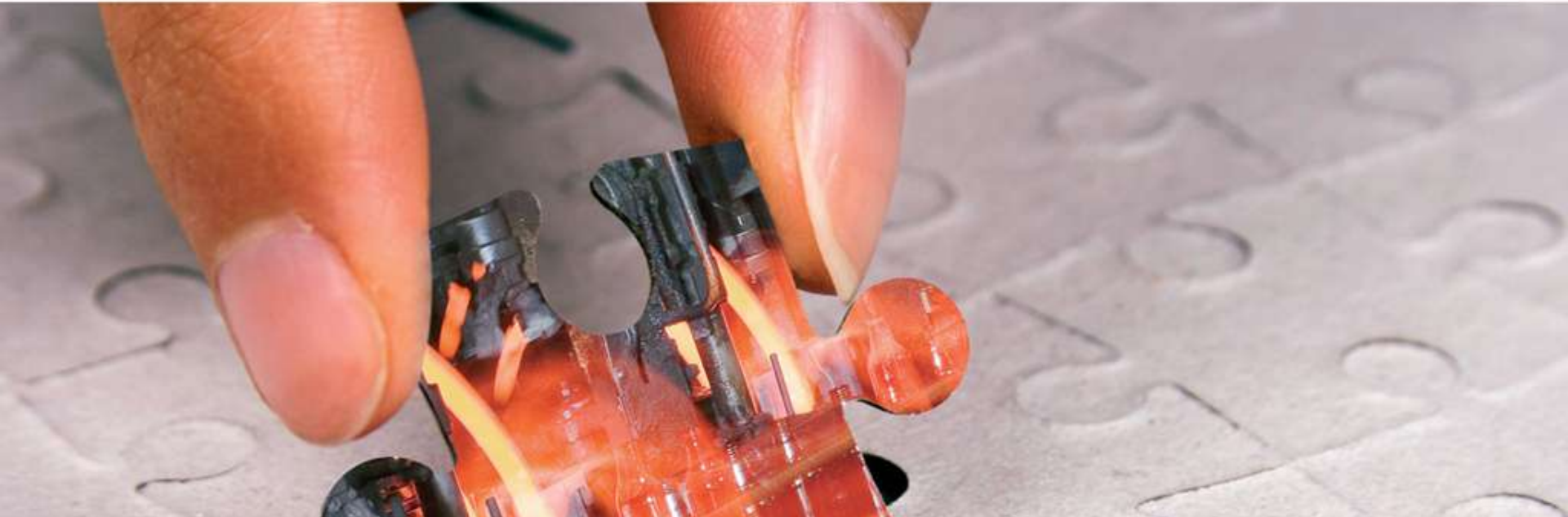


xPARvision

hEADING for perfection



Billions to gain

AGENDA

- **Introduction to XPAR Vision**
- Portfolio
- IR-D capabilities and customer gains
- IGC capabilities and customer gains
- Gob Assist capabilities and customer gains
- BTC capabilities and customer gains
- Conclusion

Introduction to XPAR Vision

- Global container glass industry
- Hot End inspection and forming process control
- Development and implementation – customer support
- Innovative & technology leader
- Decades of experience

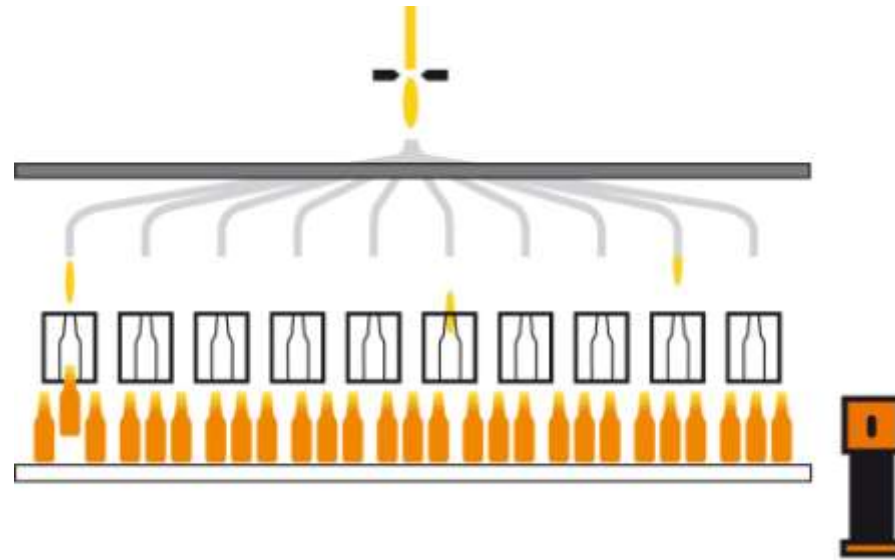
XPAR Vision references



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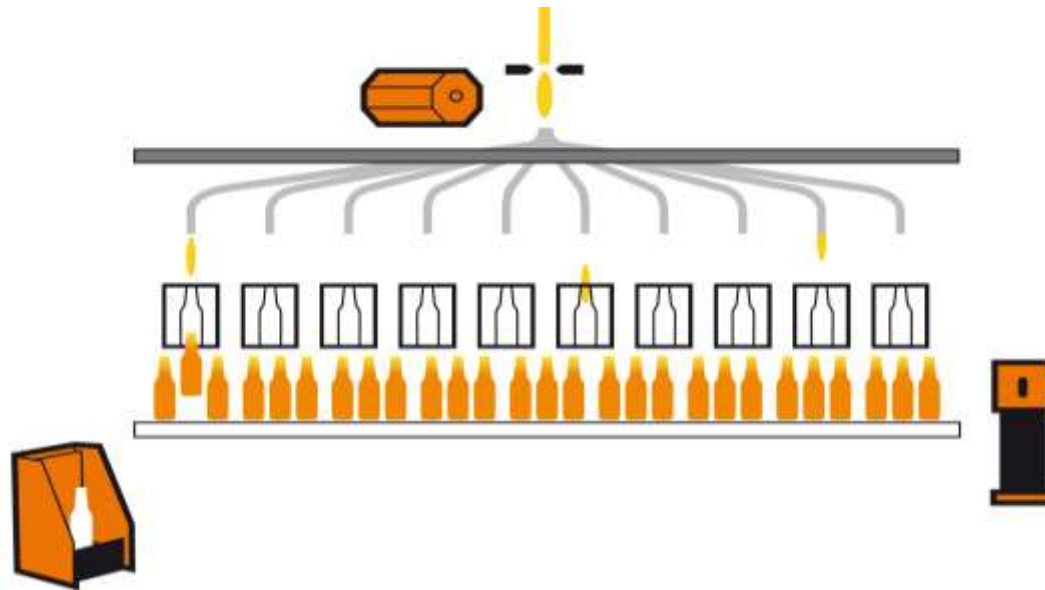
Introduction to XPAR Vision product portfolio



