



xPARvision

Sjoerd van der Zwaan (CTO)

Base facts



Based in Groningen, The Netherlands

Founded in 1999



Focus on container glass forming (hot end)

Focus on sensing, robotics and artificial intelligence

Focus on inspection, process monitoring and (automatic) process control



Active in over 35 countries

Supplier to more than 50 glass manufacturers

Equipment installed on over 650 production lines

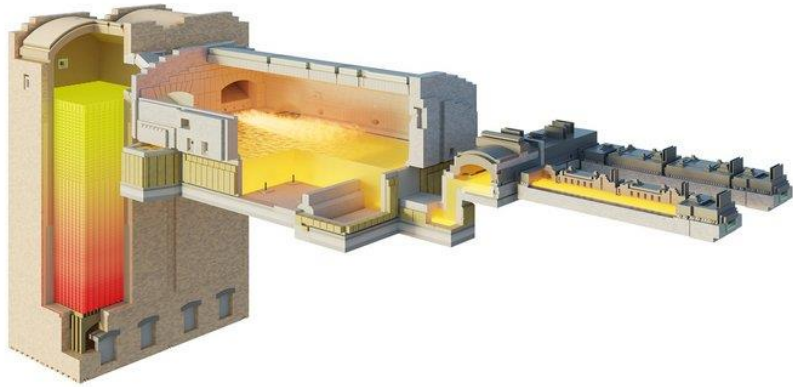


People

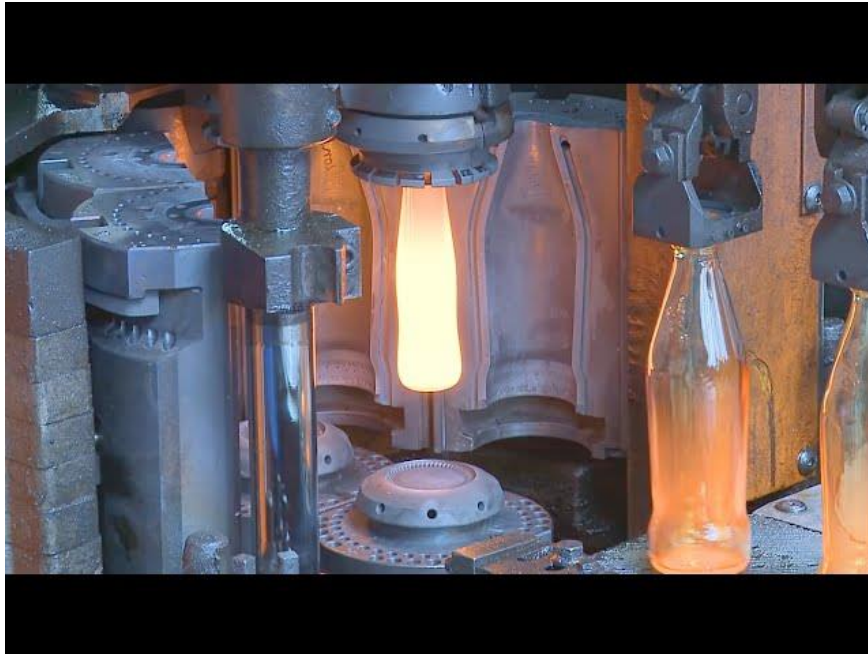
- Development, sales, operations, consultancy
- Solid balance between education and (glass forming) experience
- Low turnover – great team



Modern Plant for Container Glass



Forming proces



Their Customers



Unilever



PEPSICO



Heineken[®]



Their challenges

- Workforce
- Energy
- Sustainability

- Flexibility
- Health & safety

Quote Sandra Maria Santos (CEO of BA Glass):

I am happy to know you continue to strengthen your team. We will need to have enough capabilities to do a disruption in the ways glass packaging is produced and faster than we could dream. The youngest are running out of the heavy industry. It is a question of survival for our industry.

The industry average PTM of 85%-90%, the many process related defects and the variation in glass wall thickness of 30%-60% gives enough room to improve



Vision

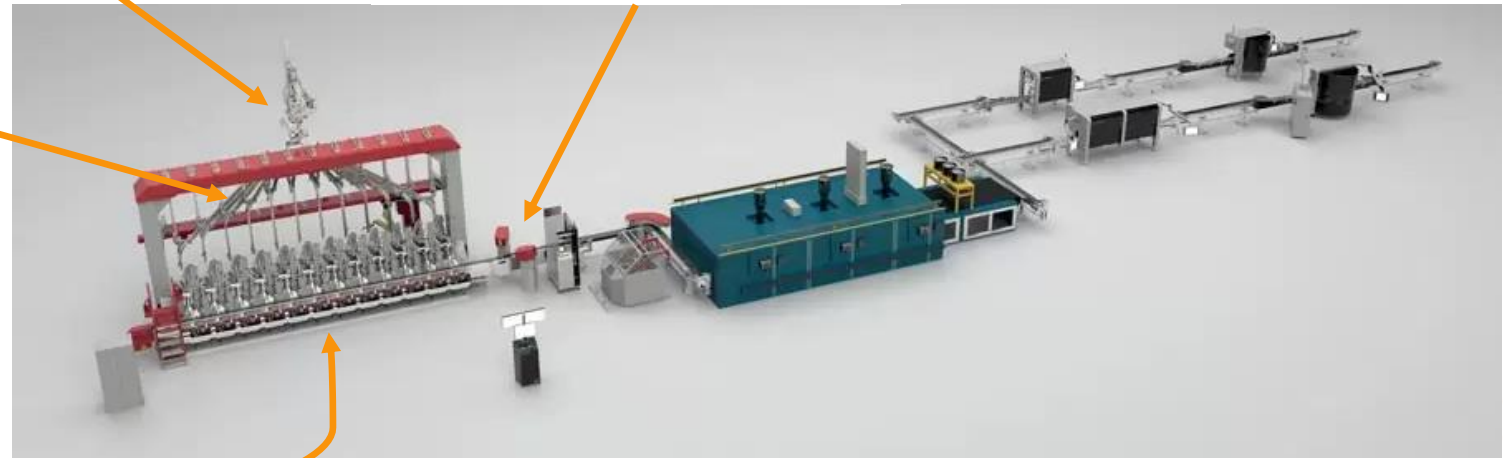
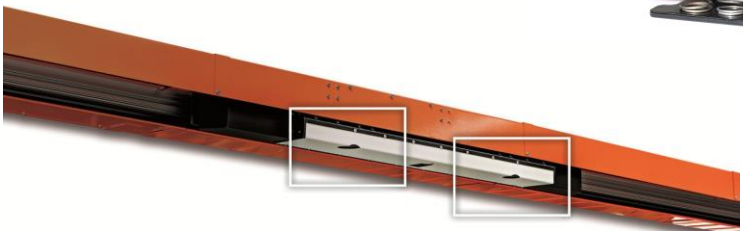
- A fully automated but supervised container glass forming process, resulting in near zero defects production, minimum variation in glass wall thickness and faster production of lighter containers, making glass more sustainable

