



ANDRITZ GROUP

# KRAFT RECOVERY SEMINAR 2023 OPERATOR FREE SPOUT DECK

• FEBRUARY 28, 2023

**ANDRITZ**

ENGINEERED SUCCESS

# CHAPTER OVERVIEW



**01** TOWARD AN AUTONOMOUS  
RECOVERY BOILER

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**02** SMELT SPOUT CLEANING ROBOT

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**03** AUTOMATED SHATTER JET  
POSITIONING

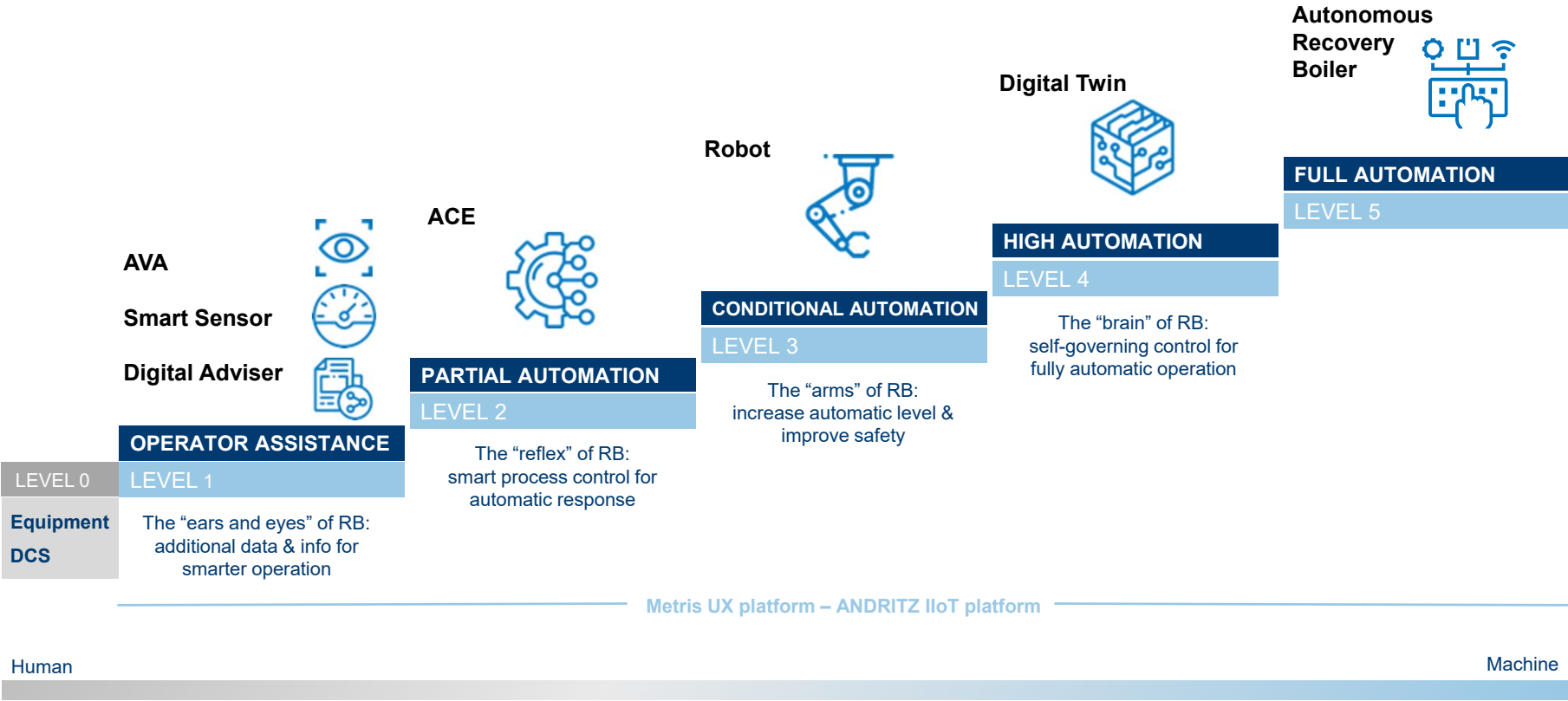
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**04** AUTOMATED REDUCTION  
EFFICIENCY MEASUREMENT

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**05**

# A SELF-GOVERNING RECOVERY BOILER





# **CHAPTER 2**

## **SMELT SPOUT CLEANING ROBOT**



## **SPOUT DECK – HIGH RISK AREA**

Operators must enter for regular tasks:

- Spout cleaning
- Smelt sampling
- Spout plugging / clearing
- Shatter jet adjusting