IR-D

Hot end infrared camera solution for inspection, process monitoring and quality control

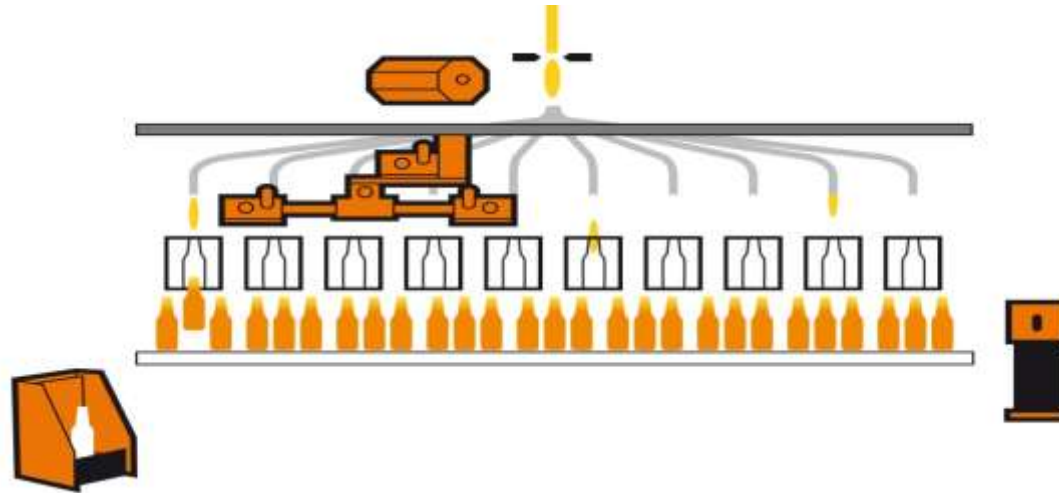
Introduction to XPAR Vision product portfolio



IGC

Hot end solution for monitoring and automated controlling the weight of the gob for process and quality control

Introduction to XPAR Vision product portfolio



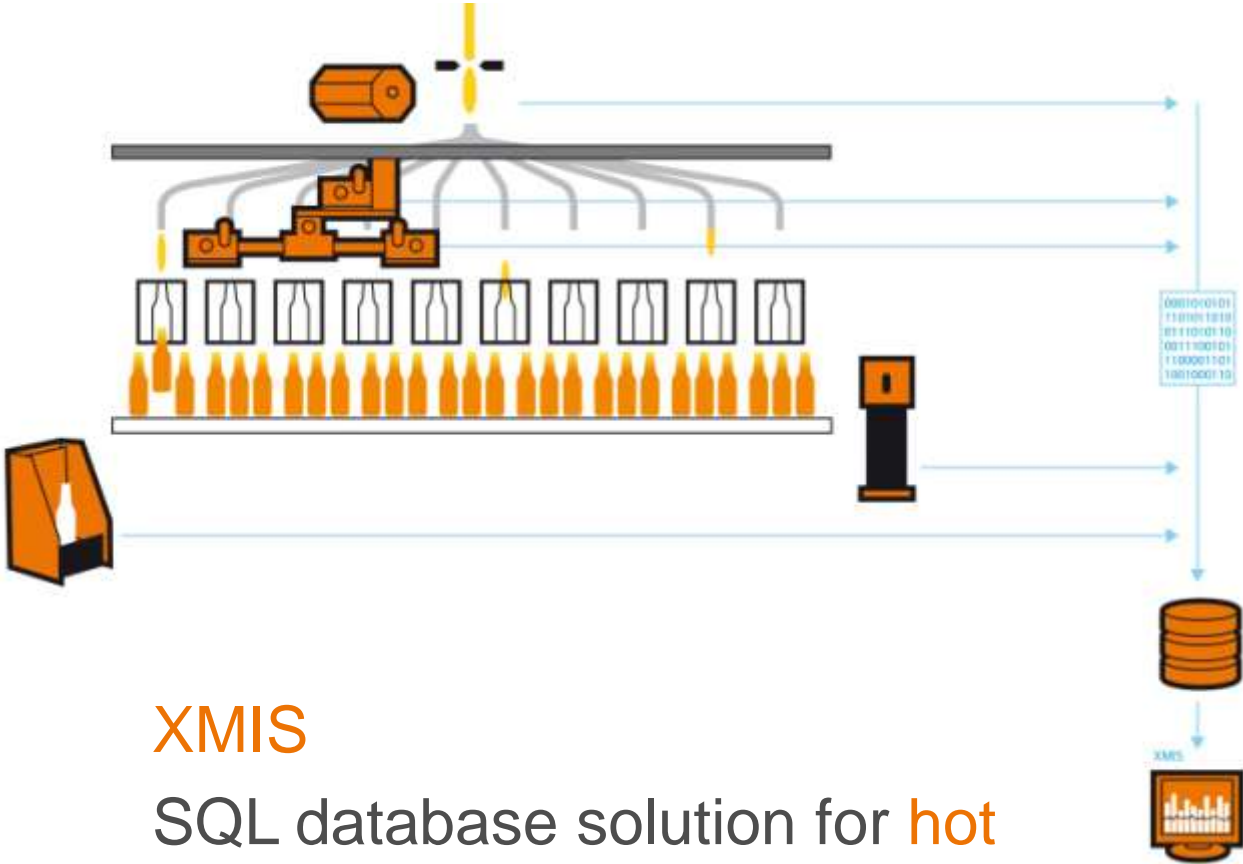
Gob Assist

Hot end camera solution for monitoring and controlling the gobloading for process and quality control

BTC

Hot end sensor solution for monitoring and controlling the temperature of the blank mould, neckring, plunger, gob and parison

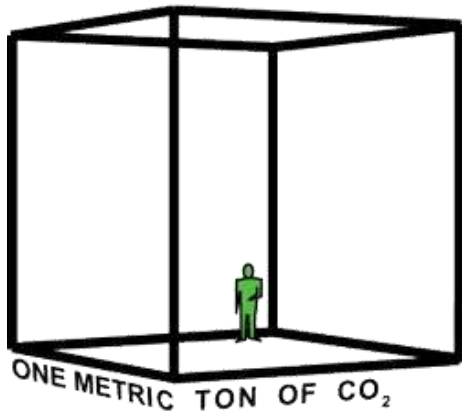
Introduction to XPAR Vision product portfolio



