

WE ARE INNOMOTICS

January 2025

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WE are Part of the Team



Dr.-Ing. Torsten Hellmuth

- Driving developments in conveying and mining over decades
 - Involved in the biggest conveyor projects globally
- Global Key Expert for Conveyor in Mining
- Global Portfolio Manager for Conveyor in Innomotics



Dr.-Ing. Sunny Schoone

- Mining Engineer from RWTH Aachen
- Global Sales Expert for Digitalization in Mining
- Global Strategy development and Portfolio Manager

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We have a well-balanced footprint across regions and industries.

+150

Years tradition

+15,000

Experts globally

49

countries

Mining
Cement
Oil & Gas
Metals
Water
HVAC
Chemicals
Food & Beverage
Marine
Pulp & Paper
Power
Automotive
Intralogistics



■ Countries with
regional sales
setup

HVM FACTORIES

Norwood, USA
Berlin, Germany
Erlangen, Germany
Nuremberg, Germany
Sibiu, Romania
Drásov, Czech Republic
Tianjin, China

MVD FACTORIES

New Kensington, USA
Jundiaí, Brazil
Nuremberg, Germany
Shanghai, China
Mumbai, India

LVM FACTORIES

Tuebingen, Germany
Maroldsweisach, Germany
Mohelnice, Czech Republic
Frenštát, Czech Republic
Yizheng, China
Tianjin, China

Mining Offering

Electrification, Automation and Digitalization



Electrification

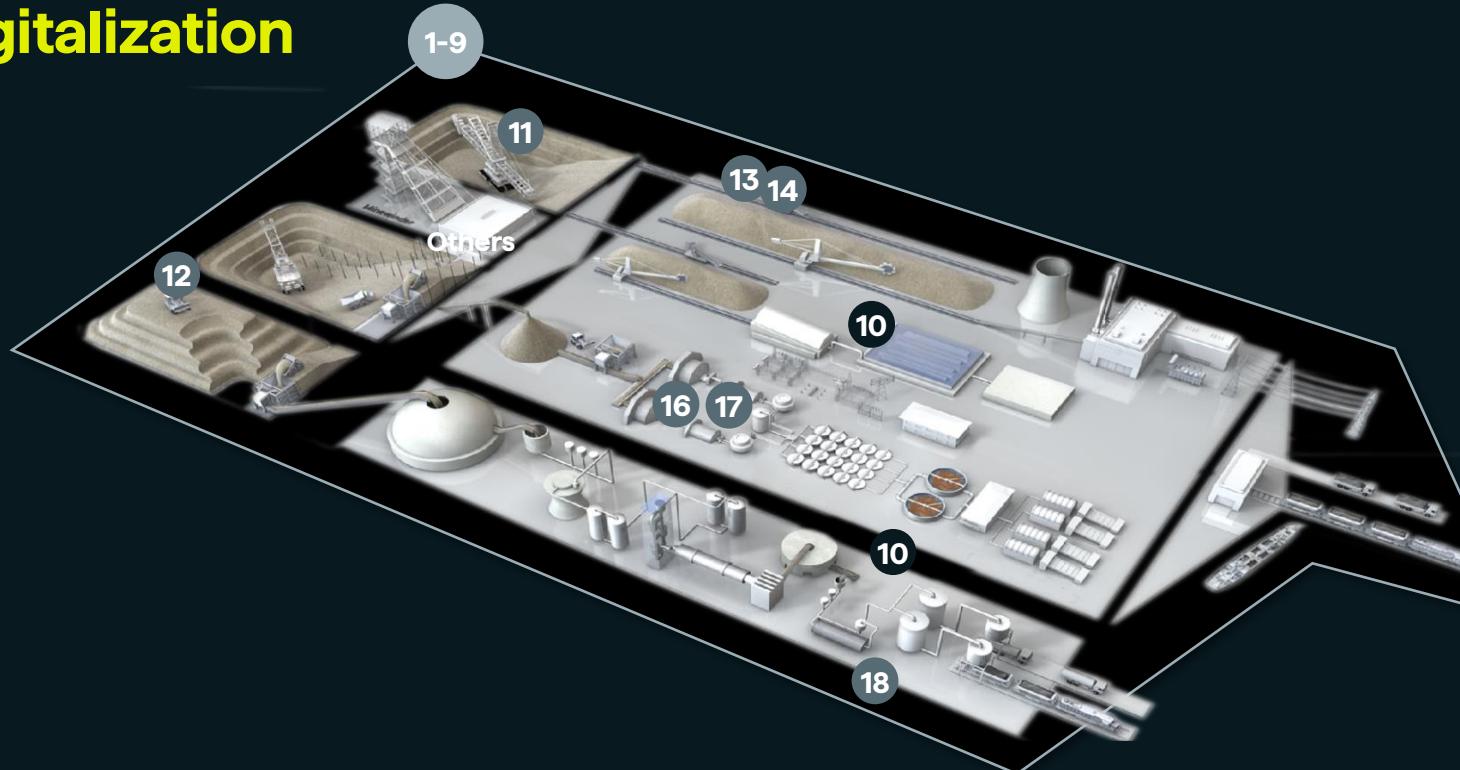
- Wide range of electrical solutions for grinding, conveying, material handling, including pre tested e-houses
- Engineering expertise and deep domain know-how to address vertical specificities

Material Handling

- 12 Mine Hoist / Winder
- 13 Conventional Conveyor drive
- 14 Gearless Conveyor drive