# ANDRITZ SMELT SPOUT ROBOT COMPONENTS

Automated smelt spout cleaning



Delivered with protective suit to cover against smelt splashes



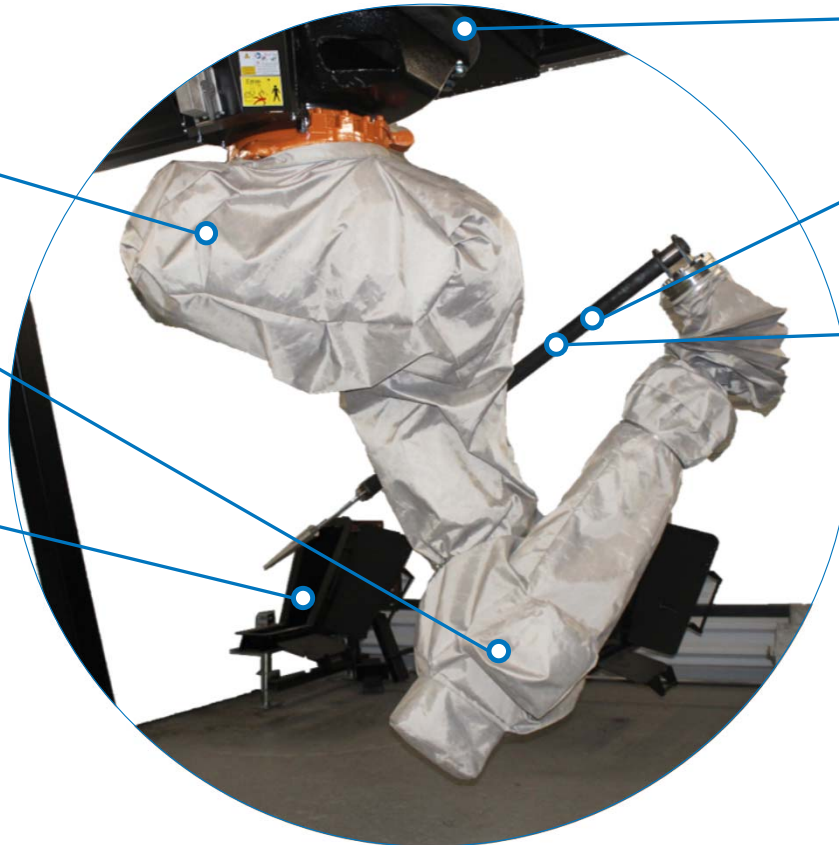
Accurate and stable tool movement



Spout location tracking with laser sensors



High availability



Strong support construction



Durable cleaning tool



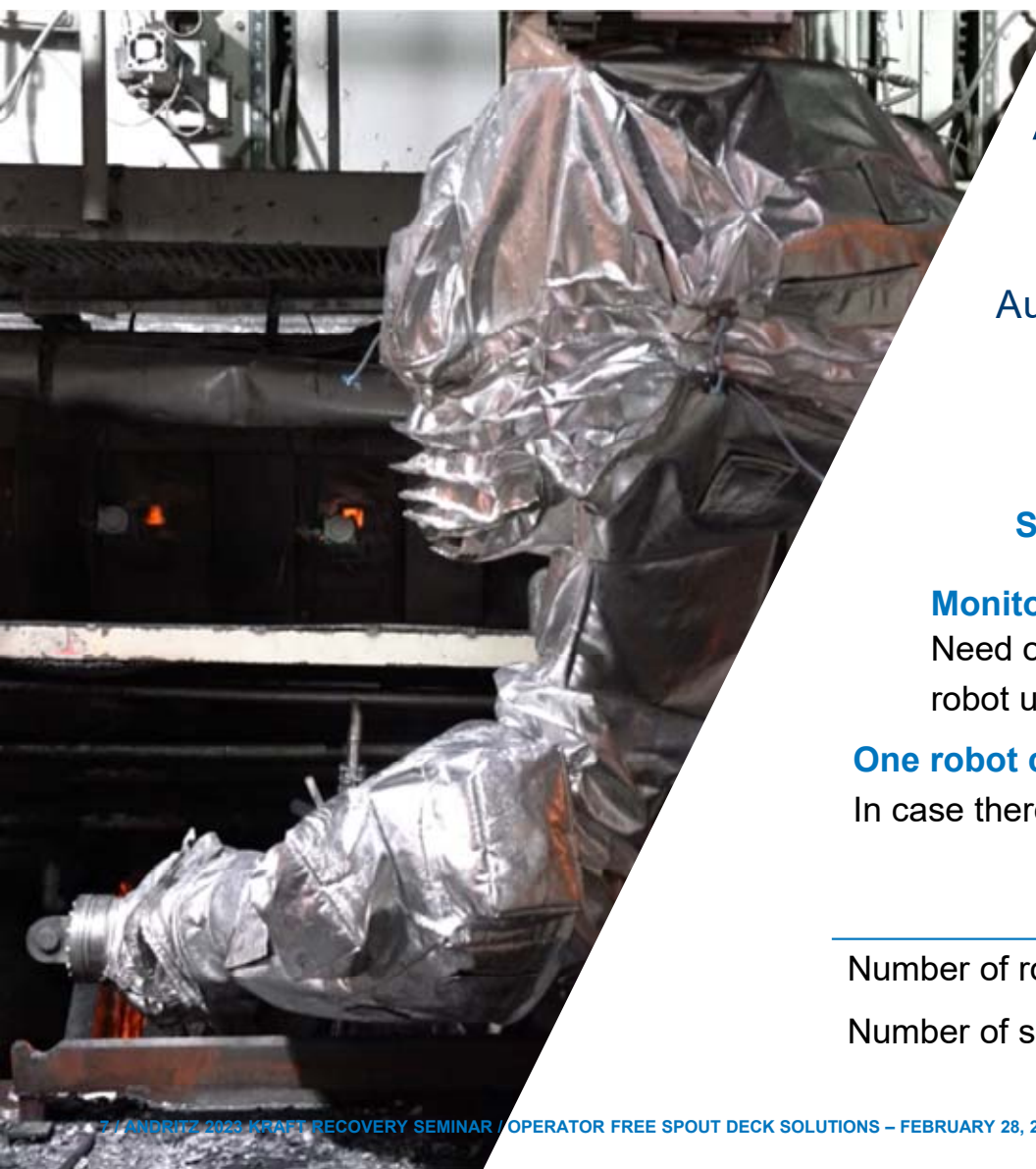
Reduction sampling as an option



Collision free operation



Smart cleaning



# ANDRITZ SPOUT ROBOT CONTROL

Automated smelt spout cleaning

**Tool optimization** is based on smelt behavior.

**Safe and easy tool change** by bolted connection.

## Monitored tool wear change

Need of tool change is indicated by the robot user interface.