XMIS

SQL database solution for hot end analyzing and reporting

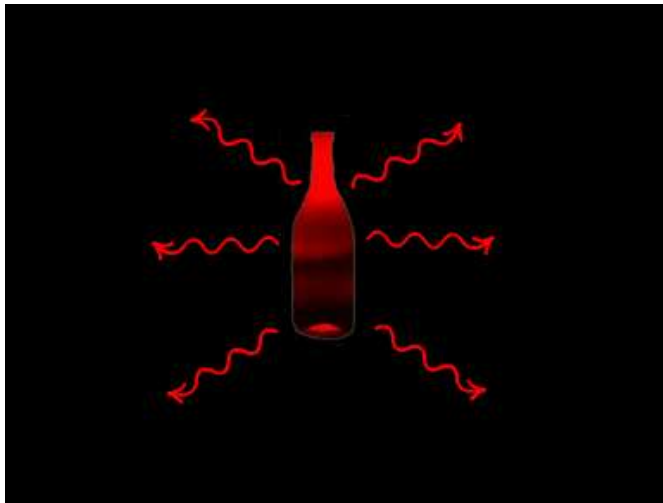
Billions to gain



AGENDA

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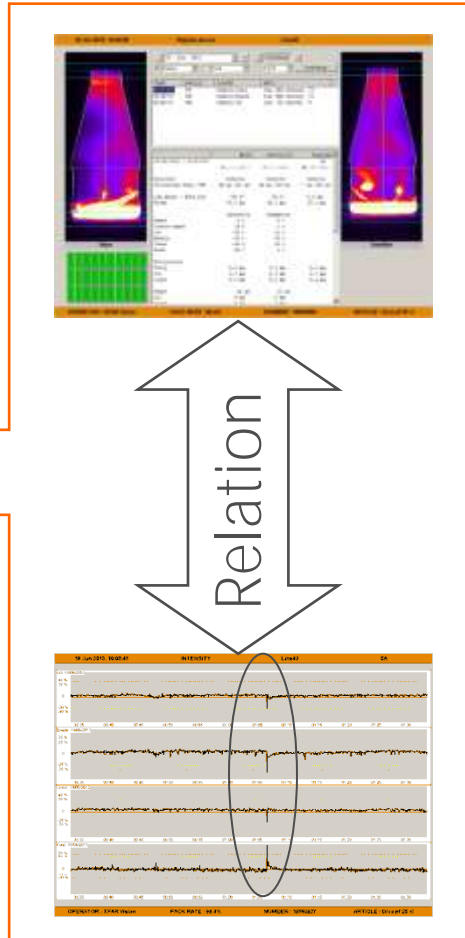
XPAR IR-D: InfraRed Dual camera system



XPAR IR-D capabilities

Product focus

- Bird swing
- Thin spot
- Thin bottom, neck, wall
- Chocked neck
- Wedged bottom
- Freak
- Stuck ware
- Inclusion
- Shape
- Verticality
- Fin

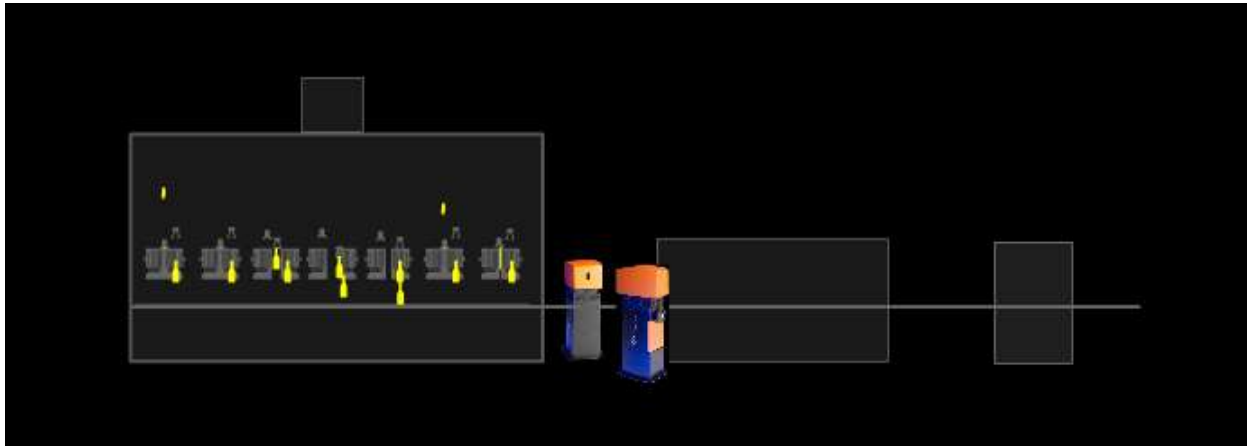


Process focus

- Swabbing
- Loading
- Section performance
- Ware handling
- Cooling
- Speed
- Mould condition/design
- Gob temperature
- Section stop-start
- Job change