Mission

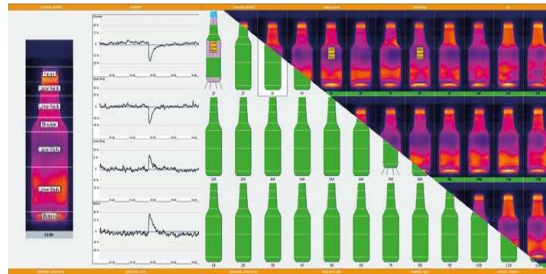
- We make it possible for container glass manufacturers to optimize their forming process in order to produce higher quality and lighter containers, at lower cost whilst being less dependent on people
- We focus on sensors, robotics, artificial intelligence and automation



XPAR technology



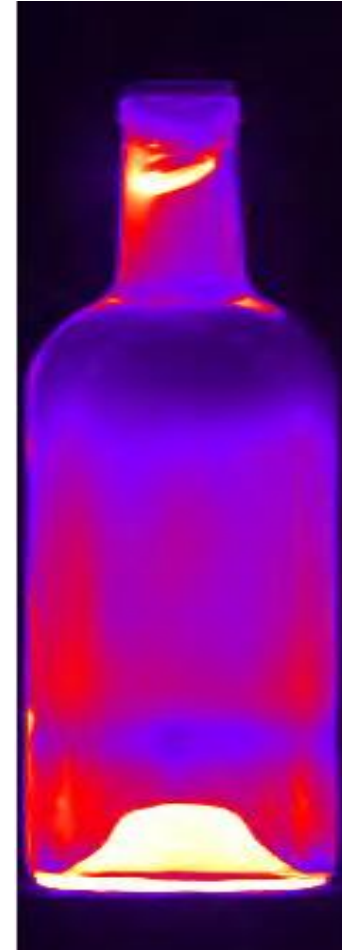
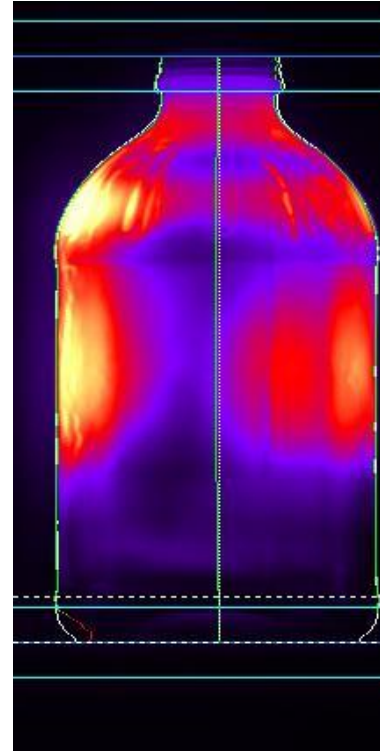
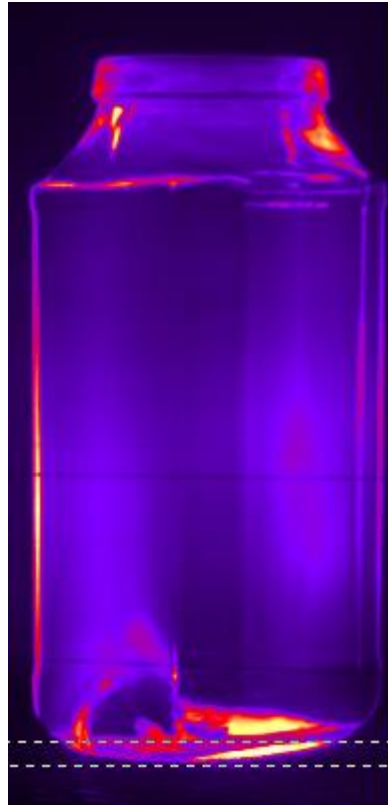
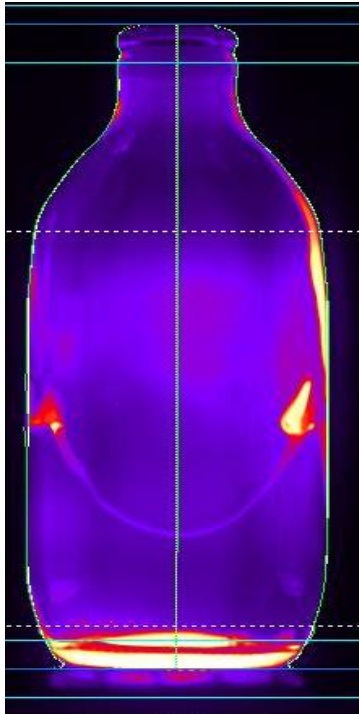
Bottle inspection and process monitoring



Per cavity, per bottle, real time, quality and process information

- Inspection
 - Bottle inspection
 - Reduced blocked ware / resorting
 - Improved quality to customer
 - Track and trace with Long Term Image Storage
- Process monitoring
 - Fast corrective actions on cavity performance and transport
 - Improved efficiency / pack to melt
- Process improvement & (automated) control
 - Automated control of ware spacing and vertical glass distribution
 - Faster job change, improved swabbing / section stop-start
- Multi gob/product/color/process