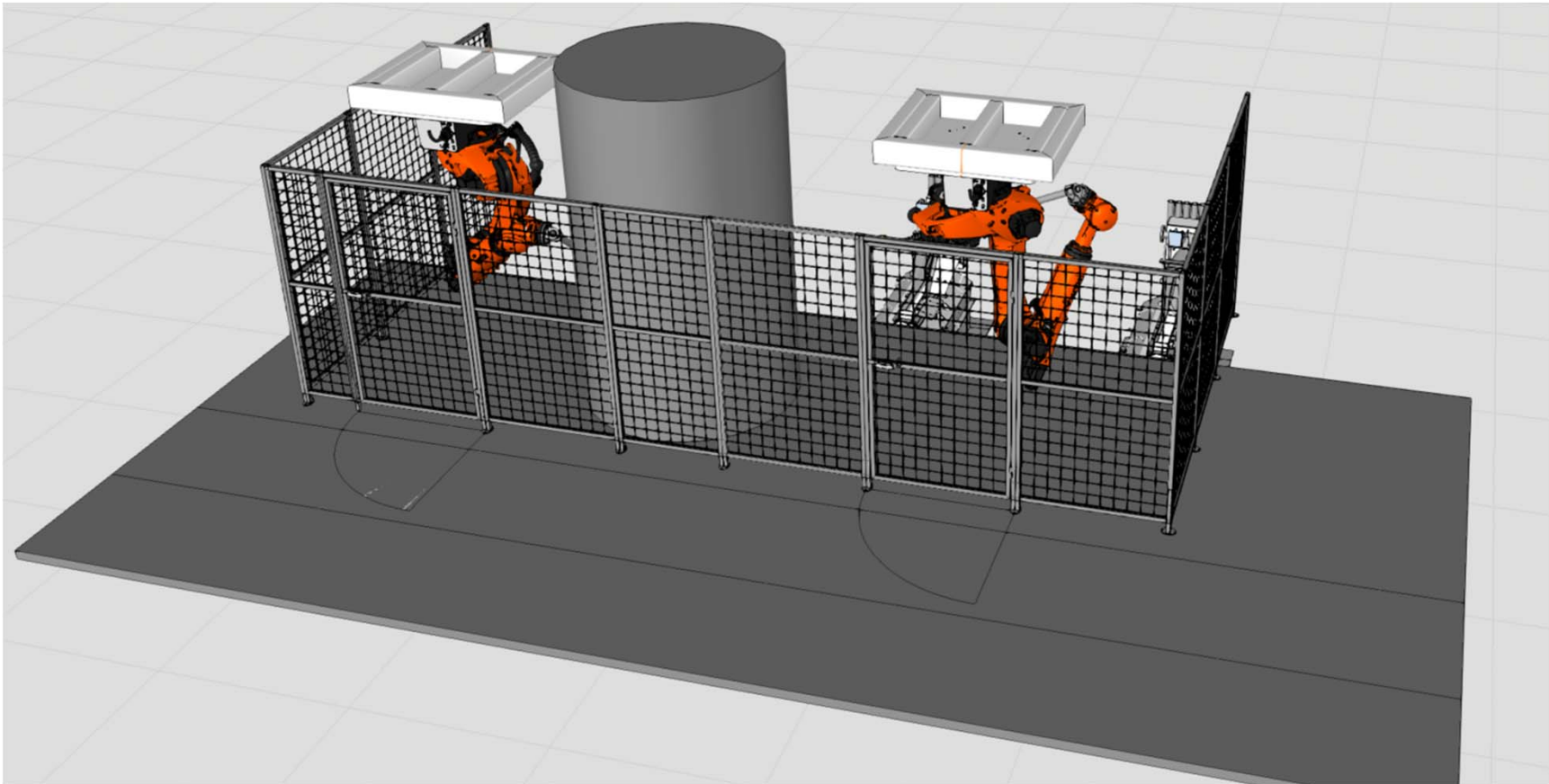
**One robot can clean** up to three spouts.

In case there are more spouts, more robots are used.

## Number of robots

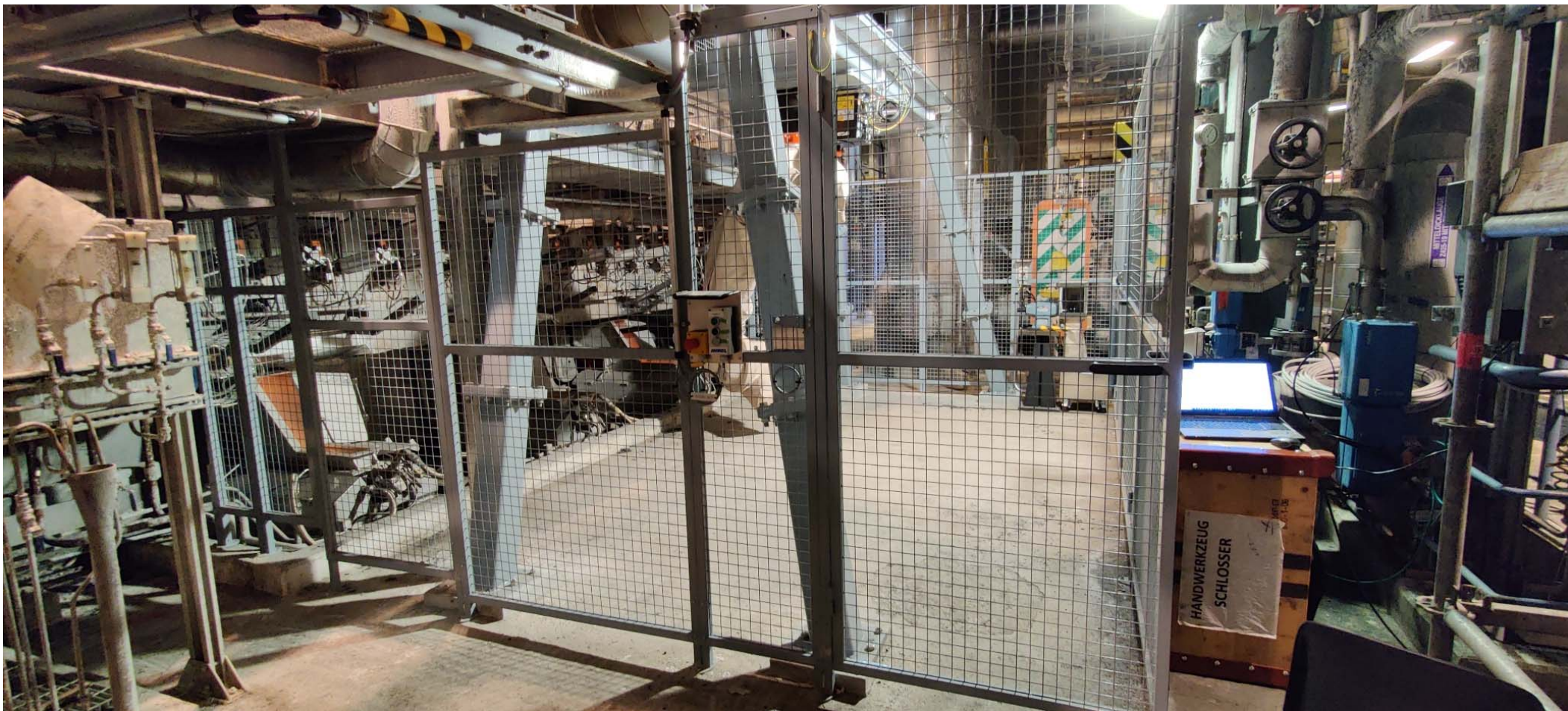
	1	2	3	4	5
Number of robots					
Number of spouts	1-3	4-6	7-9	10-12	13-15