XPAR IR-D gains

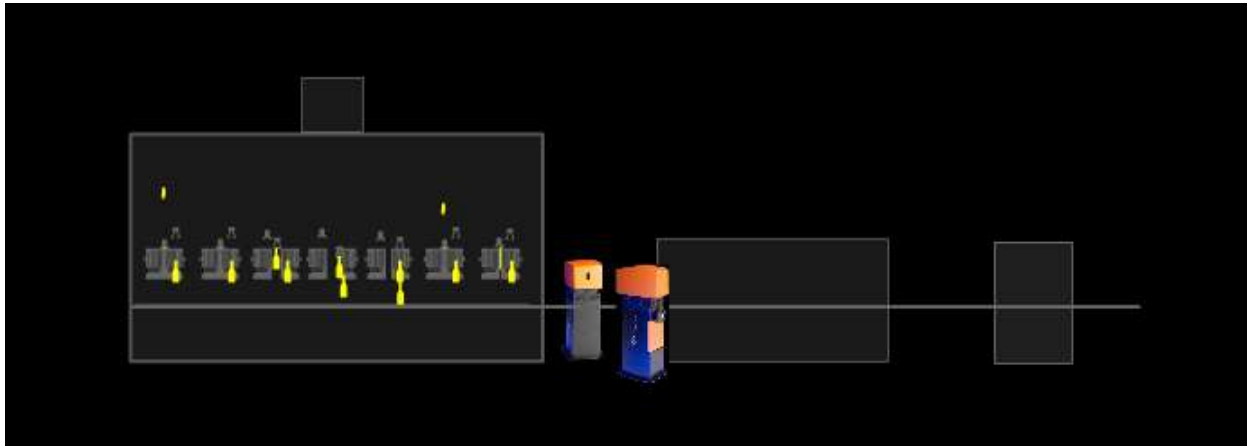
- Improved ware spacing



1% – 4%

XPAR IR-D gains

- Reduced held ware / blocked ware / resorting

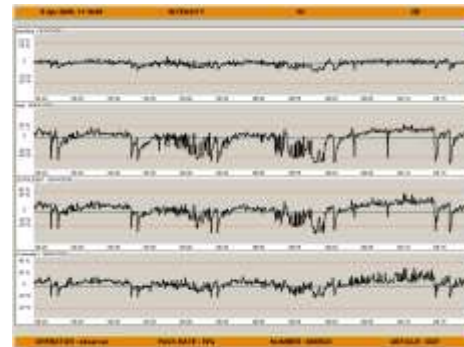
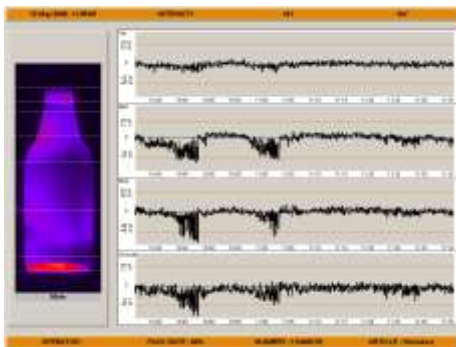
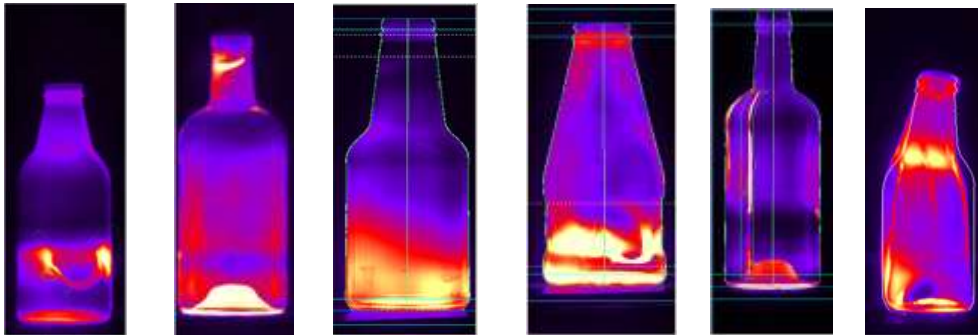


Time	Product	Status	Defect
10:00:00	01	OK	
10:00:01	02	OK	
10:00:02	03	OK	
10:00:03	04	OK	
10:00:04	05	OK	
10:00:05	06	OK	
10:00:06	07	OK	
10:00:07	08	OK	
10:00:08	09	OK	
10:00:09	10	OK	
10:00:10	11	OK	
10:00:11	12	OK	
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10:00:49	50	OK	
10:00:50	51	OK	
10:00:51	52	OK	
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10:00:53	54	OK	
10:00:54	55	OK	
10:00:55	56	OK	
10:00:56	57	OK	
10:00:57	58	OK	
10:00:58	59	OK	
10:00:59	60	OK	

50%-80%

XPAR IR-D gains

- Reduced specific rejects by improved process performance, reduced sections stops

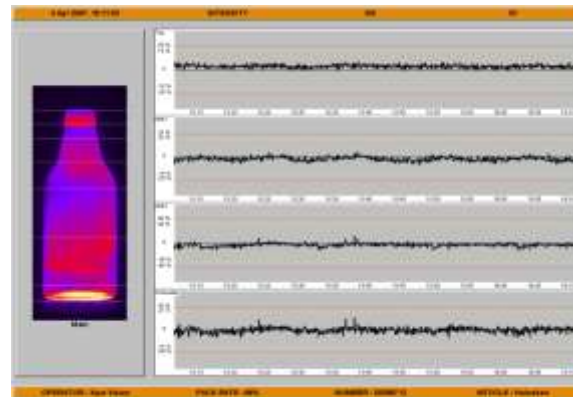
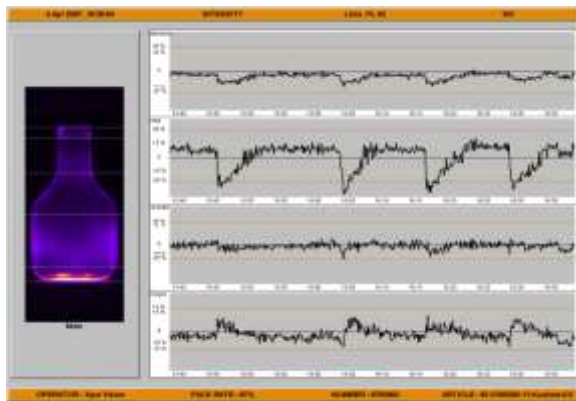