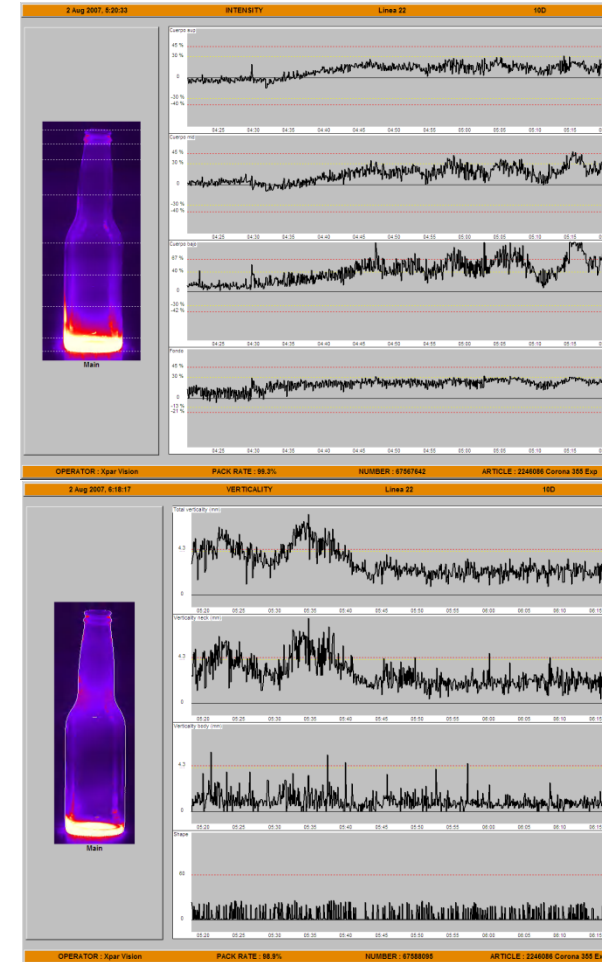
Critical defects



- These defects will lead to customer complaints.
- The IRD will reduce this risk very strong.



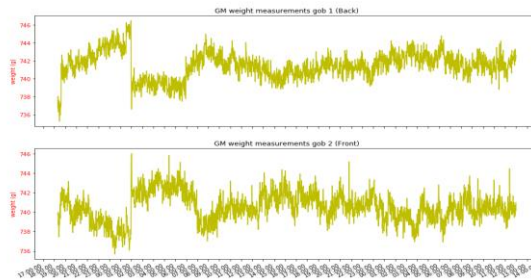
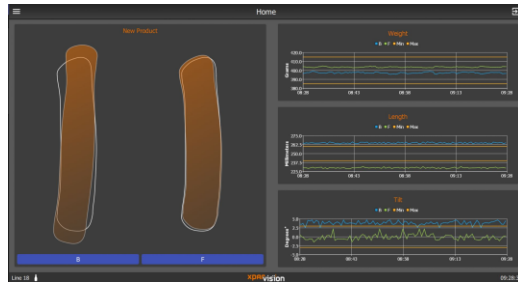
Process monitoring



