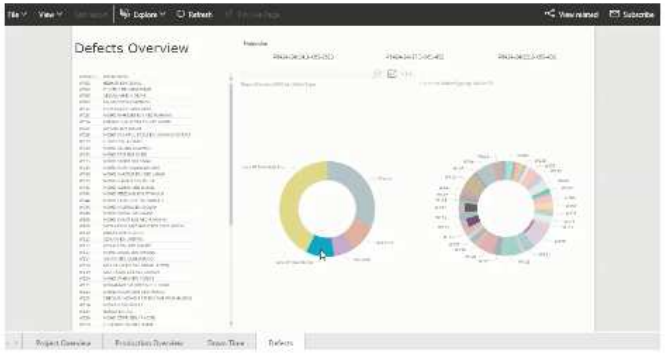


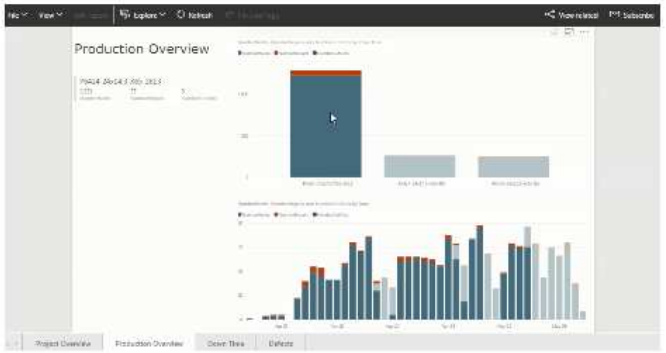
Technology & Innovation

How to improve productivity without compromise pipeline integrity?

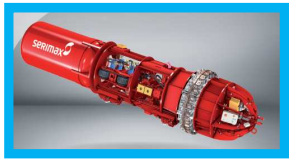
I. Industry latest ASSET

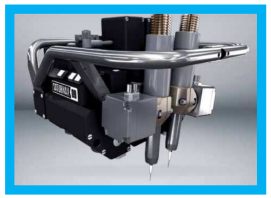
II. Data Managment





Technology Solution: Look above pure Welding operation





Beveling **Fit Up** **Welding** **Internal Inspection**

	Barge Move	ILUC pull	Fit up	Purge + band + ground	Welding	Scanvision	Hot grinding OD (hidden time)
Average	03:00	02:05	**06:30**	02:56	17:45	**03:56**	02:59
Weld #	Barge Move	ILUC pull	Fit up	Purge + band + ground	Welding	Scanvision inc. Positioning	Hot grinding OD (hidden time)
W213	03:26	01:57	05:50	02:35	18:23	04:35	02:57
W241	03:10	01:35	06:30	03:10	17:25	02:28	02:47
W242	02:50	01:42	06:45	03:30	17:05	03:29	03:28
W369	03:21	01:25	04:57	03:49	17:42	05:22	03:23
W551	02:58	03:52	05:17	02:53	18:09	03:20	02:14
W552	02:15	03:05	09:50	02:30	17:53	05:03	03:05
W553	03:03	00:58	06:19	02:06	17:39	03:18	02:58
Target			**01:30**			**00:50**	

Fit Up time

Scanvision

Significant difference between Cycle time expected and observed offshore

Technology Solution CleverScan

Optimal, accurate and rapid measurement tool of pipe end dimensions along with software analysis including pipe end-to-end fit-up solutions and pipeline sorting