Customers
reclamations
Cost of poor
quality

2%-10%

XPAR IR-D gains

- Improved swabbing, creating consistency amongst operators

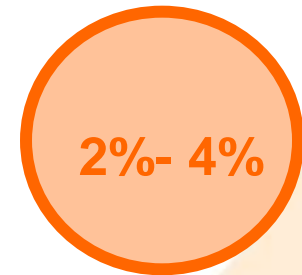
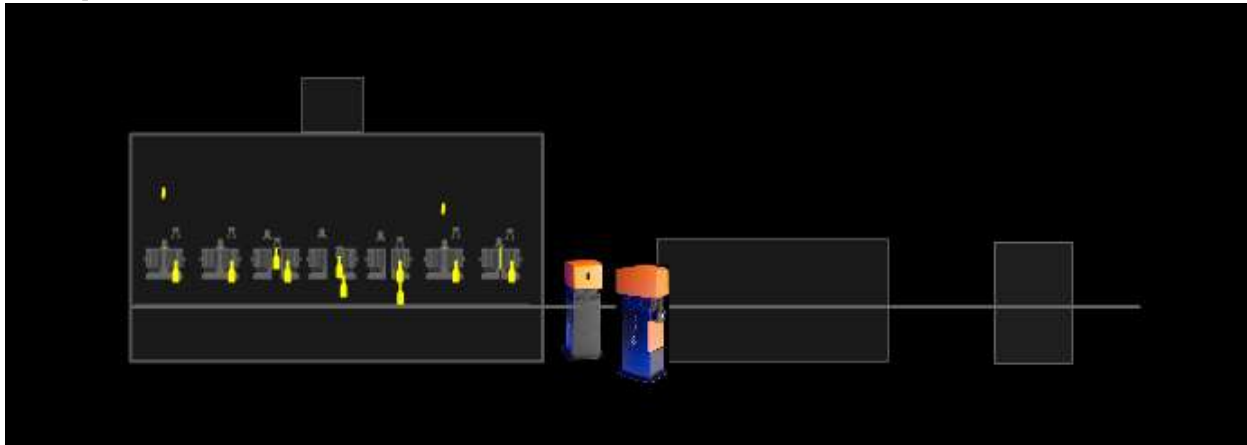


Health
Safety
Wellbeing

1%-2%

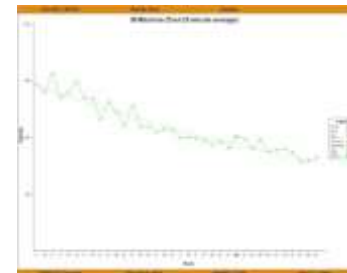
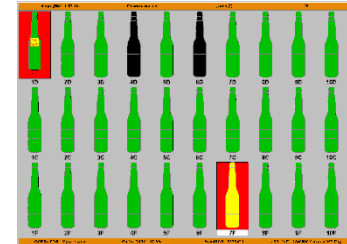
XPAR IR-D gains

- Time gain due to quicker intervention leads to improved process performance, reduced section stops



XPAR IR-D gains

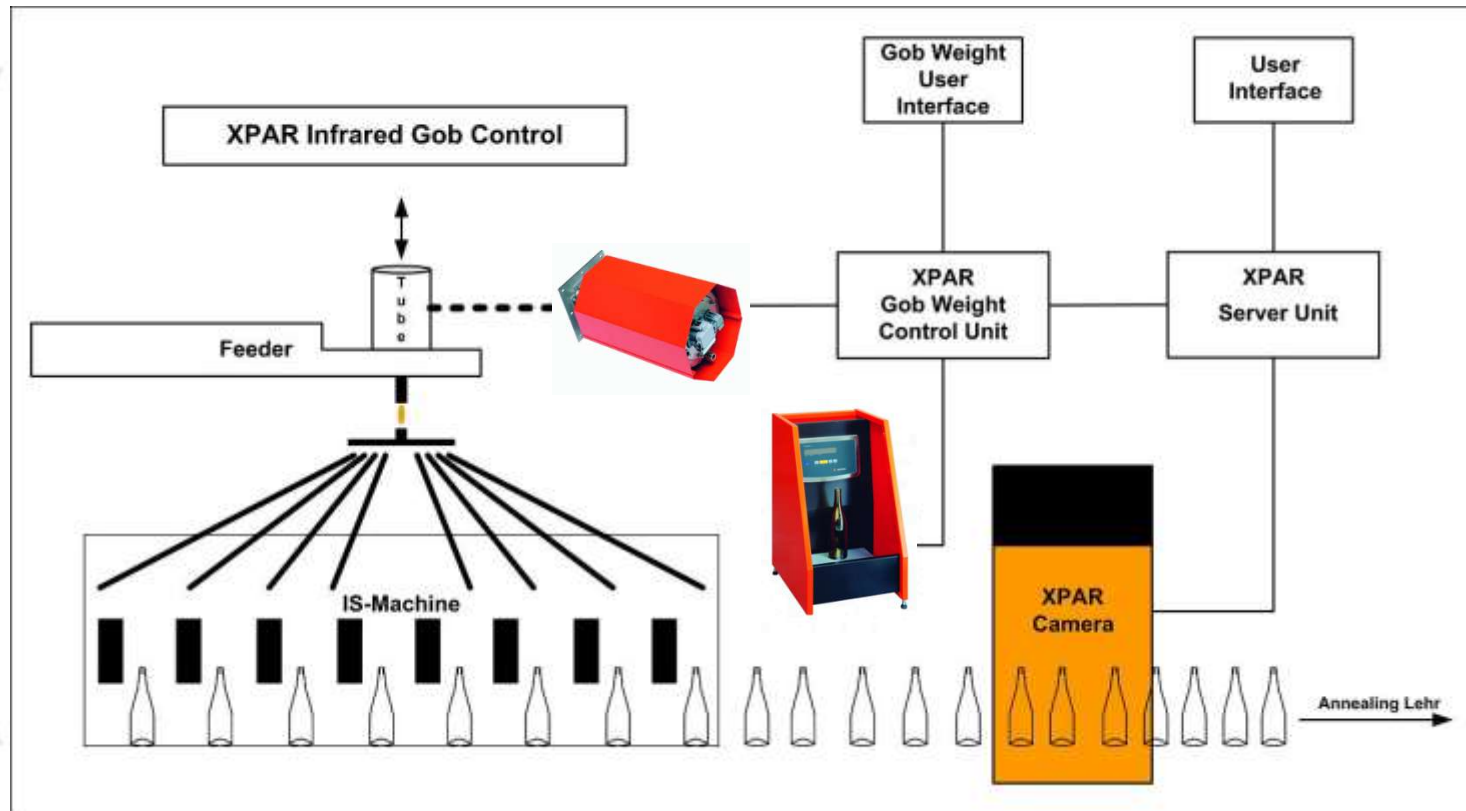
- Improved job change → much shorter ramp up time
- Transport screen → reject stuck ware
- Overview screen → react on alarm
- Machine graph → stabilize machine
- Hand over



AGENDA

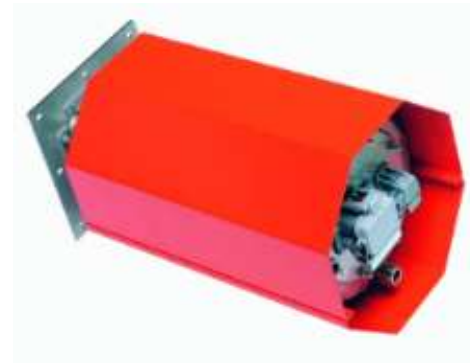
- Introduction to XPAR Vision
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XPAR IGC: Infrared Gobweight Control system