The IRD is also a good tool to assist at the start up after the jobchange

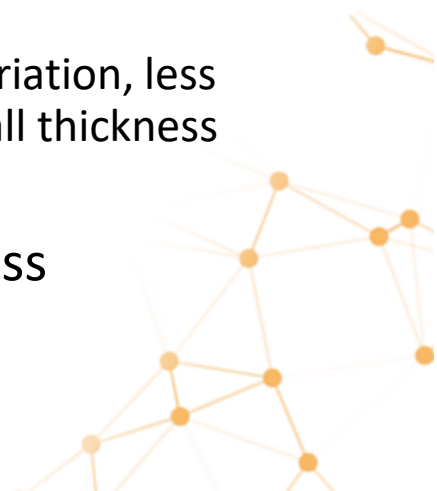


gob forming control

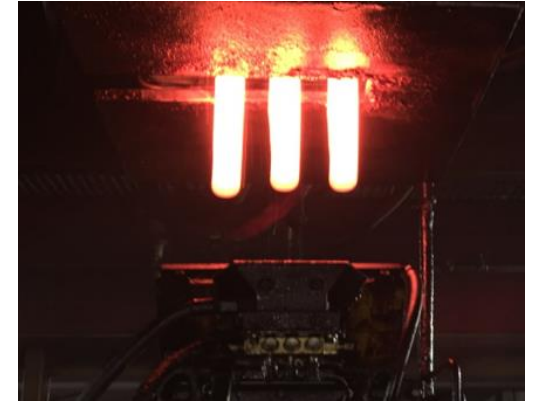
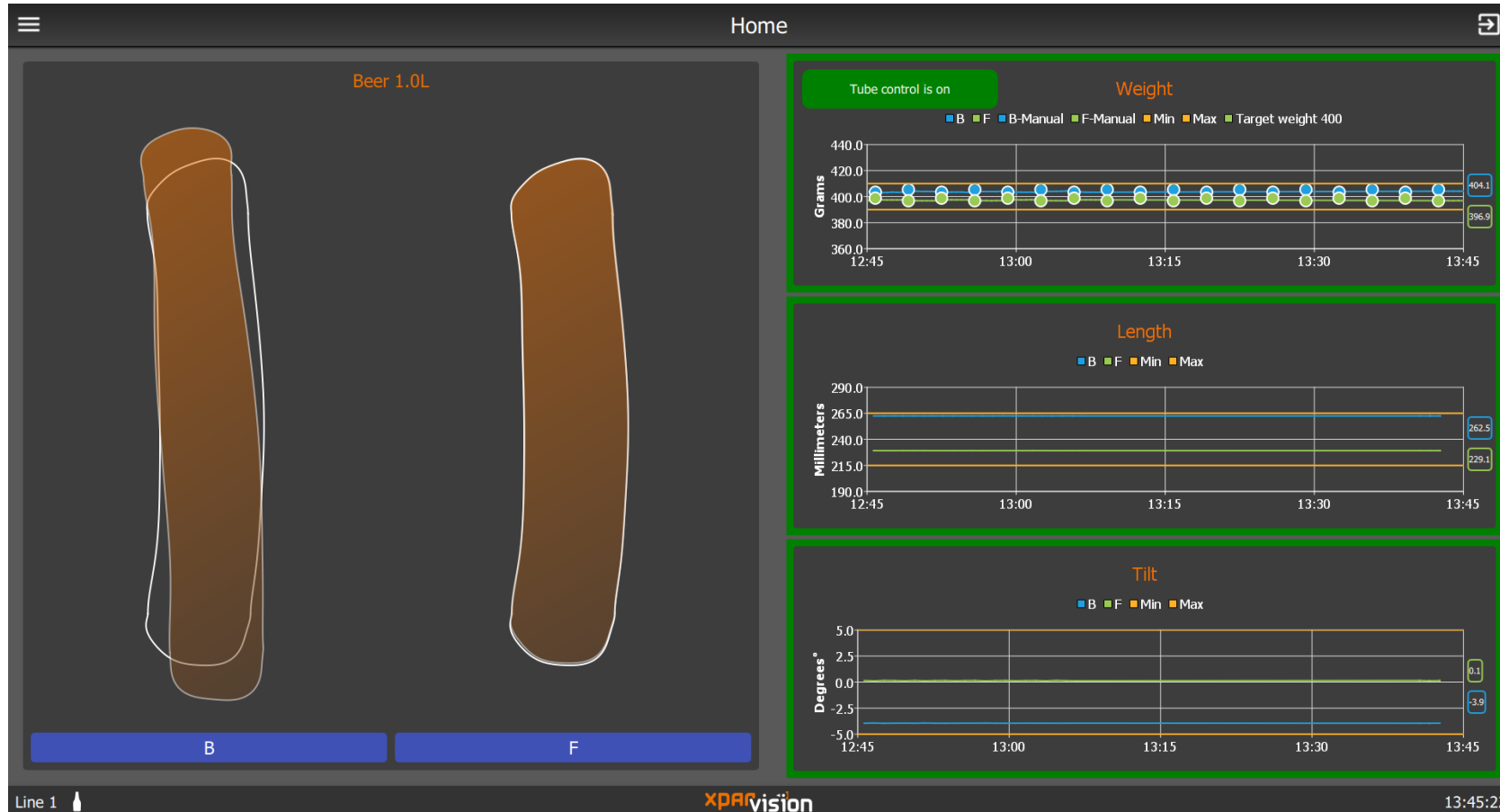


Per cavity, real time, quality and process information

- Process monitoring
 - Gob inspection and monitoring: length, volume, angle and shape
- Process improvement & (automated) control
 - Automated gob weight control through tube and needle adjustments
 - Faster job change, less weight variation, less defects produced, lower glass wall thickness variation
- Multi gob/product/color/process

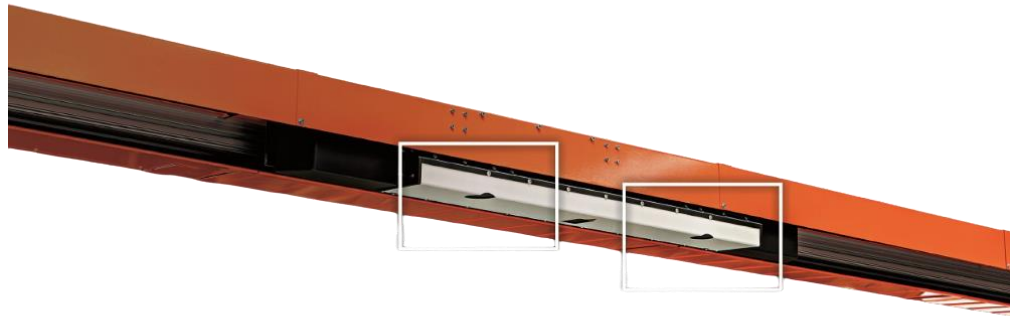


Measurements



- The main screen (Home) shows information of the Gobs just after cut.
- At the left the gobs are shown and on the right the measurements of the Gobs: measured weight, length and the tilt of the gobs.