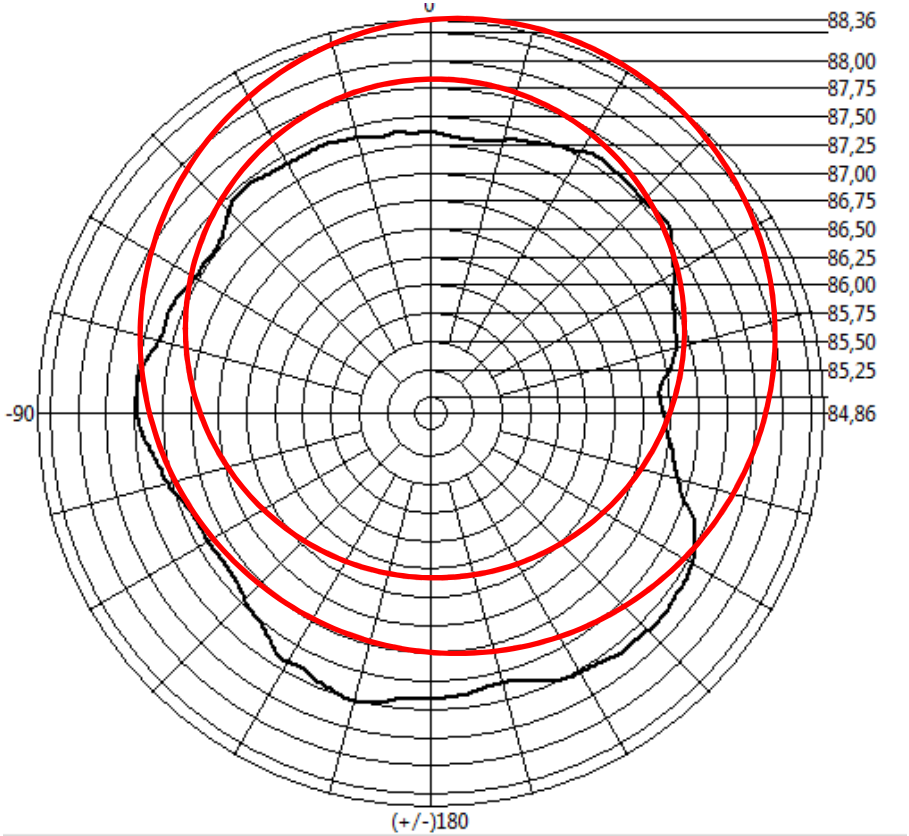
- Laser precision
- Inner & outer pipe dimension monitoring
- Advanced software calculating optimal fit-up and rotation

Data derived into a customised report

Technology Solution CleverScan

Generating Statistics

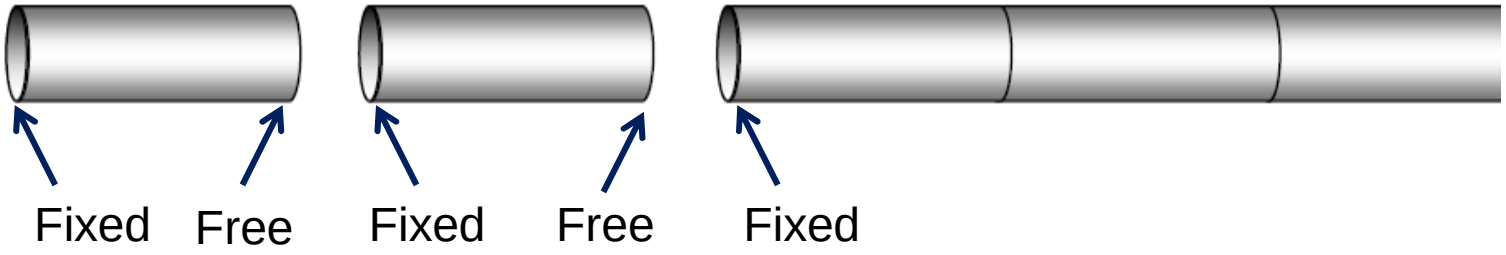
Software can be used with ANY DATA collected with different laser system.



	Avg ID (mm)	Max ID (mm)	Min ID (mm)	OOR (mm)
Avg (mm)	174,20	174,94	173,60	1,19
Max(mm)	174,31	175,71	173,87	4,49
Min(mm)	174,13	174,45	173,27	0,15

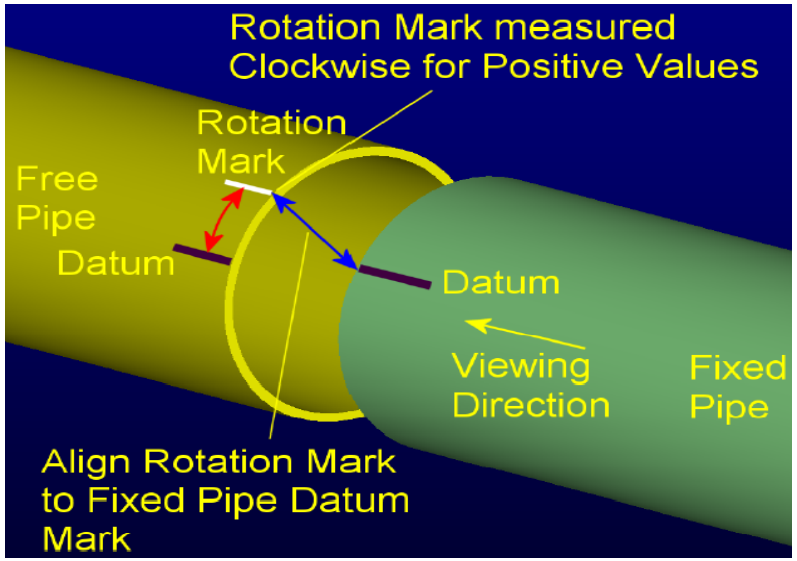
Pipe ID	Avg ID (mm)	Max ID (mm)	Min ID (mm)	OOR(mm)
000001_A	174,14	174,45	173,64	0,81
000001_B	174,13	174,57	173,87	0,70
000004_A	174,19	175,06	173,42	1,65
000004_B	174,25	175,71	173,27	2,44
000011_A	174,31	174,91	173,82	1,09

