

**CAT<sup>®</sup>**  
**ROCK**  
**STRAIGHT**  
**SYSTEM**

**AUTOMATION**



# FULLY AUTOMATED

THE CAT ROCK STRAIGHT SYSTEM  
IS FULLY AUTOMATED.

- Ethernet IP-based automation
- Autonomous cutting sequence
- Automated hauling and advancing of the system
- Full system remote control capabilities
- Data history storage for real-time monitoring of machine functions for predictive maintenance
- Automation system prepared for SIL2 ratings





**OPERATOR CAB**  
ROCK STRAIGHT SYSTEM



# REMOTE CONTROLLED

All system functions can be remote controlled and monitored from an operator cabin underground or from the surface.



# COMFORTABLE & SAFE

The air-conditioned operator cabin provides a safe and comfortable workplace for the operator.





## **PERMANENT LIVE DATA MONITORING TO MINIMIZE UNSCHEDULED DOWNTIME**

**The Hard Rock Miner HRM220 and the Hard Rock Conveyor HRC30 use a Mobile Machine Control (MMC) System for control, monitoring and protection: the system includes central control components and data logging.**

**The modular design allows it to be configured to meet individual control needs: customized software upgrades are possible.**

**Remote operation and diagnosis of major components from the operator cabin is supported with on screen information.**

**Operator control includes a start-/stop function, position and adjustment of the cutting units, the miner's speed and position at the face.**

**Permanent live data monitoring for equipment protection: the MMC warns the operator, in case of damage the MMC shut down the system. The data generated can be transferred to a surface location for analysis and evaluation.**

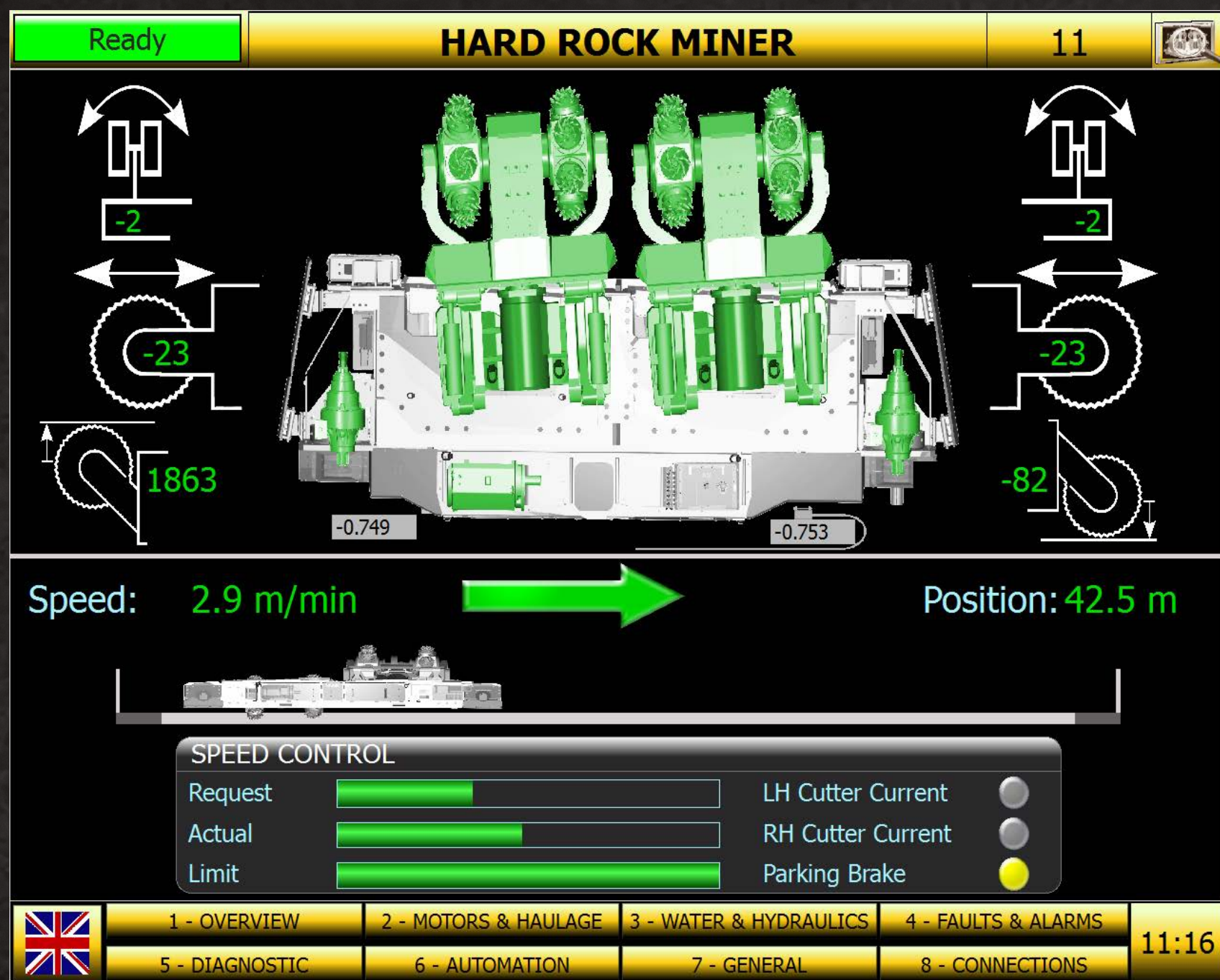
**Altogether the miner's control system matches your needs: it is easy to install, to operate and to maintain.**