# ANDRITZ SMELT SPOUT ROBOT SAFETY FENCE





# INSTALLED SYSTEM

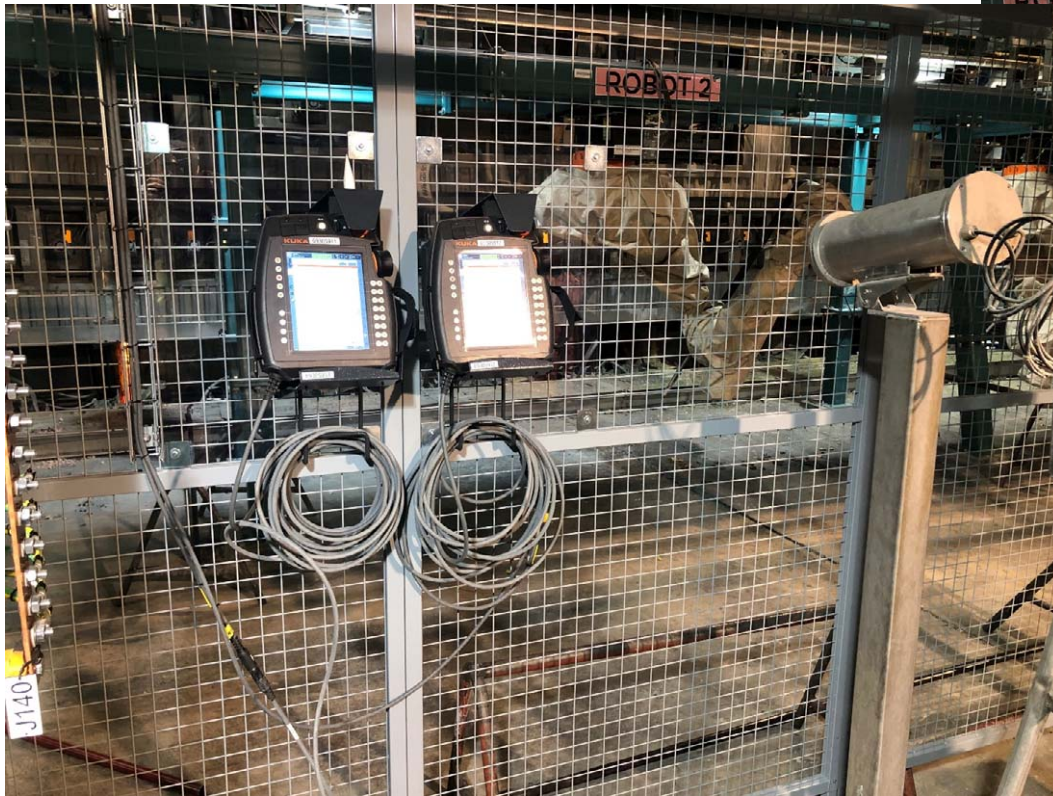


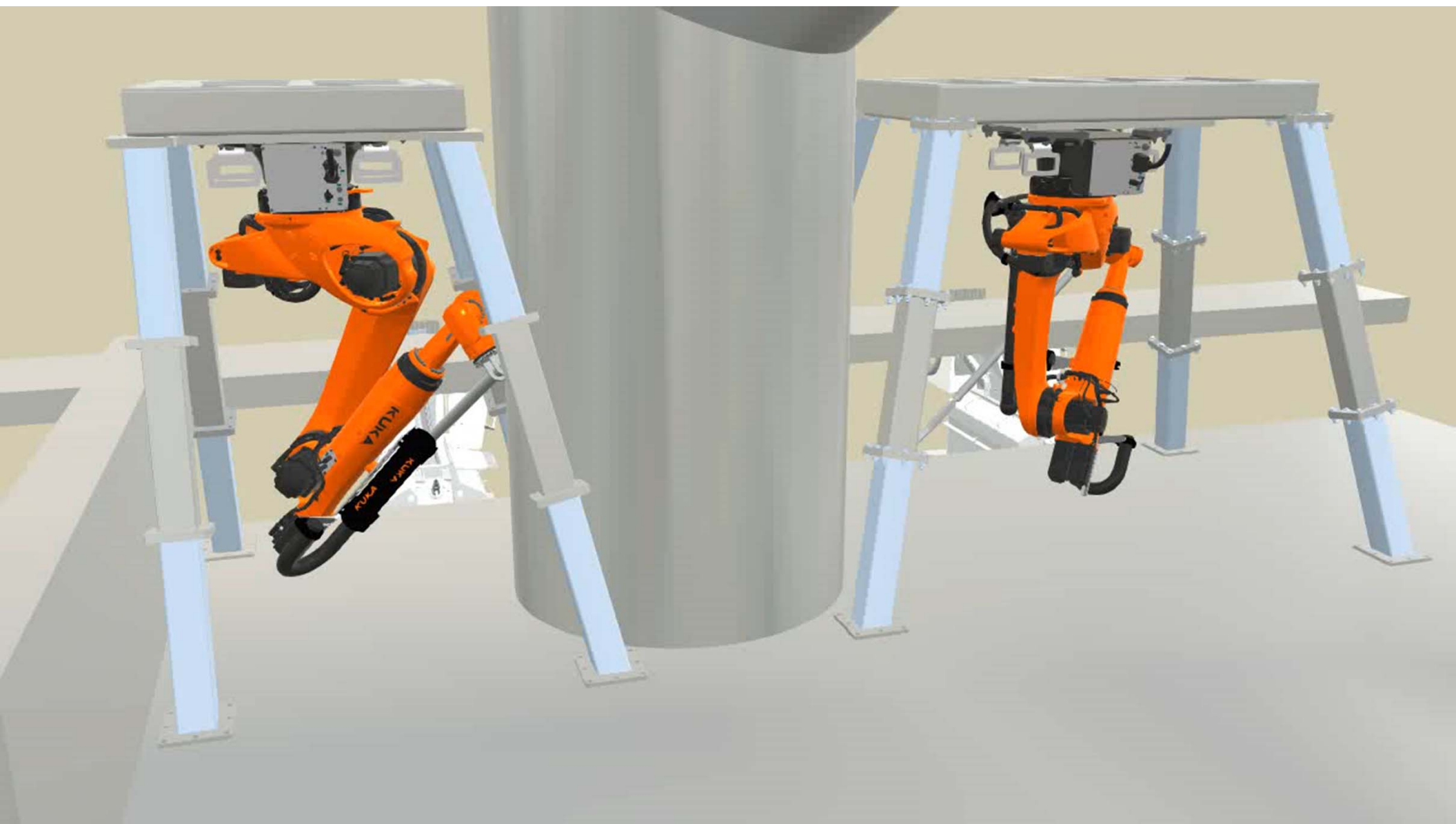


# INSTALLATION PICTURES

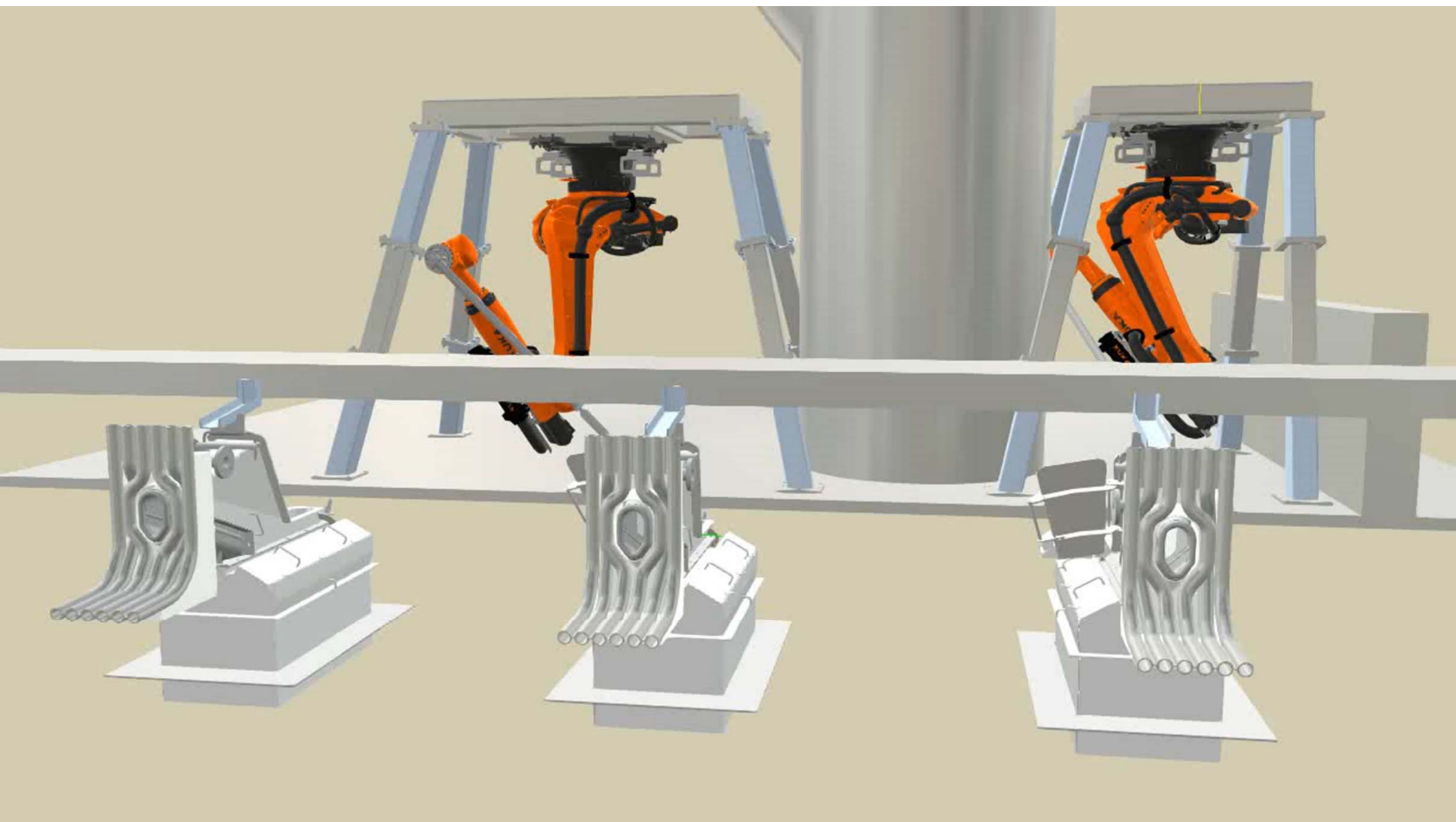


PLC Cabinet and Smart Pad

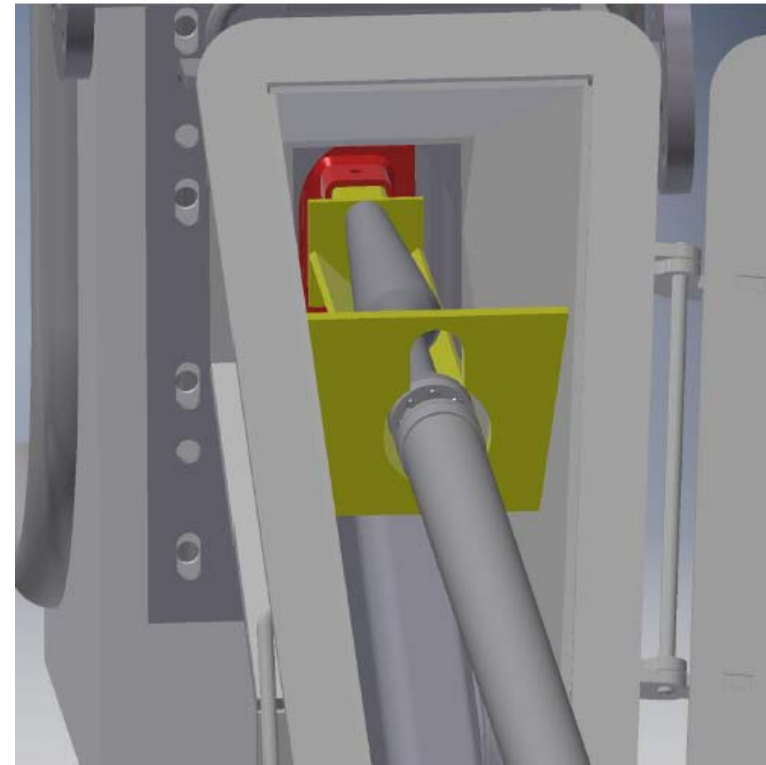
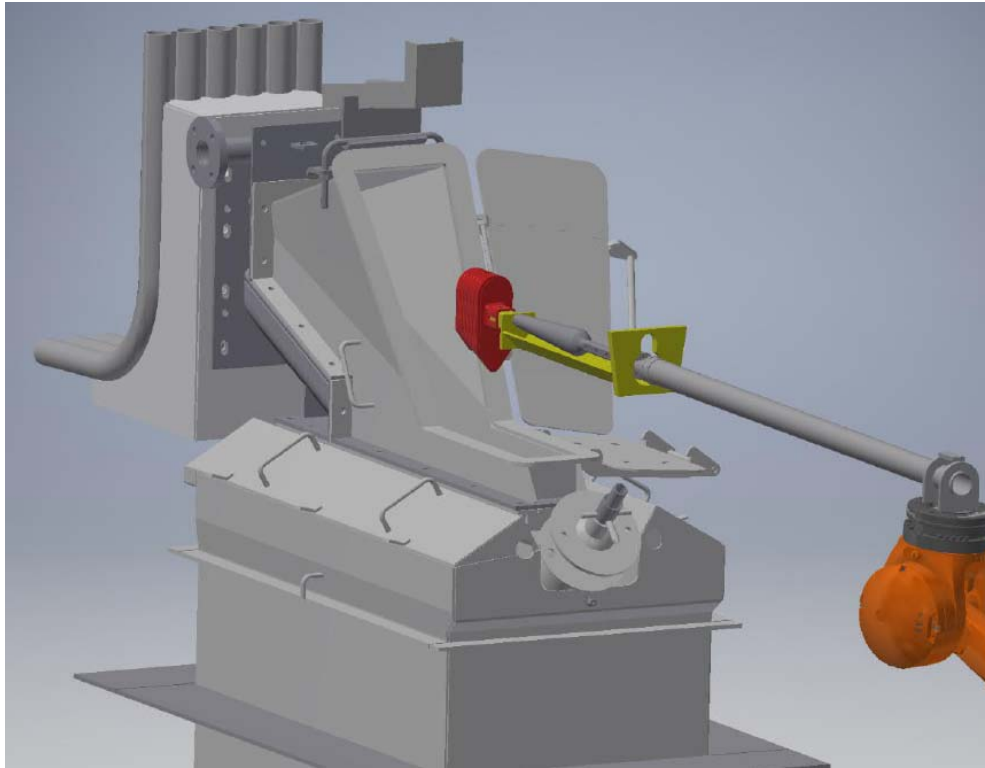