Technology Solution CleverScan



OFFSHORE sequencing

- Riggers load the pipes into bevelling in the defined order as per sequence number
- In the bead stall, free pipe is rotated into the correct rotational position
- Datum line is aligned to the rotation line prior fit-up



Technology Solution CleverScan Option Bevel

vallourec

Technology Solution Scanvision HD

Ensure **root integrity**

HD Quality (0,05mm occuracy)

Automatic detection of defect

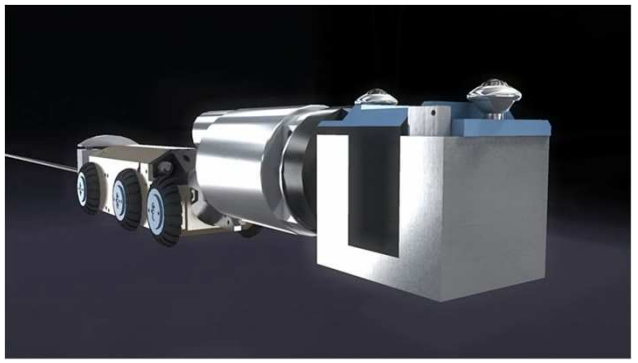
Detection and dimensioning of root imperfections

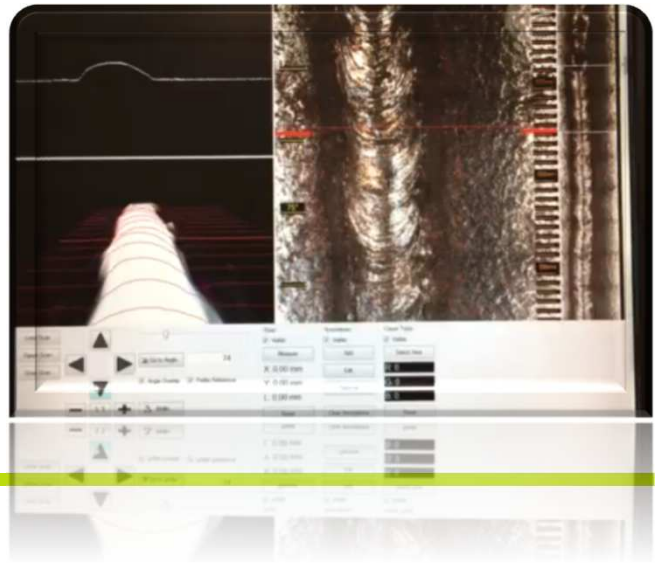
Fully modular system to enable application for all construction methods

Enhanced traceability and quality control

Complementary with other NDT methods

3D root profiling





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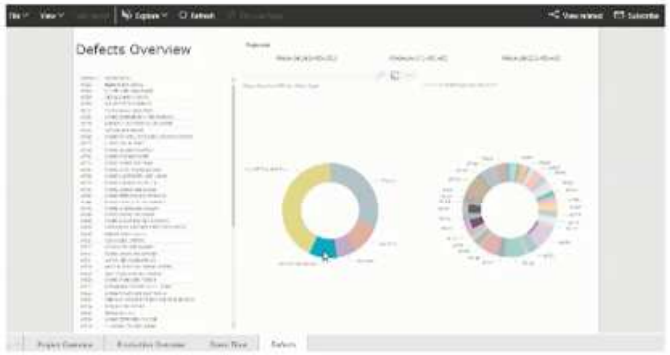


Data Management CLEVERWELD

FULL QUALITY ASSURANCE AND INTEGRITY FOR YOUR MOST COMPLEX PROJECTS

- Full traceability on performance: welding, NDT, FJC and other third party services
- Real-time production tracking
- Customizable reports
- Long-term data storage

Data Management CLEVERWELD

- **Product features**
  - RFID pipe end tracking capabilities
  - Welding operator tracking
  - Welding "As run" customizable report generation
  - Welding survey according to WPS
  - Welding parameters change logging
  - Business Intelligence worldwide reporting
  - Third party raw data attachment
  - Production Downtime recording
  - Pipe sorting and best matching (with CleverScan equipment)