XPAR IGC capabilities

- Automated control of weight of all gobs - operator independent
- Accurate weight control $< 0.5\%$ of the weight
- Robust and reliable



XPAR IGC gains

- Reduce weight variation: glass usage, defects, stable forming process
 - Accuracy 0,2% – 0,3%
 - Maximum reduced weight variation from 3 % to 0,4%



3%

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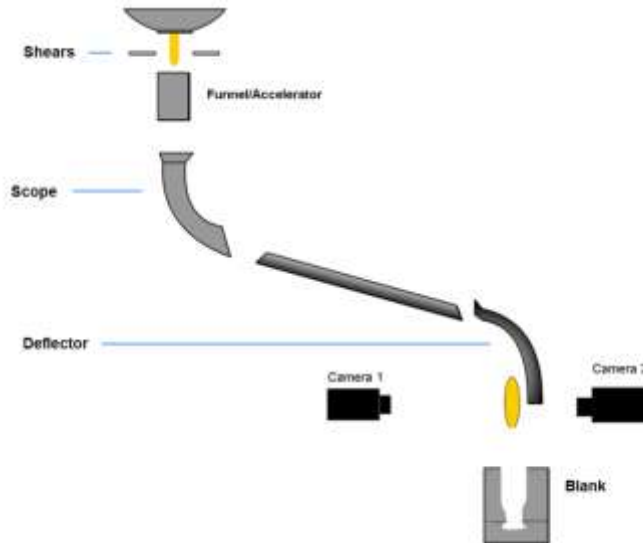
XPAR GA/BTC

- GA: Gob Assist
- BTC: Blank side Temperature Control

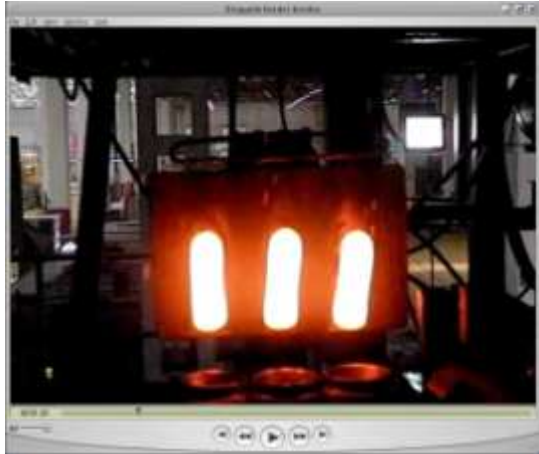


XPAR GA capabilities

- Position into the blank mould
- Speed
- Length
- Shape
- Diameter
- Orientation
- Time of Arrival



XPAR GA capabilities → gob length

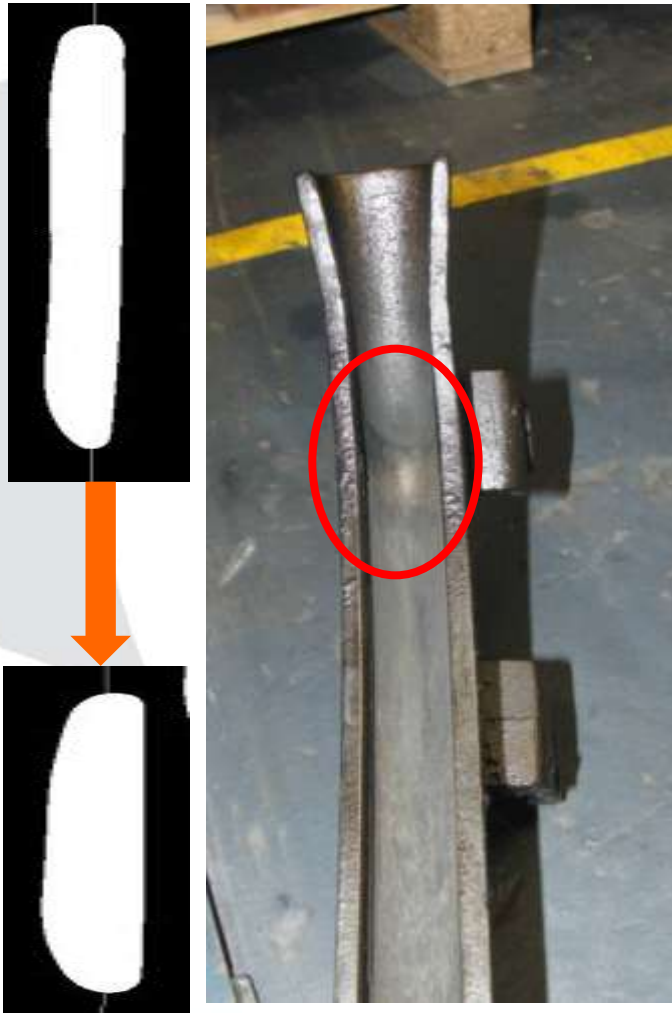


After cut, gobs seems to be equal



during descend variations occurs, length, shape and diameter can be very different when they arrive at the blank

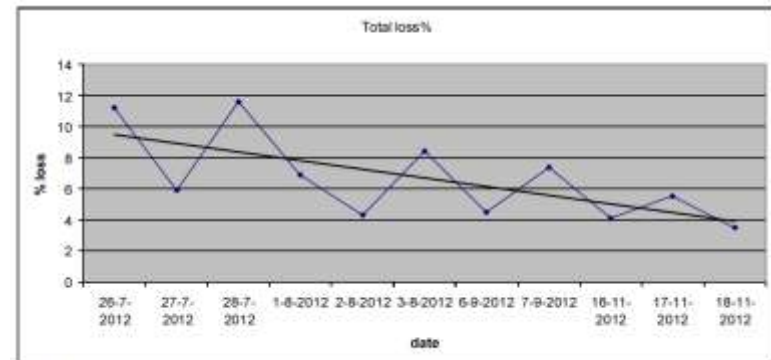
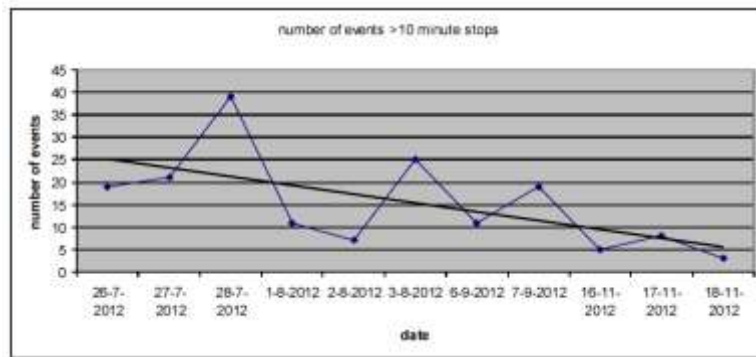
XPAR GA capabilities → gob length