# MMC BASED AUTOMATION

HRM220 and HRC30

# VISUALIZATION



## DISPLAY APPLICATION CATEGORIES

1. Overview
2. RSS Motor
3. Water & Pressure
4. Faulte & Alarm
5. Diagnostic
6. Automation
7. General
8. Connection



# MMC BASED AUTOMATION

HRM220 and HRC30

## HANDLING

Quick Access Menu

Radio Remote

Reset Radio  
Registration

Reset

Control Mode:

Maintenance
Auto_Radio
Controlcenter
Manual_Radio

Hostname : hmi-cc  
Software Revision: 12952    Date: 2014/09/12 14:28:47

### MACHINE OPERATING MODUS

- Maintenance
- Auto Radio
- ControlCenter
- Manual Radio



# MMC BASED AUTOMATION

HRM220 and HRC30

# AUTO CUTTING

## CONTROL CENTER VIEW

### Motor Status

	STATUS	Temp.	Current %	Current
Left Cutter	STOPPED	38.6 °C		0 A
Right Cutter	STOPPED	29.4 °C		0 A
Pump	RUNNING	9.9 °C		60 A
Haulage	STOPPED			
<b>Armored Face Conveyor</b>				
AFC	STOPPED	16.4 °C		0 A

### Arm Status



### Hydraulics

Haulage	Oil Tank	Valve Block
Pressure for. (bar) 80.0	Level (mm) 210.5	Pressure (bar) 101.5
Pressure rev. (bar) 80.0	Temperature (°C) 62.3	

### Cooling Water

<b>Cooling Water LH Cutter</b> Temperature (°C) 20.3 Flow (l/min) 0.1	<b>Cooling Water Pump</b> Temperature (°C) 20.3 Flow (l/min) 0.1	<b>Oil Cooler</b> Flow (l/min) 10.1
<b>Cooling Water RH Cutter</b> Temperature (°C) 20.0 Flow (l/min) 0.0	<b>Cooling Water Supply</b> Pressure (bar) 16.0 Temperature (°C) 30.1	<b>Cooling Water AFC</b> Flow (l/m) 0.0 Temp. before (°C) 20.1 Temp. after (°C) 20.1