- **1 x Database / 3 x Modules**
  - Quality Control
  - Productivity Control
  - Client Interface

Data Management CLEVERWELD

How it works

Data collection	Traceability → RFID

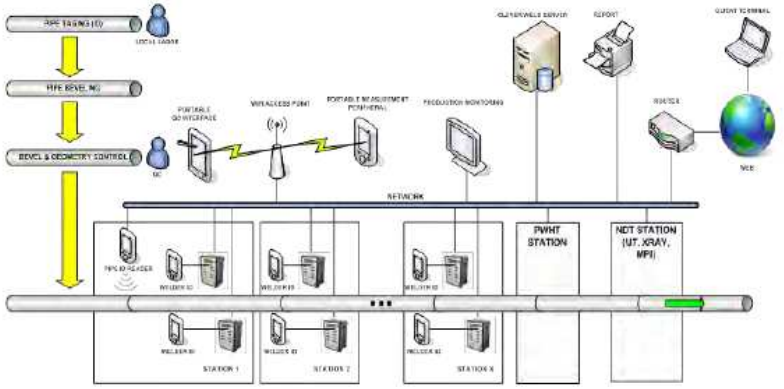
Manually

With mobile device
- Inter-pass Temperature
- Pipe number
- Visual inspection
- ...

Automatically

With connected devices

- Roxane
- Saturnax / Externax / Multinax
- Cleversort
- FJC
- AUT

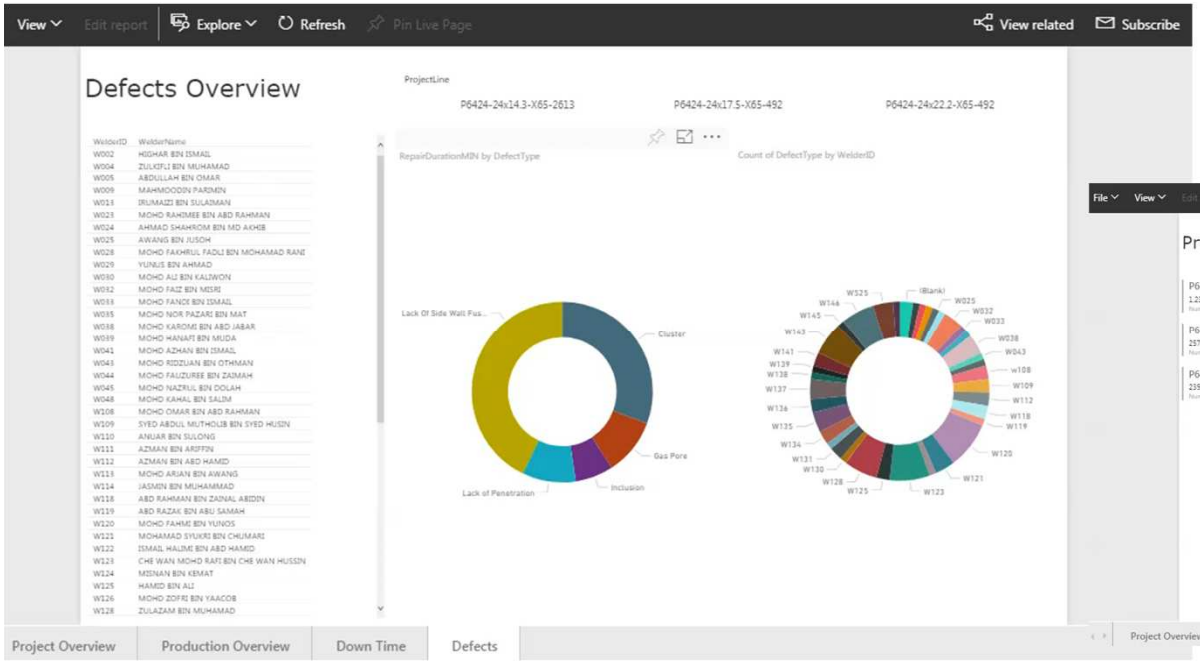


Data Management CLEVERWELD

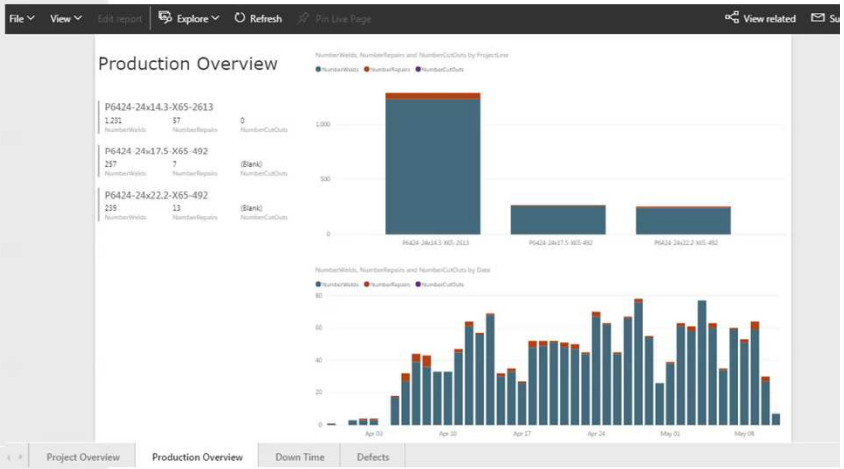
Output and interface management

Data Management CLEVERWELD

"Stop feeding - Start thinking"



DATA reporting



Data Availability

Online reporting with unlimited access.

Better analysis

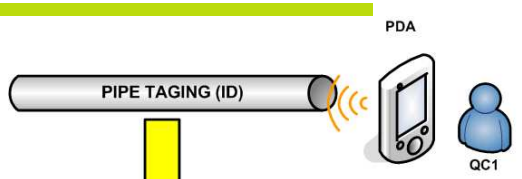
Data analysis with chart automatically generated.

No more time spent to feed the data but focus on analysis it.

Track Record

All Project data kept in Data bank to get full track record on demand and use previous experience in more efficient way.