- Gob length strongly relates to friction
- Critical point: entrance into the deflector
- Effective remedies:
 - Lubrication/swabbing/cooling
 - Coating and design
- Other learnings:
 - Relation between length, shape and diameter
 - Friction relates strongly to speed and time of arrival
 - Low friction: higher speed, correct diameter and correct loading and TOA
 - High friction: lower speed, uncorrect diameter and incorrect loading and TOA

XPAR GA gains

- Length, shape, diameter (speed, ToA)
 - Less uncontrolled sections stops (left chart)
 - Reduced losses (right chart)
 - Improved material life time



Graph 1: Total loss in % for 'Missing bottles' for line C5

- Position
 - Improved life time of material/coating
 - Reduced swabbing (max. 50%)
 - Improved quality

XPAR GA gains

- Improved efficiency
- Improved quality
- Improved know how
- Reduced operator workload
- Improved safety

Health
Safety
Wellbeing

2%-4%

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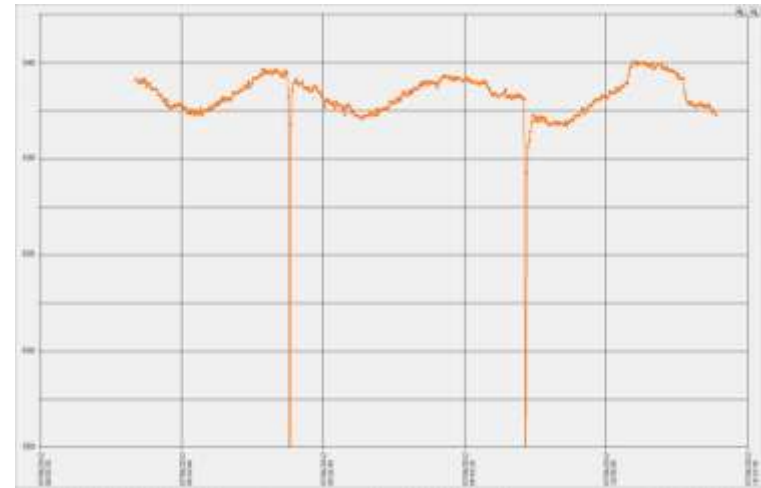
XPAR BTC capabilities