### Error

ID	Description	Time	Freq
F10	Control System	26-Sep-11 21:36	1
F11	Control Motor in Face	26-Sep-11 21:37	1
F11	Arm Movement not Done	26-Sep-11 21:40	14

Control System, 26-Sep-11 21:36, Freq: 1  
Data Suspended

### Error History

ID	Description	Time	Freq
F122	F122	26-Sep-11 21:01	1
F1712	Control System Pump not started	26-Sep-11 24:30	10
F1323	Safety Emergency Fast Halt	26-Sep-11 24:33	1
F2812	Automation System Display / Gas Server - Game Fault	26-Sep-11 24:33	1

F122, 26-Sep-11 21:01, Freq: 1  
F1712  
Data Suspended





## MMC BASED AUTOMATION

HRM220 and HRC30

# RADIO REMOTE CONTROL

The certified and intrinsically safe radio remote control enables the direct control of the different drives of the cutting machine.

The machine is equipped with an intrinsically safe remote receiver. Power for the remote control is supplied by a rechargeable battery which can be loaded at a charging station.



## FEATURES

- Intrinsically safe
- SIL 2 certified (safety integrity level)
- Data memory
- Graphic display
- Ethernet cable for charging station
- Ethernet/IP protocol



# MMC BASED AUTOMATION

HRM220 and HRC30

# FACE ALIGNMENT

Adjustment of the system to the specific conditions of the face.

Ready **FACE** 61

Face Configuration

Face Length	41.9 m
Maingate Width	5.2 m
Tailgate Width	6.0 m
Number of Shields	24
Shield Width	1750 mm
Maingate -> Roof Support Distance	5.2 m

1 - OVERVIEW 2 - MOTORS & HAULAGE 3 - WATER & HYDRAULICS 4 - DIAGNOSTIC 5 - DIAGNOSTIC 6 - AUTOMATION 7 - GENERAL 8 - CONNECTIONS 11:17

## Face Configuration:

- Face length
- Drift width
- Shield Width
- Number of Shields

Ready **ARM POS. & CUTTING SPEED CONFIG.** 65

Leading ARM

6.00 m/min

Auto Speed Increase: ACTIVE

2000.0

0.0

Trailing ARM

1 - OVERVIEW 2 - MOTORS & HAULAGE 3 - WATER & HYDRAULICS 4 - DIAGNOSTIC 5 - DIAGNOSTIC 6 - AUTOMATION 7 - GENERAL 8 - CONNECTIONS 11:17