Data Management CLEVERWELD



Step 1

Step 1
Pipe referencing
Pipe No = RFID unique ID

Lay Out

>Wifi connectivity

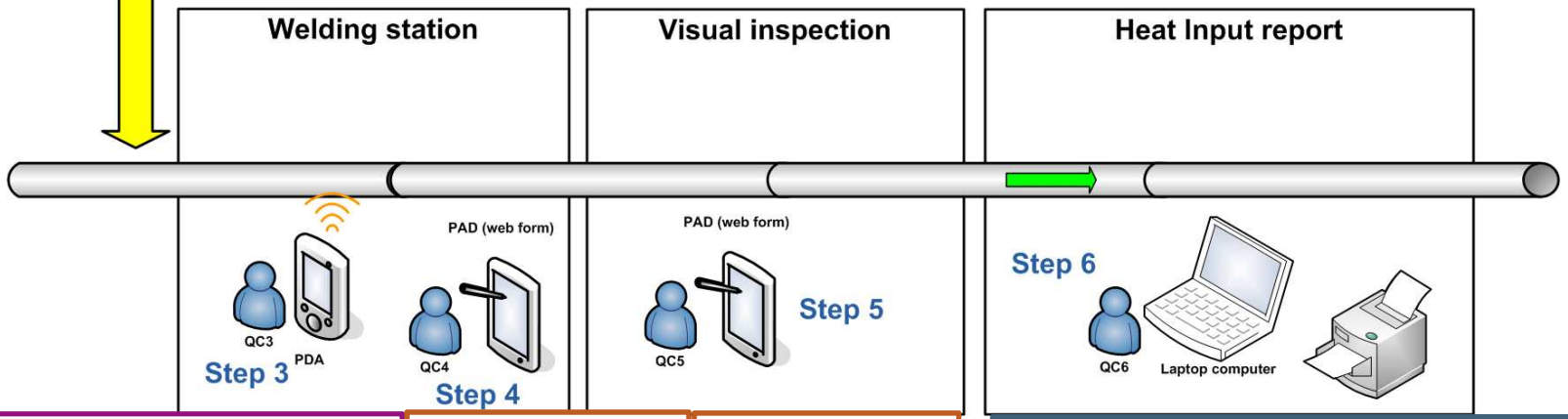
>Orwel mobile software

Step 2

Step 2
Pipe geometry measurement

>Wifi connectivity

>Web interface



Step 3
Pipe link
Weld No=Pipe No + Pipe No

Step 4
Pipe fit up measurement

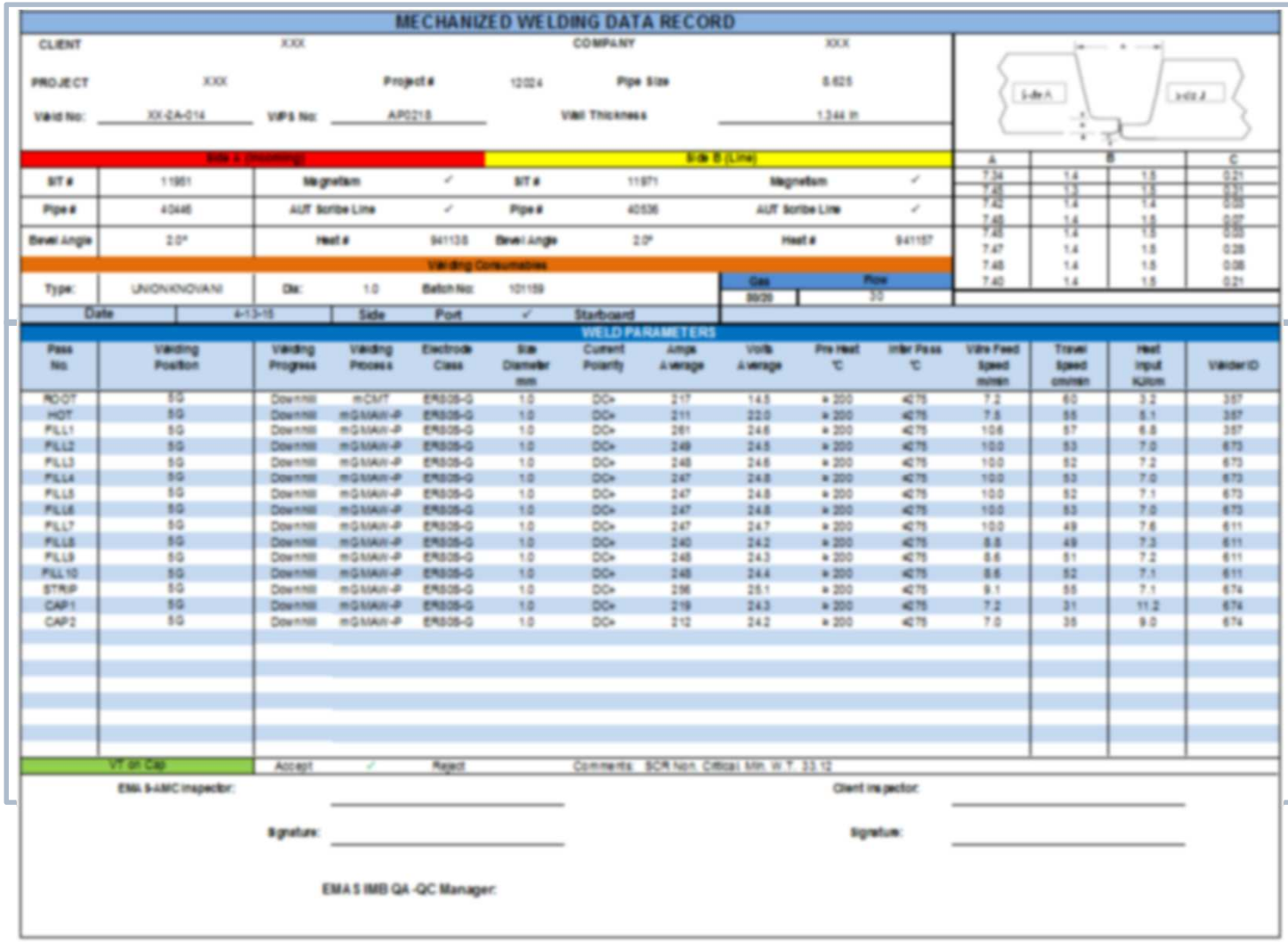
Step 5
Visual inspection

Step 6
>Welding data report 'as run' and NDT report integration
>Wifi or wire connectivity
>Orwel software

Data Management CLEVERWELD

Customizable Excel template/printable on PDF from application

Welding Data Record Example



MECHANIZED WELDING DATA RECORD

CLIENT	XXX			COMPANY	XXX		
PROJECT	XXX		Project #	12324	Pipe Size	8.625	
Weld No:	XX-GA-014	WPS No:	AP0218		Wall Thickness	1.344 in	

Side A (Incoming)				Side B (Line)			
ST #	11991	Magnetism	✓	ST #	11971	Magnetism	✓
Pipe #	40446	AUT Scribe Line	✓	Pipe #	40536	AUT Scribe Line	✓
Bevel Angle	2.0°	Heat #	941138	Bevel Angle	2.0°	Heat #	941157

Welding Consumables							
Type:	UNIONKNOVANI	Dia:	1.0	Batch No:	101159	Gas	Flow
						80/20	30