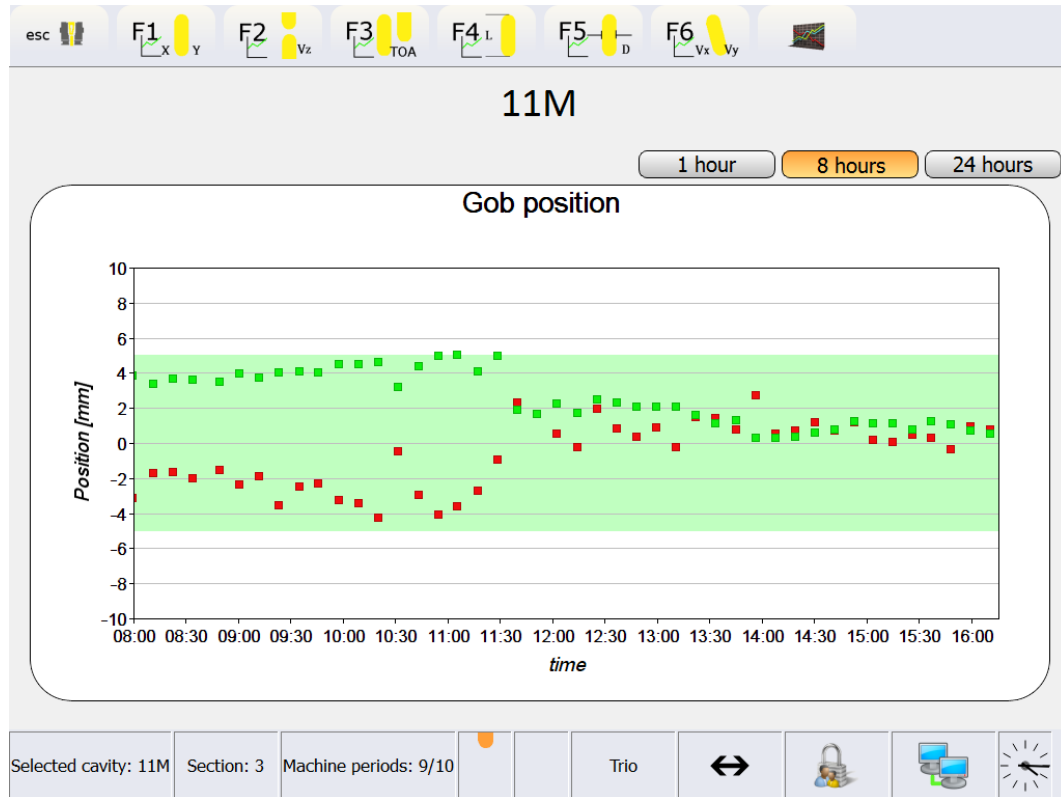
Loading & container forming control



Per cavity, real time, measuring quality and process information

- Process monitoring
 - Key quality and process information on gob loading (GA): length, position, speed, time of arrival, shape and orientation
 - Key quality and process information on blank temperatures (BTC): blank, plunger, neck ring and parison
- Process improvement & (automated) control
 - Automated controls of blank and plunger temperatures
 - Faster job change, less defects produced, lower glass wall thickness variation
- Multi gob/product/color/process

Poor GOB loading



26 Jun 2014, 16:10:16 Rejects are on PL41

Main

26 June 2014 00:47:15:48

Intensity Low Boden 11M Save Bitmap

TIME	MOULD	CAUSE	INFO
10:16:00	11M	HIGH Körper mitte	49.9 %
10:16:32	11M	HIGH Körper mitte	41.5 %
10:18:47	11M	HIGH Körper mitte	48.4 %
10:19:23	11M	Asymmetry Körp...	34.8 %
10:19:37	11M	HIGH Körper mitte	37.7 %
10:20:09	11M	LOW Hals unten	-59.6 %
10:20:22	11M	HIGH Boden	147.5 %
10:20:58	11M	HIGH Boden	122.7 %
10:26:06	11M	HIGH Boden	66.1 %

Satellite

	Main	Satellite	DualCam
26-06-2014 / 10:20:58			11M
Rejected	Intensity ...		Intensity ...
Processing Time, TTR	61 ms 1136 ms	79 ms 683 ms	-- ms 683 ms
Cam Angle / Ware pos	-90.0°	53.1°	0.7 mm
Width	60.1 mm	60.1 mm	60.1 mm
	Intensity	Asymmetry	
Mdg	-4 %	2 %	
Hals oben	-34 %	10 %	
Hals unten	-80 %	14 %	
Schulter	-65 %	17 %	
Körper oben	-20 %	12 %	
Körper mitte	31 %	16 %	
Körper unten	83 %	17 %	
Boden	122 %	16 %	
Verticality			
Total	4.1 mm	4.2 mm	4.4mm -22°
Hals	2.2 mm	1.8 mm	2.2 mm
Körper	2.0 mm	2.5 mm	2.5 mm

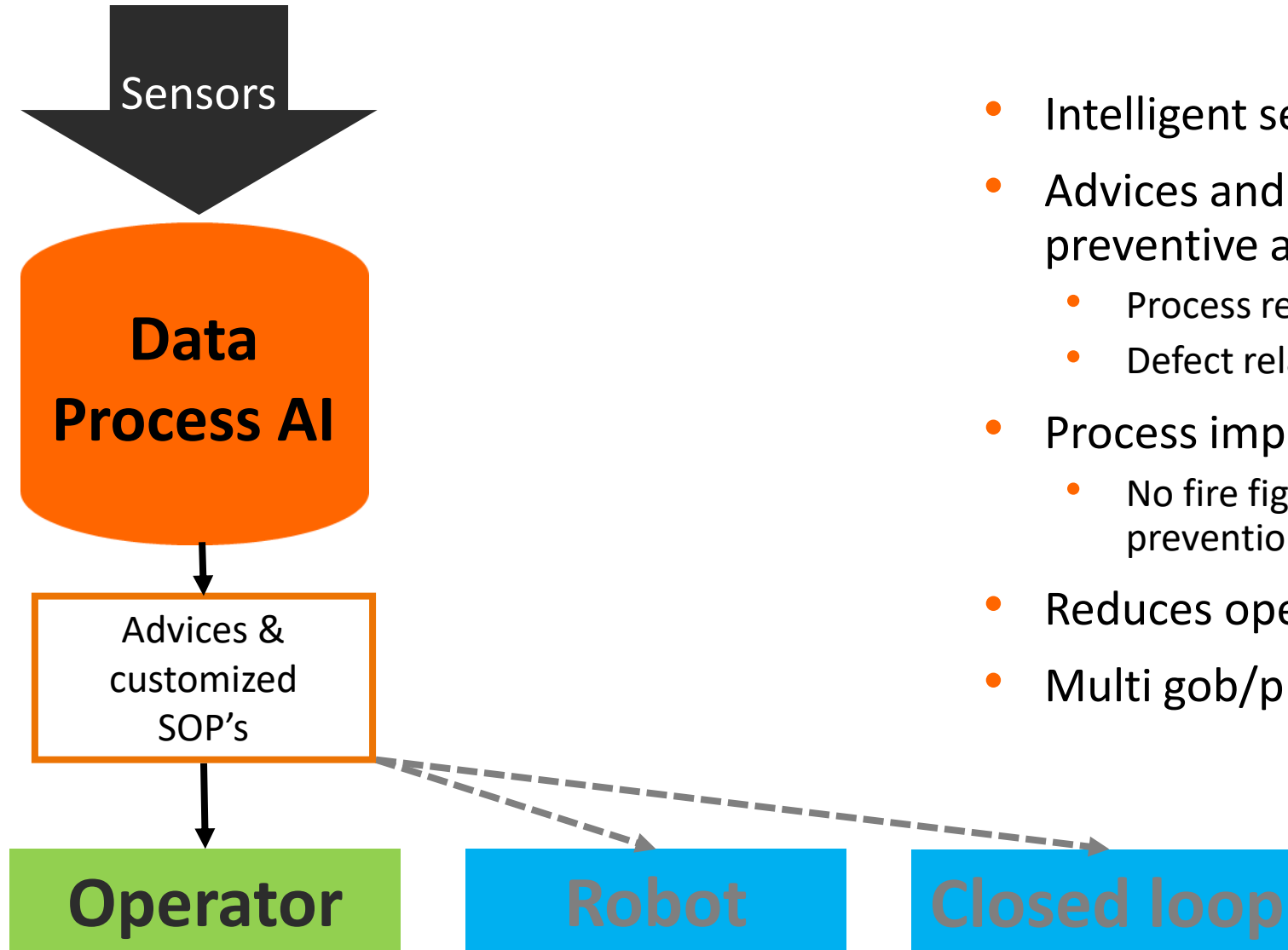
Operator: XPAR Vision Pack Rate: 98.1% Number: 359854454 Article: 311313 33cl Holsten TC

Typical for position: Poor glass distribution in shoulder and body.