# ROBOT PLUG INSTALLATION



# AUTOMATIC TOOL CLEANING STATION



- Cleans the robot's spout cleaning tool automatically
- Optimizes cleaning tool lifecycle
- Less heat stress for tool tip
- Keeps measuring environment stable

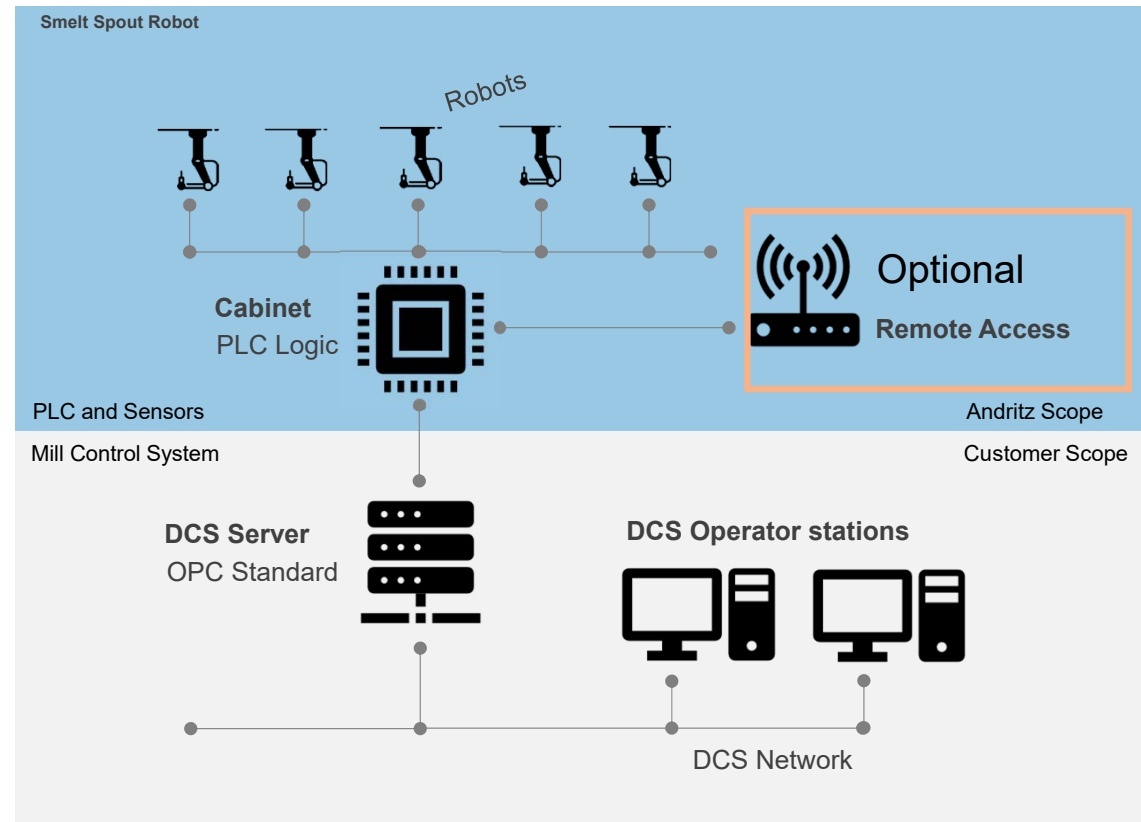


# ROBOT CONTROL TOPOGRAPHY

## Automated smelt spout cleaning and sampling technology

### The robot can be controlled locally or remotely

- The robot has a local PLC which handles communication between the DCS and PLC as well as between the PLC and the robotic system.
- The control unit provides a possibility to access robot's working area by using local touch panel
- **Option:** The process cameras in the control room ensures that some malfunctions can be reset remotely