Date	4-13-15	Side	Port ✓	Starboard

A	B	C	
7.34	1.4	1.5	0.21
7.43	1.3	1.5	0.21
7.42	1.4	1.4	0.03
7.48	1.4	1.5	0.07
7.43	1.4	1.5	0.03
7.47	1.4	1.5	0.08
7.48	1.4	1.5	0.08
7.40	1.4	1.5	0.21

WELD PARAMETERS

Pass No.	Welding Position	Welding Progress	Welding Process	Electrode Class	Size Diameter mm	Current Polarity	Amps Average	Volts Average	Pre Heat °C	Inter Pass °C	Wire Feed Speed m/min	Travel Speed cm/min	Heat Input kJ/cm	Welder ID
ROOT	5G	Downhill	mCMT	ER80S-G	1.0	DC+	217	14.5	≥ 200	≤275	7.2	60	3.2	357
HOT	5G	Downhill	mGMAW-P	ER80S-G	1.0	DC+	211	22.0	≥ 200	≤275	7.5	55	5.1	357
FILL1	5G	Downhill	mGMAW-P	ER80S-G	1.0	DC+	261	24.6	≥ 200	≤275	10.6	57	6.8	357
FILL2	5G	Downhill	mGMAW-P	ER80S-G	1.0	DC+	249	24.5	≥ 200	≤275	10.0	53	7.0	673
FILL3	5G	Downhill	mGMAW-P	ER80S-G	1.0	DC+	248	24.6	≥ 200	≤275	10.0	52	7.2	673
FILL4	5G	Downhill	mGMAW-P	ER80S-G	1.0	DC+	247	24.8	≥ 200	≤275	10.0	53	7.0	673
FILL5	5G	Downhill	mGMAW-P	ER80S-G	1.0	DC+	247	24.8	≥ 200	≤275	10.0	52	7.1	673
FILL6	5G	Downhill	mGMAW-P	ER80S-G	1.0	DC+	247	24.8	≥ 200	≤275	10.0	53	7.0	673
FILL7	5G	Downhill	mGMAW-P	ER80S-G	1.0	DC+	247	24.7	≥ 200	≤275	10.0	49	7.6	611
FILL8	5G	Downhill	mGMAW-P	ER80S-G	1.0	DC+	240	24.2	≥ 200	≤275	8.8	49	7.3	611
FILL9	5G	Downhill	mGMAW-P	ER80S-G	1.0	DC+	248	24.3	≥ 200	≤275	8.6	51	7.2	611
FILL10	5G	Downhill	mGMAW-P	ER80S-G	1.0	DC+	248	24.4	≥ 200	≤275	8.6	52	7.1	611
STRIP	5G	Downhill	mGMAW-P	ER80S-G	1.0	DC+	256	25.1	≥ 200	≤275	9.1	55	7.1	674
CAP1	5G	Downhill	mGMAW-P	ER80S-G	1.0	DC+	219	24.3	≥ 200	≤275	7.2	31	11.2	674
CAP2	5G	Downhill	mGMAW-P	ER80S-G	1.0	DC+	212	24.2	≥ 200	≤275	7.0	35	9.0	674

VT on Cap	Accept ✓	Reject	Comments: SCR Non Critical Min. W.T. 33.12

EMA S-AMC inspector: _____ Client inspector: _____

Signature: _____ Signature: _____

EMA S IMB QA -QC Manager:

Static data (relative to the project/to the weld)

Dynamic data (relative to each pass)

Data Management CLEVERWELD

- **Information recorded in real time, centralized in a database**

- **On-time welding data report provision to customer**
  - Highly beneficial when Customer requires the PQR before the joint is coated

- **Still same quantity of QC (6x pax of the job) on ML but potential saving with back office personnel**
  - It also reduces the number of double entries so limit the risk of errors.

- **Eliminate the risk of lost paperwork and Increase capacity to extract info through Smart data base.**
  - Since all is manage electronically through data base.
  - Data collected are easily accessible.

- **Reduce customer PQR backlog**
  - Expedited the data book issuance for pipe in pipe operation and SCR clearing.