The opportunity

- AI plays an important role in streamlining operations through digitally observing production/process data and based thereon managing and directing production activities. (Productivity/efficiency improvements)
- AI emerges as a data detective, unveiling unknown anomalies/insights and performing precise predictions. (Data Science)

Process AI: operator assistance – one UI



- Intelligent sensor data analyses
- Advices and customized SOP's for preventive and corrective actions
 - Process related
 - Defect related
- Process improvement & control
 - No fire fighting, early warning, focus on prevention
- Reduces operator workload
- Multi gob/product/color/process



Value proposition for ProcessAI

- Provides “digital consultant” assistance to the operator (move in direction of skilled to unskilled)
- Improved process control through anticipation (leads to higher productivity)
- Provides a means to standardize and monitor operator workflows (leads to higher embedding and controlled operations)
- Provides a means to aggregate multiple sensor UI’s and holistically bring interpreted data to the operator (leads to improved and consistent workflows)

Validation example

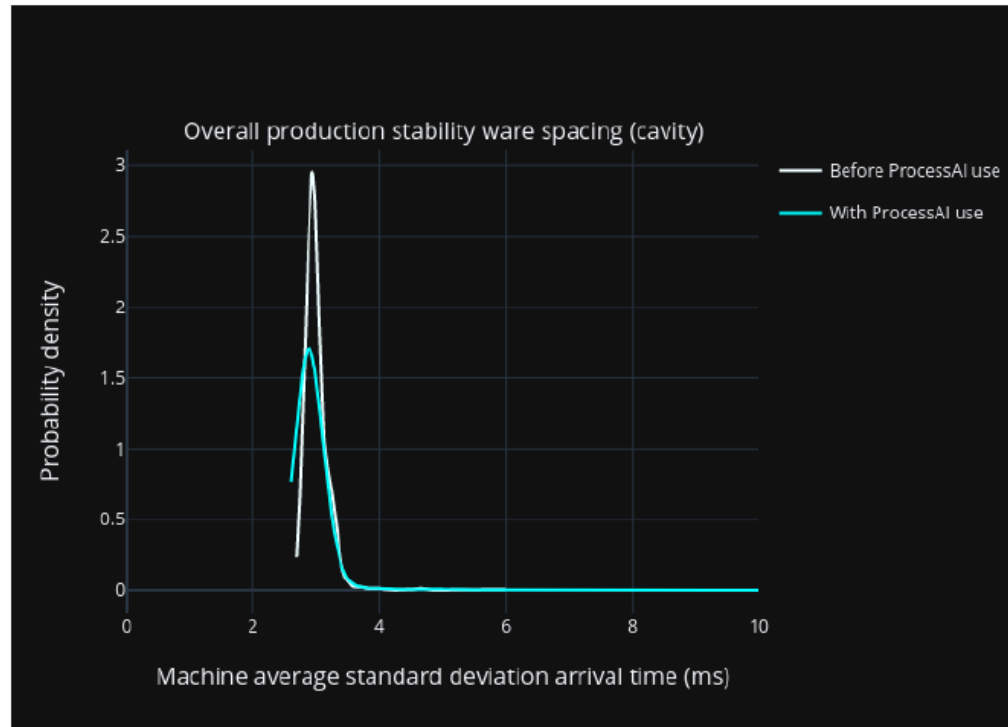
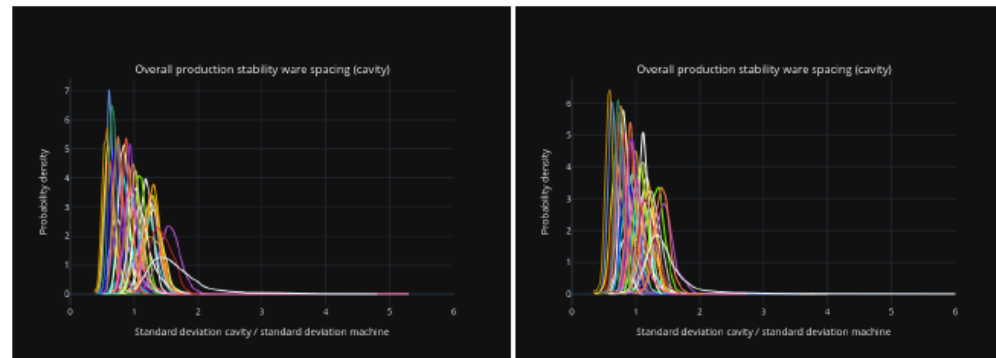


Figure 3.1: Graph showing the overall machine average standard deviation for the bottle timing.