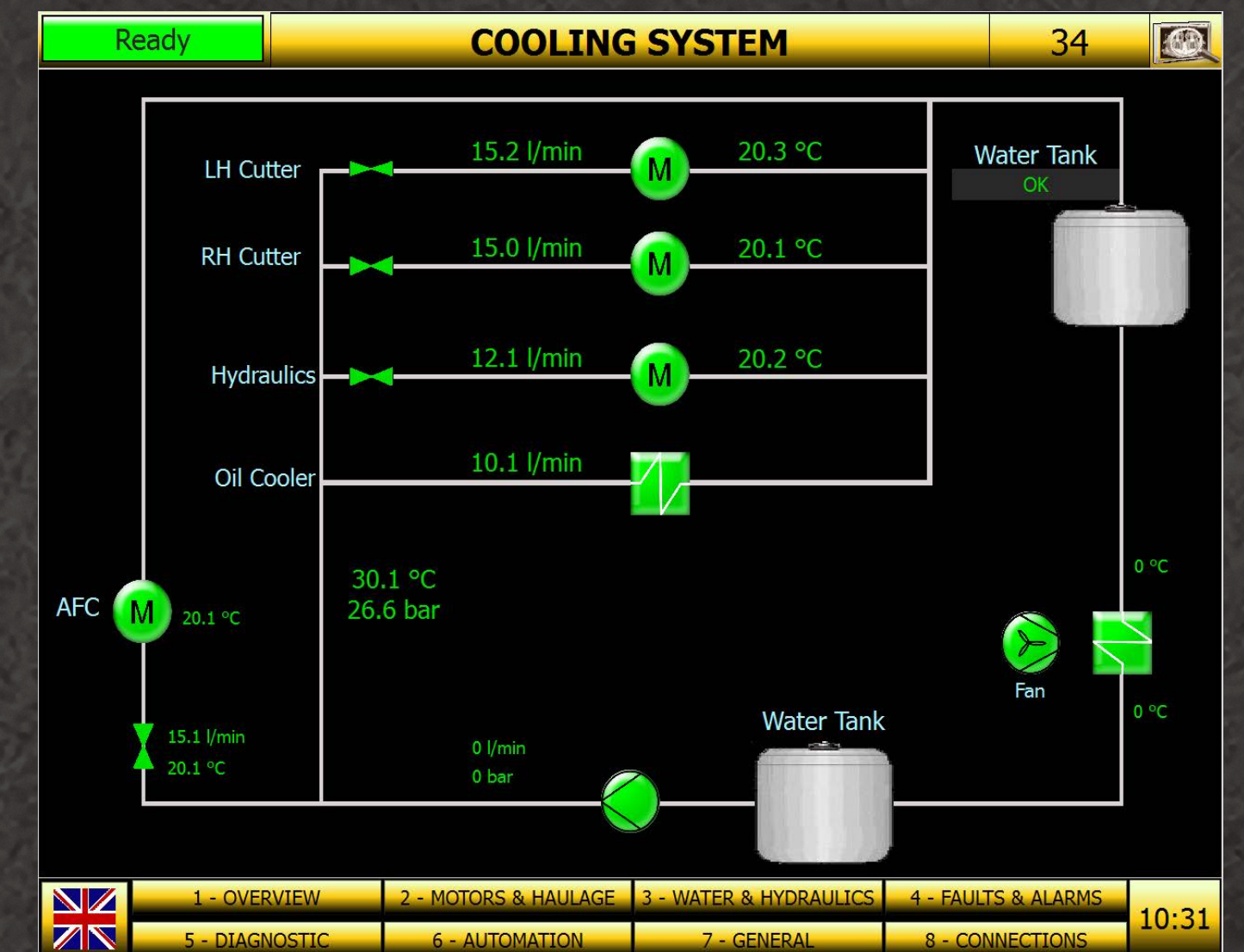