Data Management Case Study

Extract PRESS RELEASE TODAY 11th October

#BASIC MATERIALS OCTOBER 11, 2017 / 8:35 AM / UPDATED 4 HOURS AGO

Kobe Steel says there may have been data fabrication in iron powder products

Reuters Staff 1 MIN READ

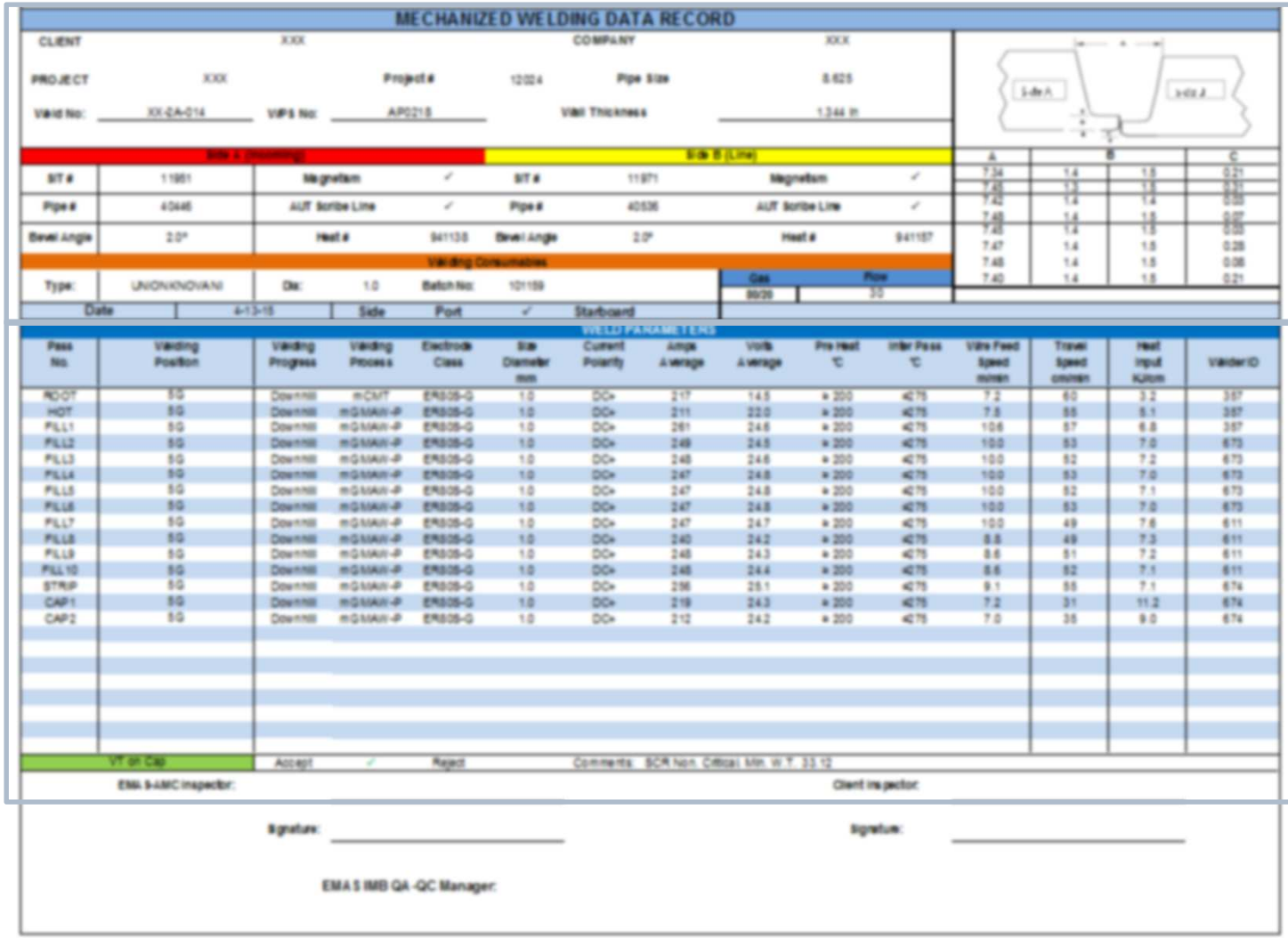
TOKYO, Oct 11 (Reuters) - Kobe Steel Ltd on Wednesday confirmed a media report that there may have been data fabrication in iron powder products.

The Yomiuri newspaper reported Japan's third-biggest steelmaker may have fabricated data on iron powder products used typically in components such as automotive gears.

Data Management CLEVERWELD

Customizable Excel template/printable on PDF from application

Welding Data Record Example



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Weld No:	XX-QA-014	WPS No:	AP0218		Wall Thickness	1.344 in	

Side A (Incoming) / Side B (Line)

ST #	11981	Magnetism	✓	ST #	11971	Magnetism	✓
Pipe #	40446	AUT Scribe Line	✓	Pipe #	40536	AUT Scribe Line	✓
Bevel Angle	2.0°	Heat #	941138	Bevel Angle	2.0°	Heat #	941157

Welding Consumables

Type:	UNIONKNOVANI	Dia:	1.0	Batch No:	101159	Gas	Flow
						80/20	35
Date	4-13-15	Side	Port	✓	Starboard		

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