# PRELIMINARY SCHEDULE



- Critical path components have been both PLC and Robot
- Schedule volatility
- Generally allocate 12-15 months until ready to install

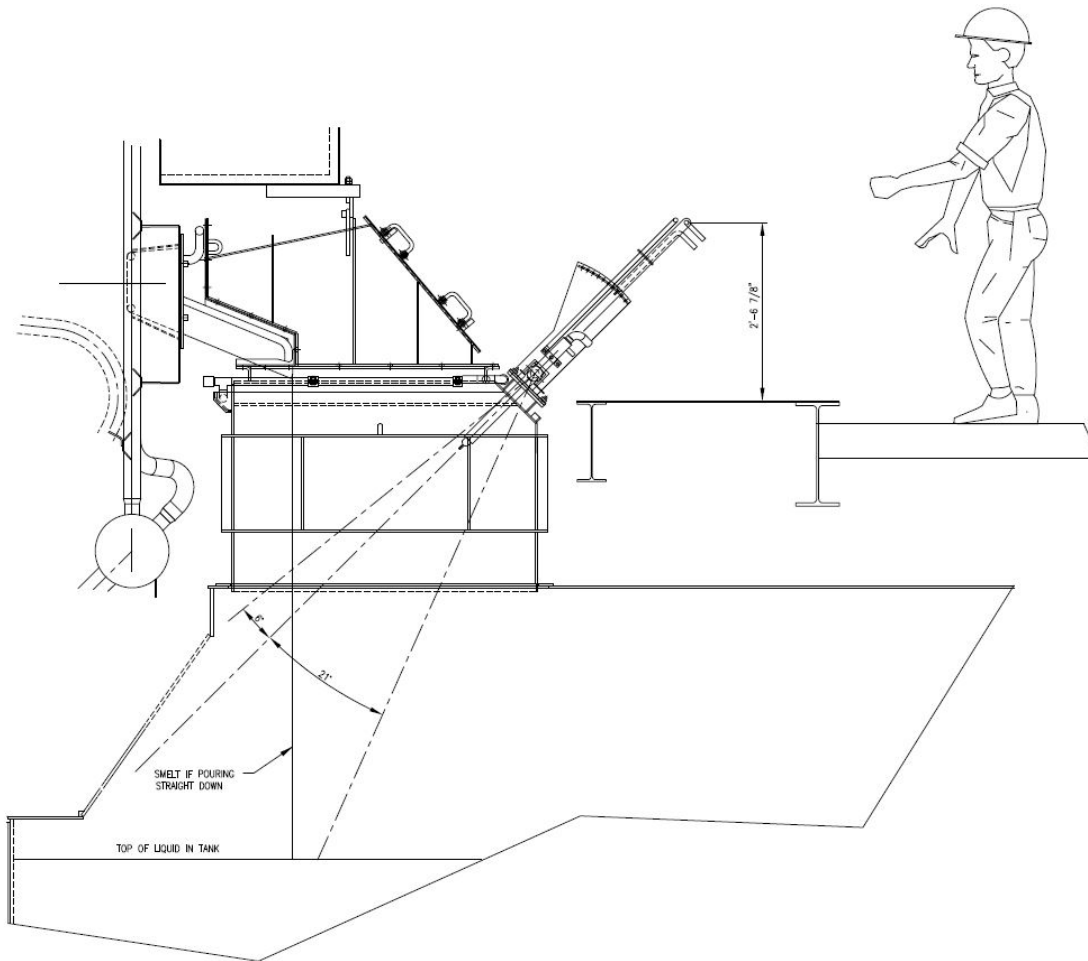




# **CHAPTER 3**

## **AUTOMATED SHATTER JET POSITIONER**

# SHATTER JET POSITIONER MOUNTED ON HOOD



SHATTER JET ADJUSTMENTS



# AUTOMATED SHATTER JET

Visual analysis tool maps dispersion field

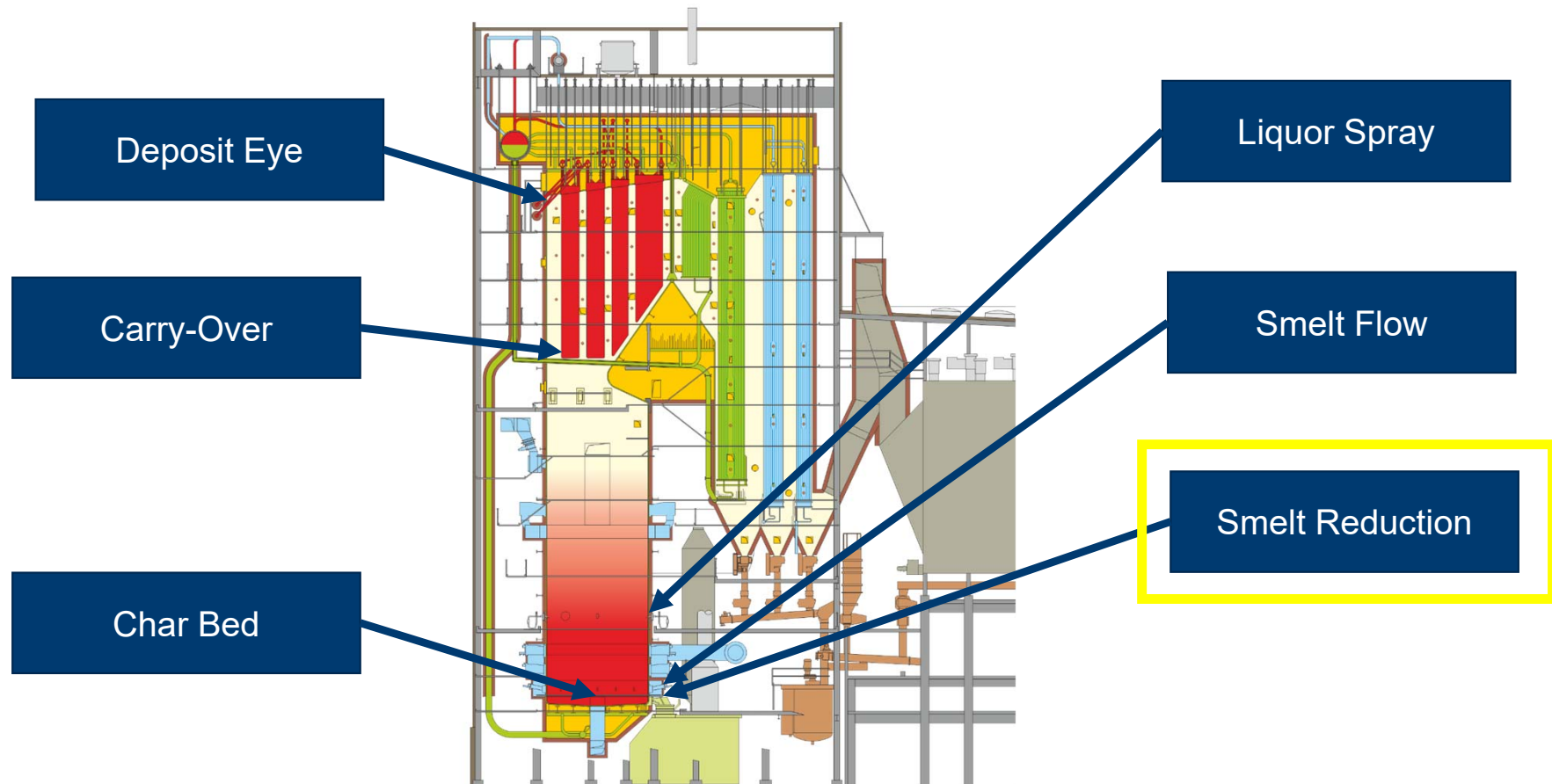




# **CHAPTER 4**

## **AUTOMATED MEASUREMENT OF REDUCTION EFFICIENCY**

# ANDRITZ VISUAL ANALYSIS (AVA)

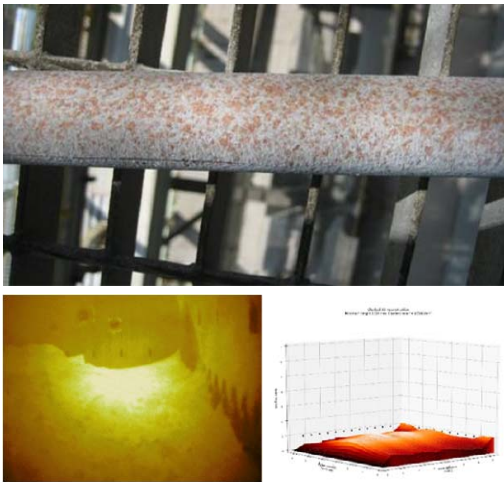


# HOW AVA WORKS

AVA turns images to valuable data

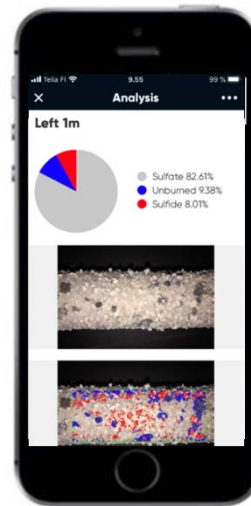
## 1. Various image sources

Pictures, videos, CCTV, mobile, IR, UV, X-ray, fast, slow, zoomed, colored, B/W etc.



## 2. Analyze

Pictures or video streams are transferred to numbers and analyzed



## 3. AVA Results

Instant analyzed feedback for process control