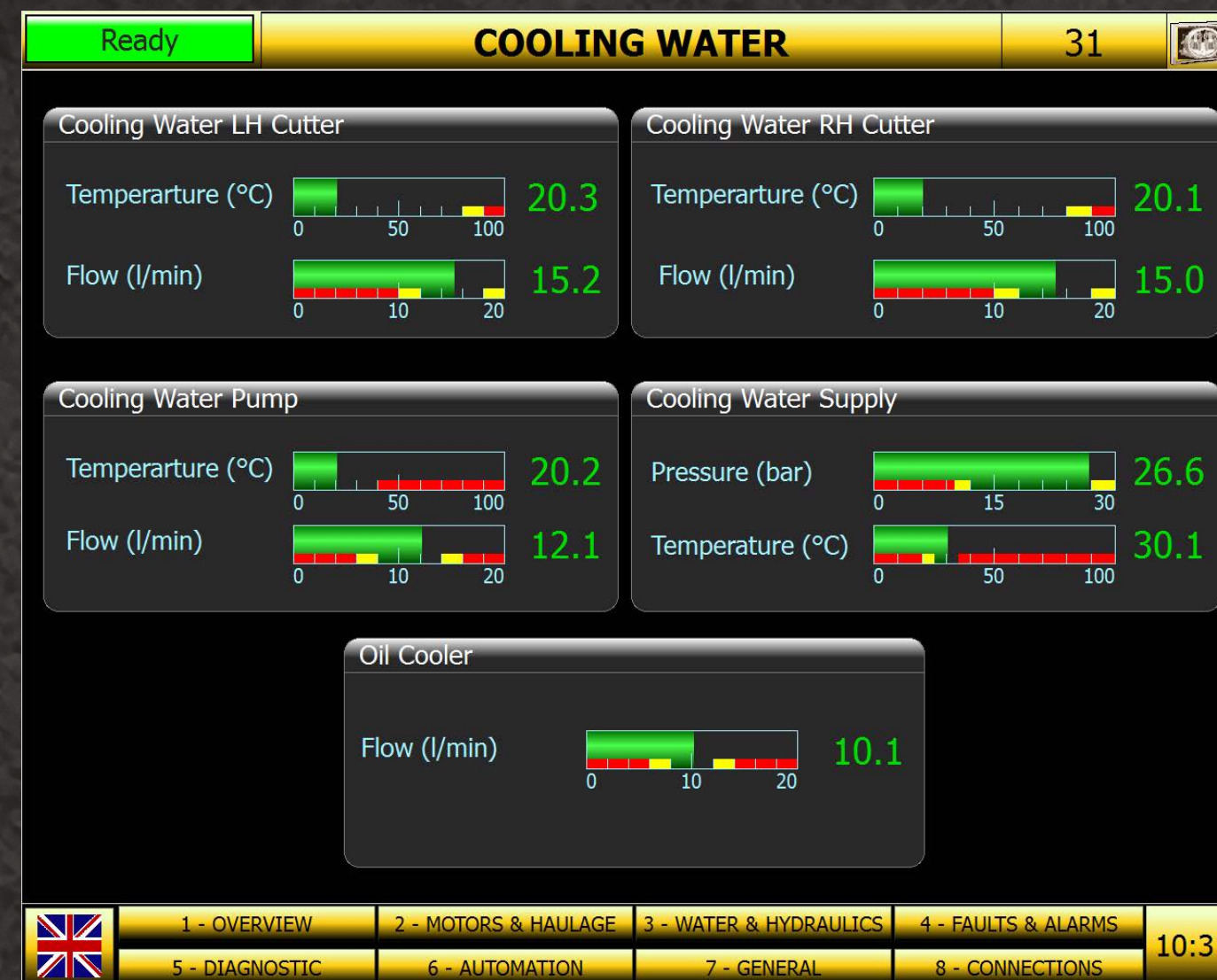
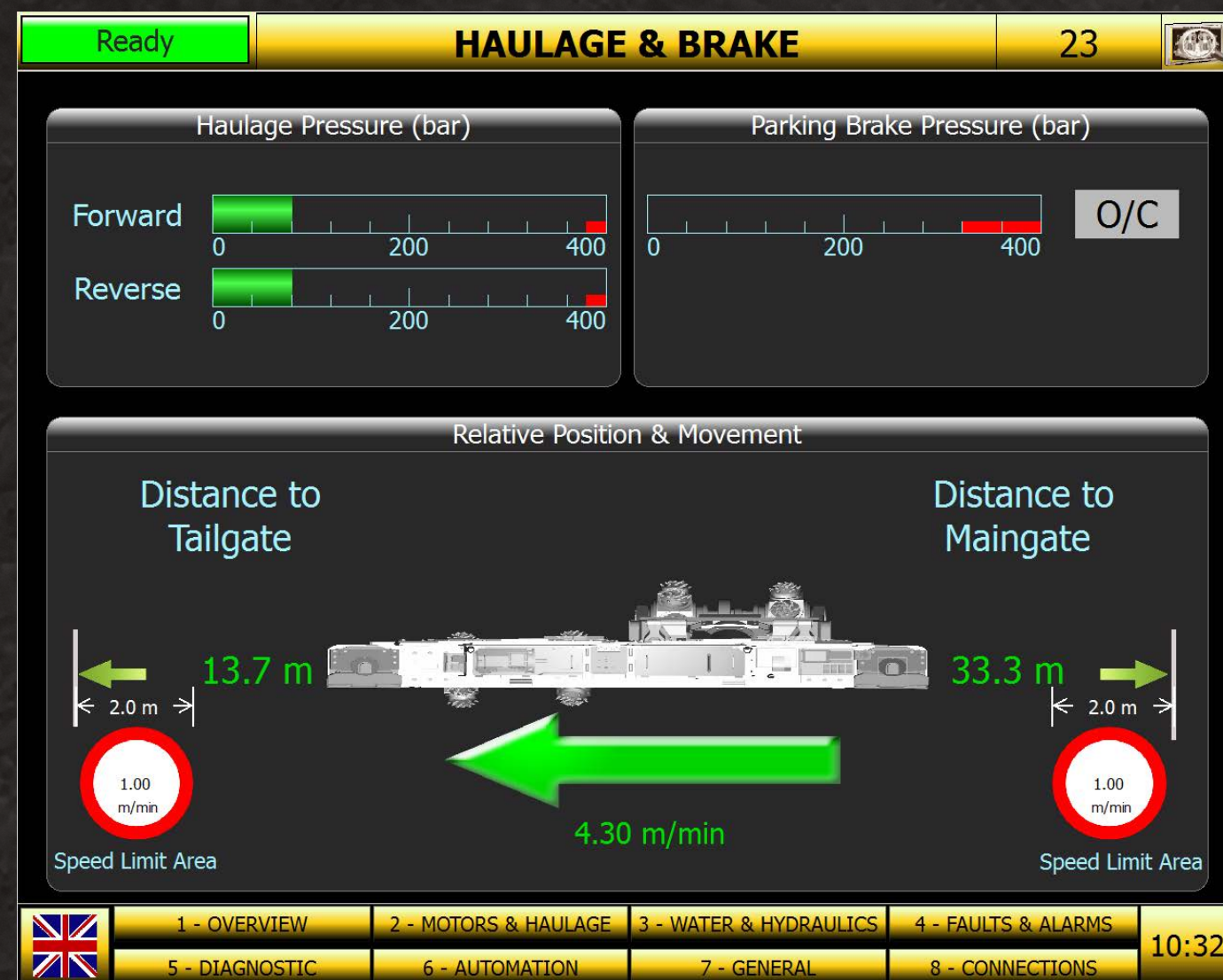
## Pre-Cutting Configuration:

- Max. Speed
- Cutter Angle
- Arm infeed
- Low cutting line
- High cutting line
- Arm Orientation

# MMC BASED AUTOMATION

HRM220 and HRC30

# SYSTEM DIAGNOSTICS



## PMC-R BASED AUTOMATION

HRS1220

# ROOF SUPPORT CONTROL



**The Cat electro-hydraulic control systems set another standard in the market of roof support systems: the dedicated PMC-R system of the HRS1220 has proven to be flexible, reliable and productive.**

**Their robust design underlines their durability, the multi-language support guarantees the use in different kinds of markets, safety is highlighted by a separate emergence and lock switch and multi feedback keys provide unsurpassed safety and user friendliness.**

**All information gathered can be transferred to the surface in real time to allow a maximization of the system performance.**

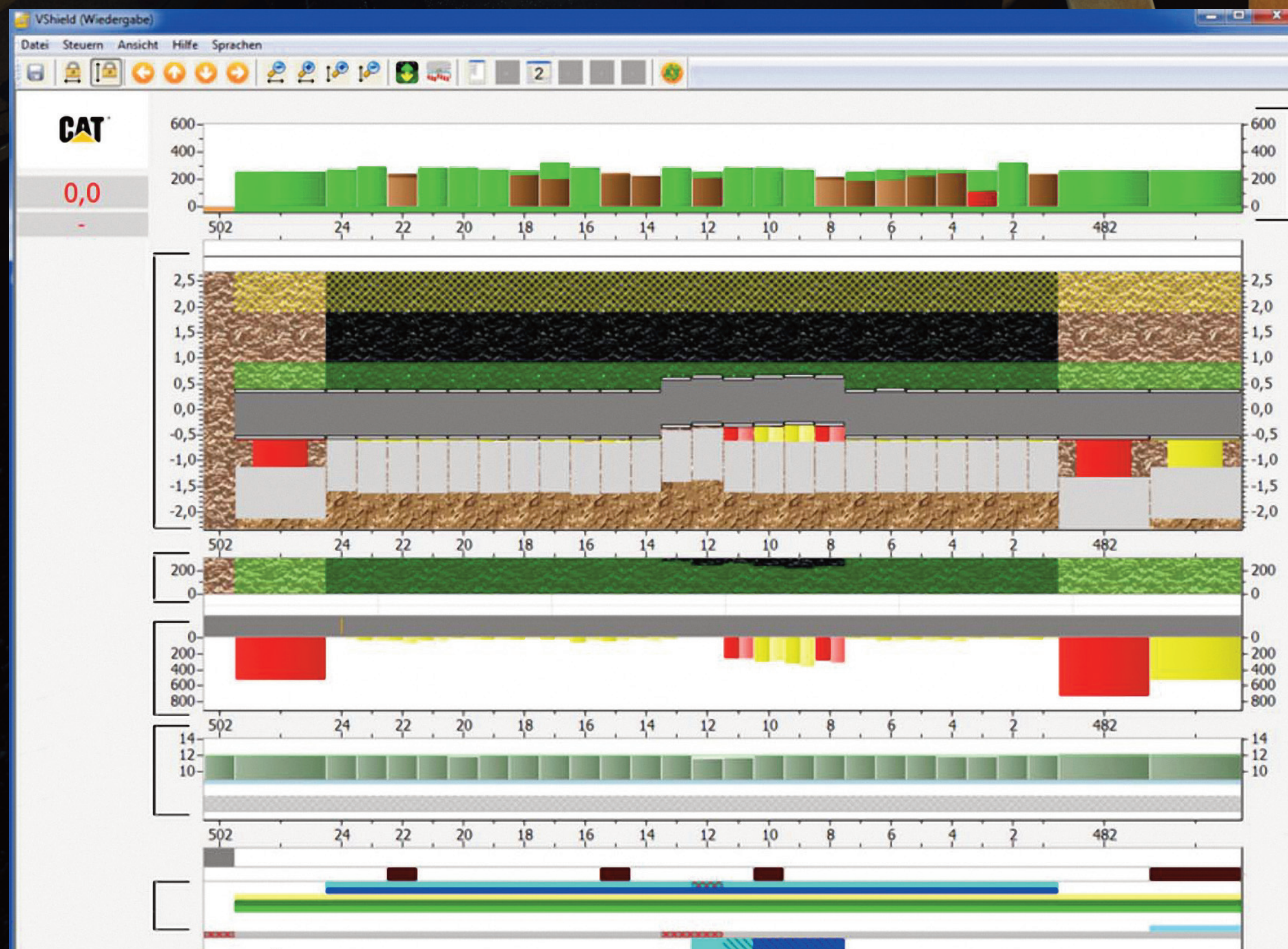
**The PMC-R electronic control system provides the most advanced face automation, equipment monitoring and remote diagnostics for all face equipment.**



# PMC-R BASED AUTOMATION

HRS1220

# VISUALIZATION



## VSHIELD SOFTWARE

- For visualization and parameter setting of the entire PMC-R roof support system (e.g. System-, SRB-, ASQ-, bank push parameter)
- The VShield Software displays all available roof support sensor data (e.g. RAM stroke, flipper stroke, leg pressure)
- Graphical trends, warnings and error messages can be displayed





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