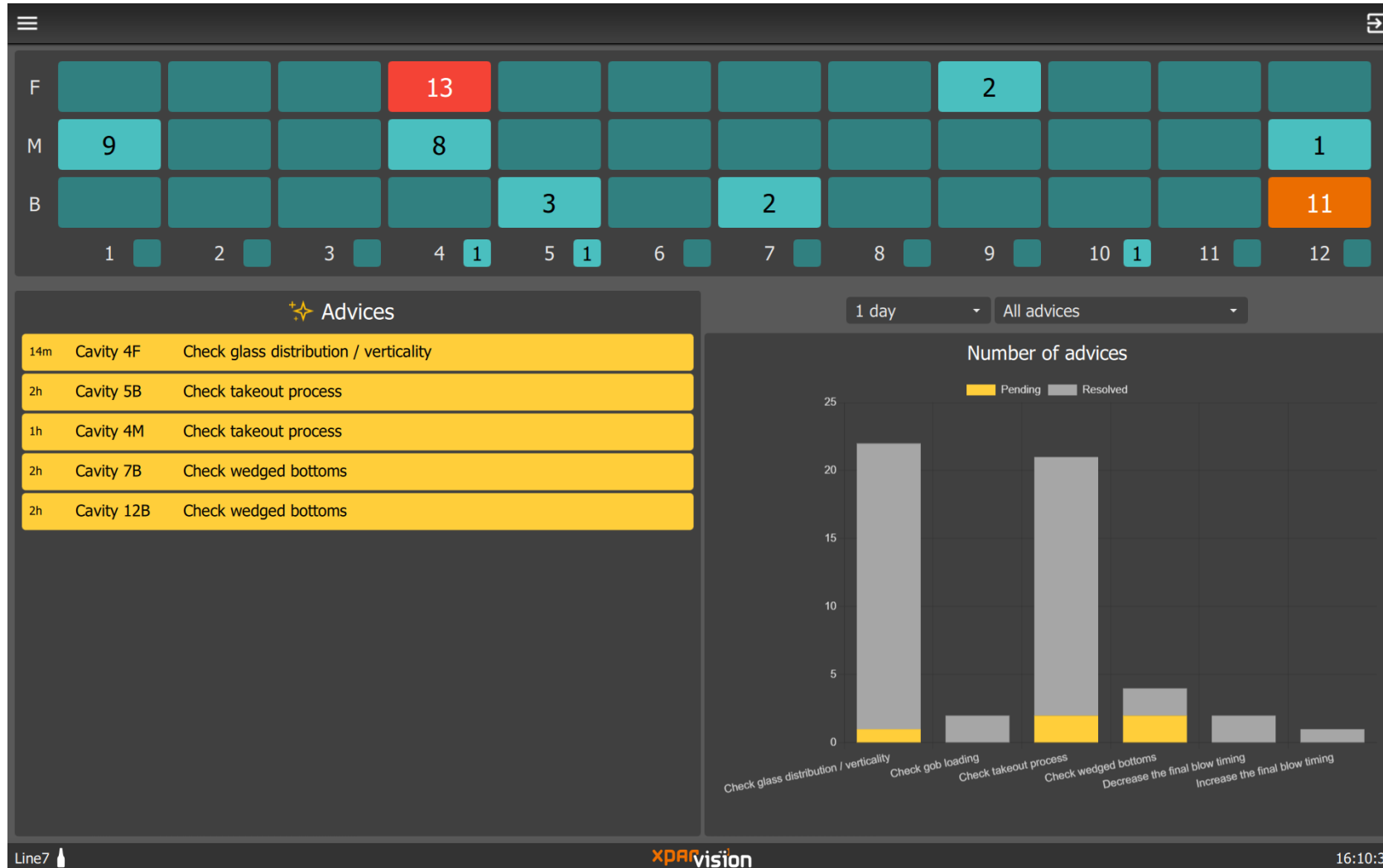


(a) Before

(b) After

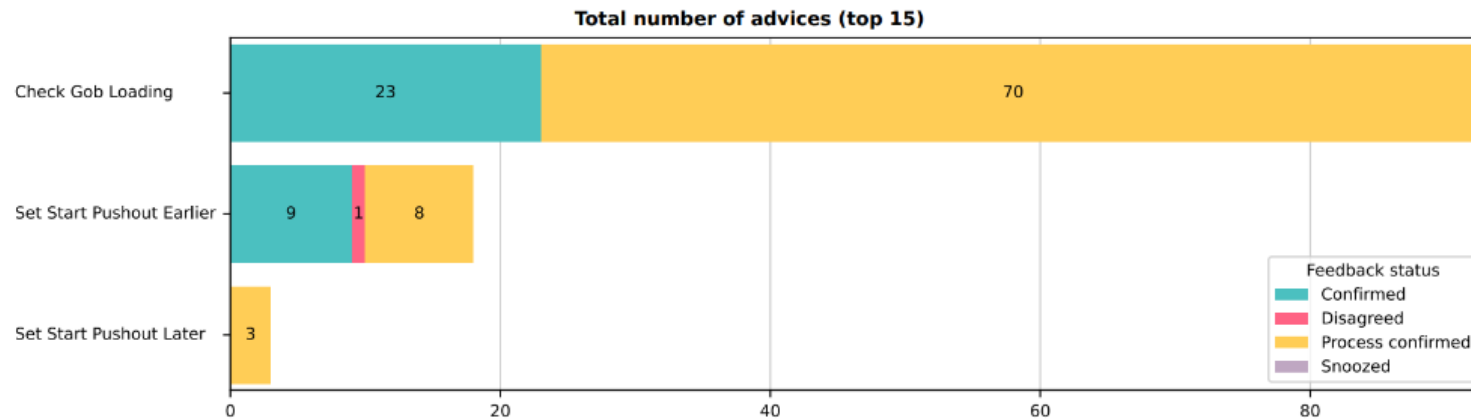
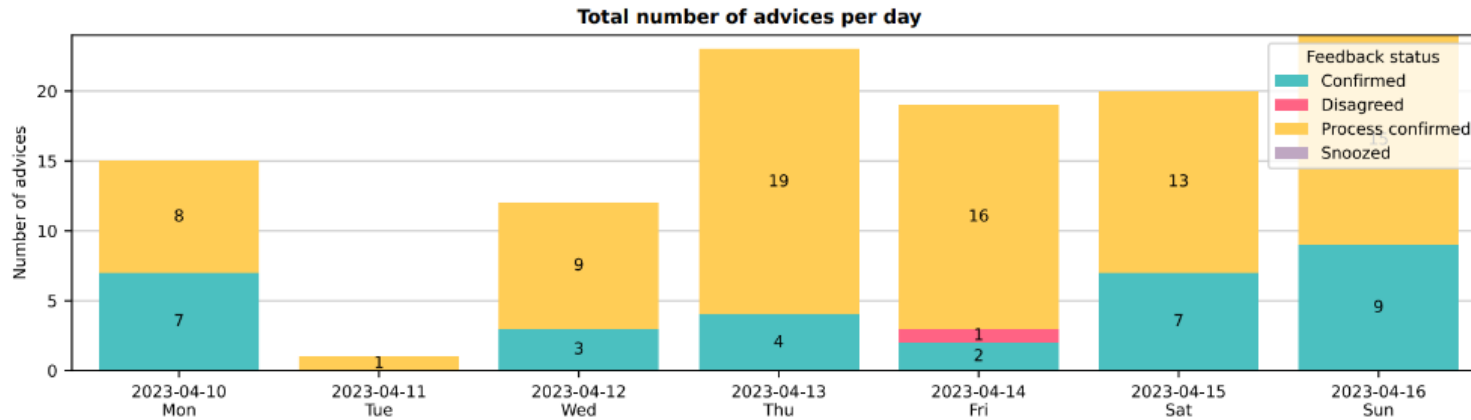