- Blank mould's
- Neck ring's
- Plunger
- Gob
- Parison

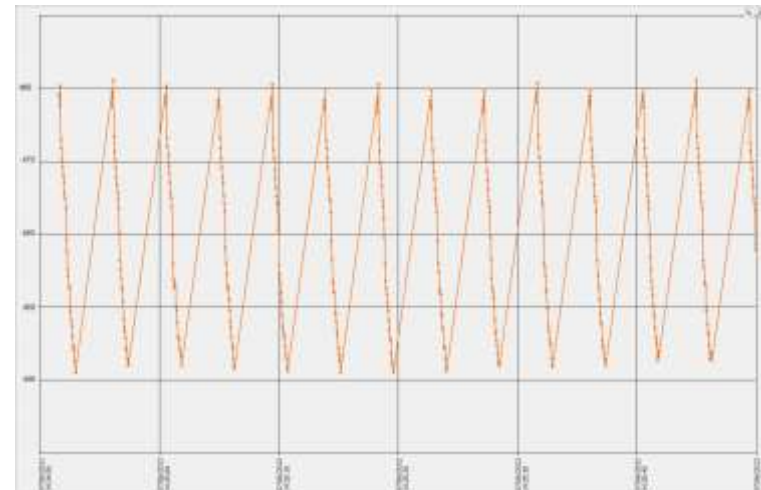


XPAR BTC capabilities

Plunger temperature
day/night



Mould temperature Δ
40° C within one
cycle



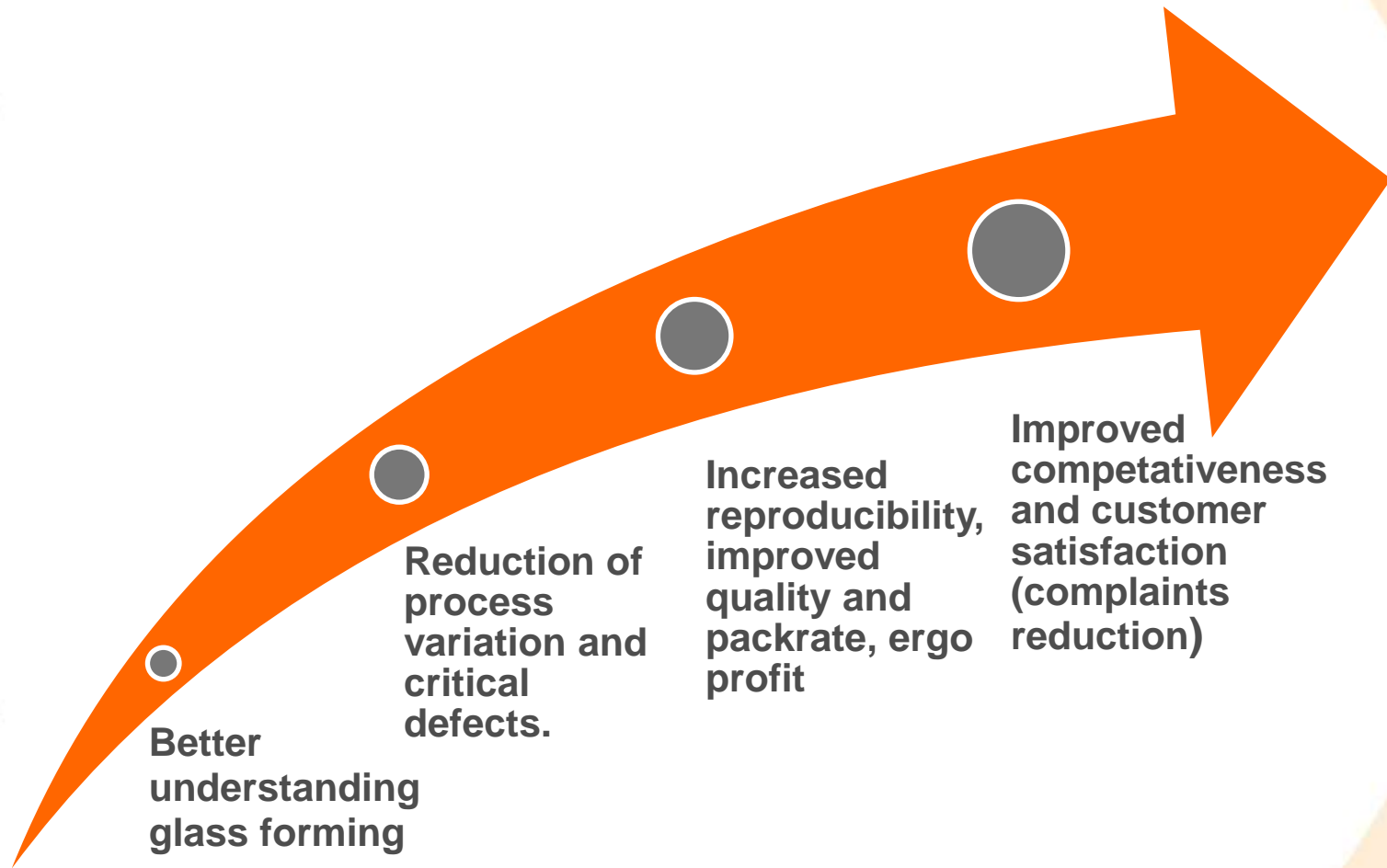
XPAR BTC gains

- High accuracy measurement
 - Timing + Position always the same.
- Findings
 - Defective plungers easier recognized
 - Differences between left and right mould's
 -
 -

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- **Conclusion**

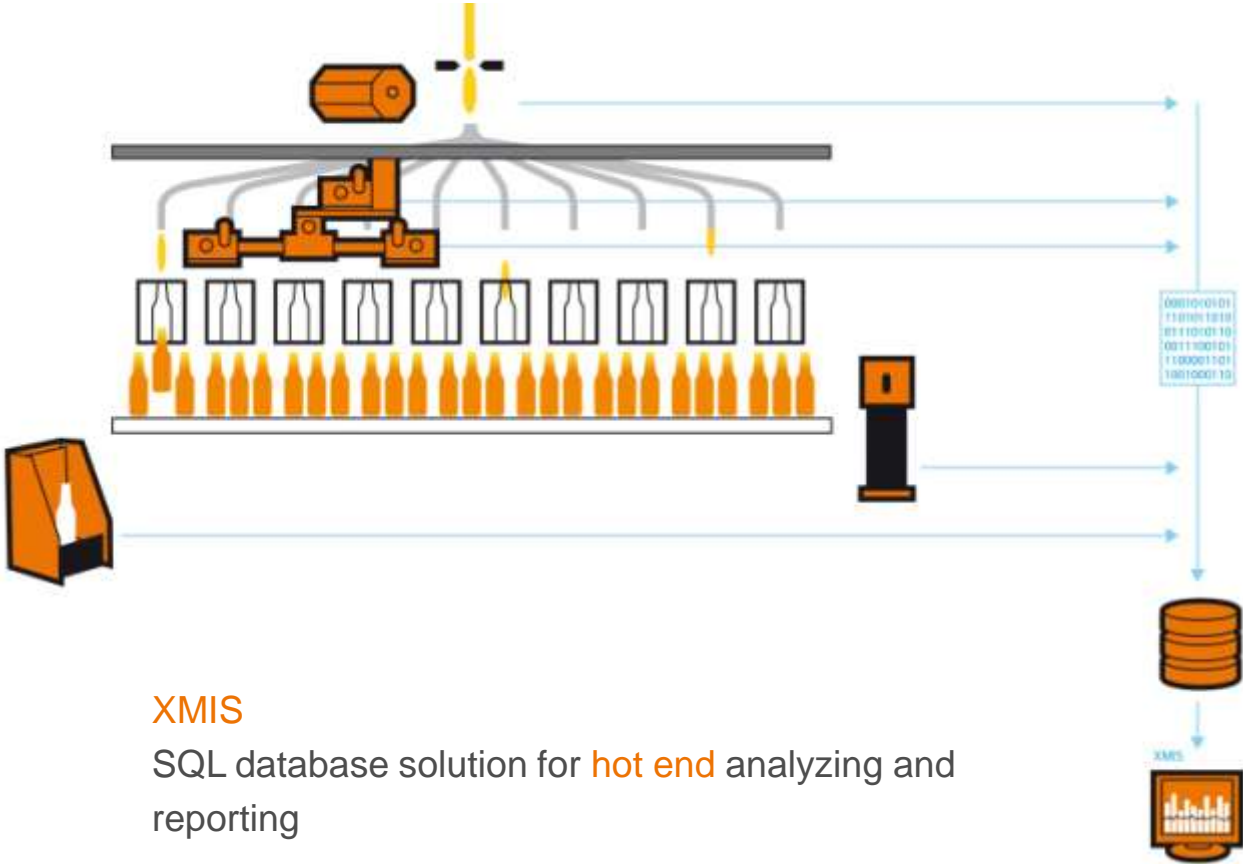
XPAR gains sum up



And what about....

- Better control, better quality and improved inspection capability
- Reduction of weight, due to better control
- Increase of speed, due to better control
- Less resorting,
- Less heldware
- Etc., etc..

Introduction to XPAR Vision product portfolio



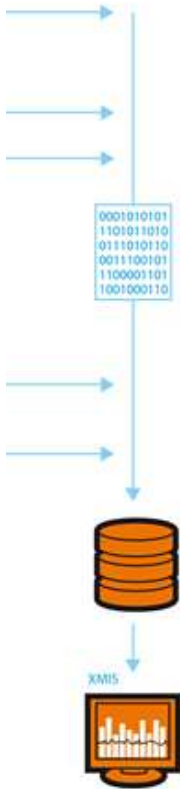
XMIS

SQL database solution for hot end analyzing and reporting

Introduction to XPAR Vision product portfolio

Factual information is a pre-condition for:

- developing XPERT
- automation



In conclusion

The glass industry must in order to keep up needs:

- Embrace the location where quality is made (HE)
- Invest in (HE) systems that contribute significantly to improve production and quality
- Look for signs of new inovative developments
- Create opportunities to better benefit from new developments

xPARvision
hEADING for perfection



Thank you