# EXAMPLE HOW TO USE AVA TOOLS

AVA tools are fast and easy to use

## 1. Take the sample



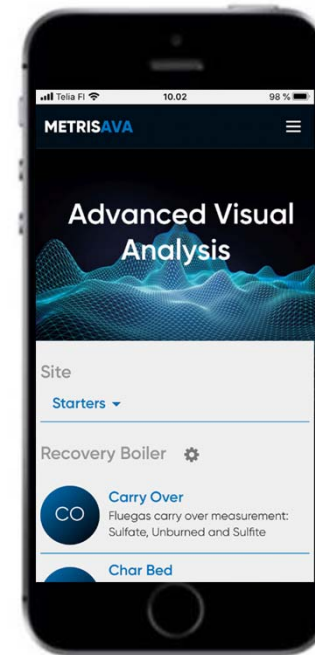
## 2. Take picture and send it for analysis



## 3. Get results



# AVA USER INTERFACE





# SMELT REDUCTION ONLINE ANALYSIS



Automated smelt sampling



# SMELT REDUCTION ONLINE ANALYSIS



Automated sample collector cleaning



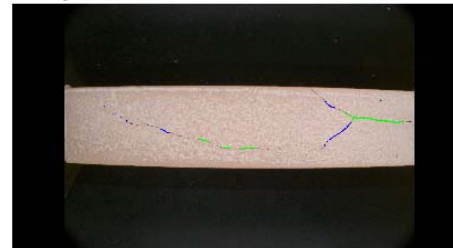
# SMELT REDUCTION

Before

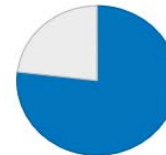
Original



Analyzed



Result



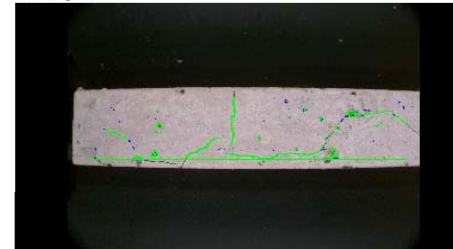
Reduction 76.86%

After

Original



Analyzed



Result



Reduction 98.99%



## AVA DATA

- Reduction %
- Reduction boiler average
- Reduction per spout



## CONTROL

- Fuel supply
- Char bed control
- Air distribution
- Green liquor quality



## SAVINGS AND BENEFITS

- Improved chemical recovery
- Real-time analysis
- Less laboratory analyses
- Reduced carry-over





# Questions?

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