Operator interface



Automated reporting – advice statistics over period

ProcessAI User Awareness



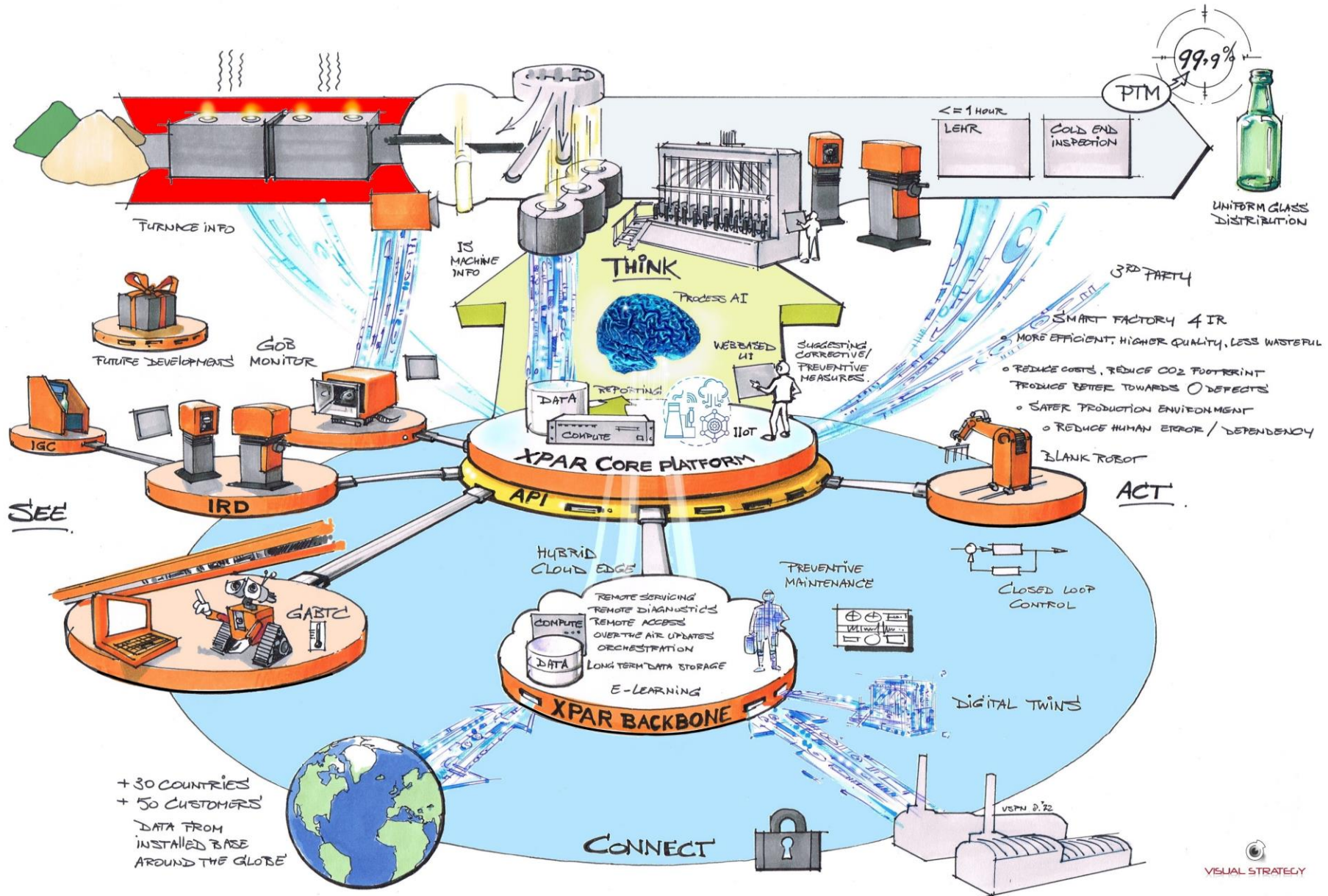
Automated reporting – worst performing sections per advice type

Line overview: Top 3 most occurring advices

#0 - Check Gob Loading

Linea F3: 93											
M1: 93											
S1: 5	S2: 3	S3: 7	S4: 9	S5: 3	S6: 17	S7: 3	S8: 5	S9: 2	S10: 7	S11: 6	S12: 26
B: 1	B: 1	B: 1	B: 3	B: 3	B: 2	B: 1	B: 1	B: 2	B: 3	B: 1	B: 4
M: 3	M: 1	M: 2	M: 6	M: 0	M: 9	M: 1	M: 2	M: 0	M: 3	M: 4	M: 4
F: 1	F: 1	F: 4	F: 0	F: 0	F: 6	F: 1	F: 2	F: 0	F: 1	F: 1	F: 18

SENSE-THINK-ACT-CONNECT all coming together



- Fill an ETL pipeline with 650+ lines worth of data
- Use ProcessAI modules as production quality indicators
- Let the data speak, use Data Science to study subprocess impact on product quality
- Compare the industry on different productions lines with different automations levels:



Consultancy for production
optimization (Data Science)

Leading to targeted sales

Opening the way to
performance based
business models





Thank you!

Bright ideas.
Better glass.

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