Grinding

- 16 Gearless Mill drives
- 17 Pinion Mill drives
- 18 E-House Solutions



Automation

Large scale automation solutions as stand-alone or as part of the digital mine to integrate automation and digitalization over the life cycle of the plant

- 10 Automation Solutions for Cement and Mining



Digitalization

- Own software back-bone highly customizable to customer requirements
- Proven ability to increase plant efficiency to reach sustainability targets

- 1 AssetAnalytics

- 5 LineUp

- 2 AI Pyro / AI Mills

- 6 Pit to Port

- 3 CoPilot

- 7 ProcessTwin

- 4 LifeCycle

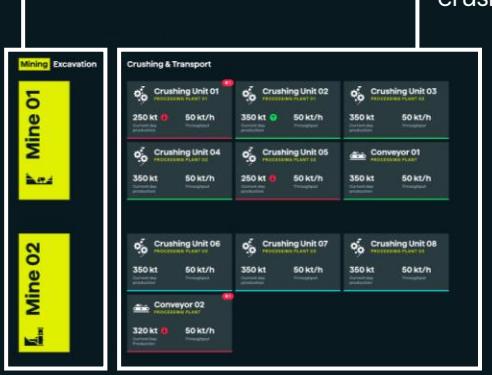
- 8 YardMaster

Innomotics DigiMine Portfolio

Integrated solutions to close operational and data gaps across mining value chain

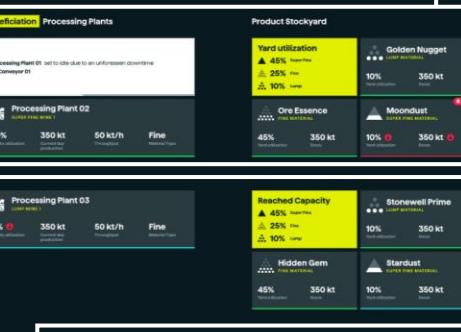
LineUp

Mine Short Interval Control



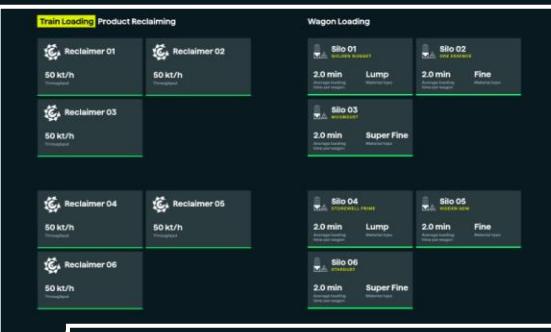
ProcessTwin

Physical modelling and simulation of crushing and transport systems.



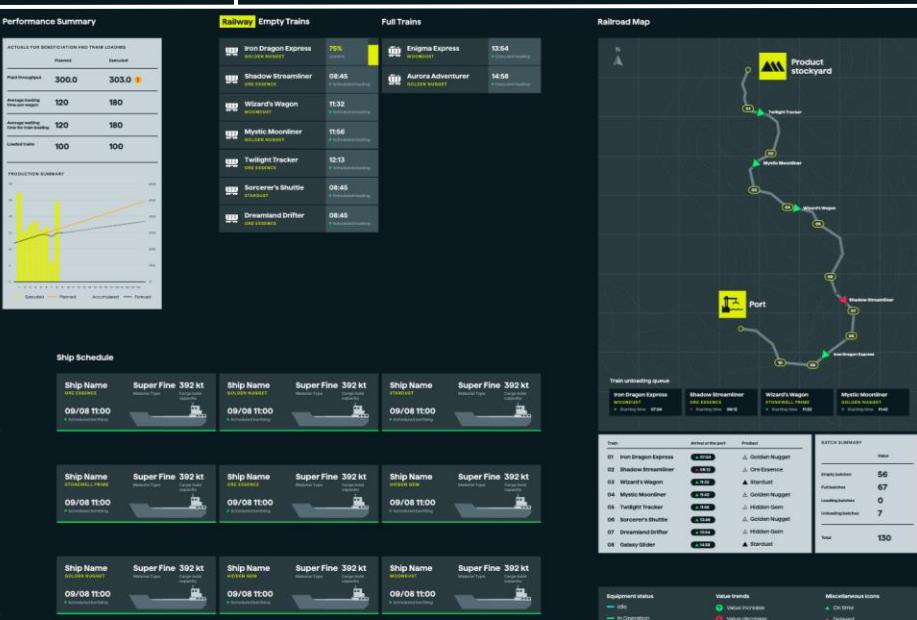
CoPilot / Lifecycle

Holistic approach for mineral process automation and optimization, integrating simulation and engineering tools.



Pit-to-Port

Integration of production and logistic information for streamlined value chain monitoring and optimization.



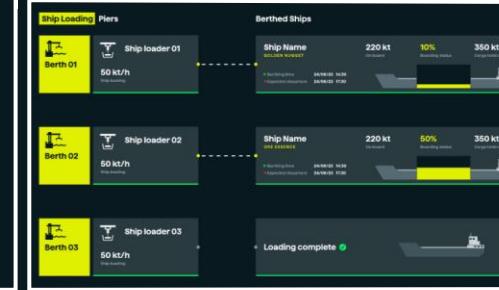
AssetAnalytics

AI based monitoring critical assets e.g. grinding, wagoon tipplers



YardMaster

Autonomous stockyard operation for efficient inventory management



References





Use Case

-

Overland Conveyor in Copper Mining

Hackathon
Hack Mining!

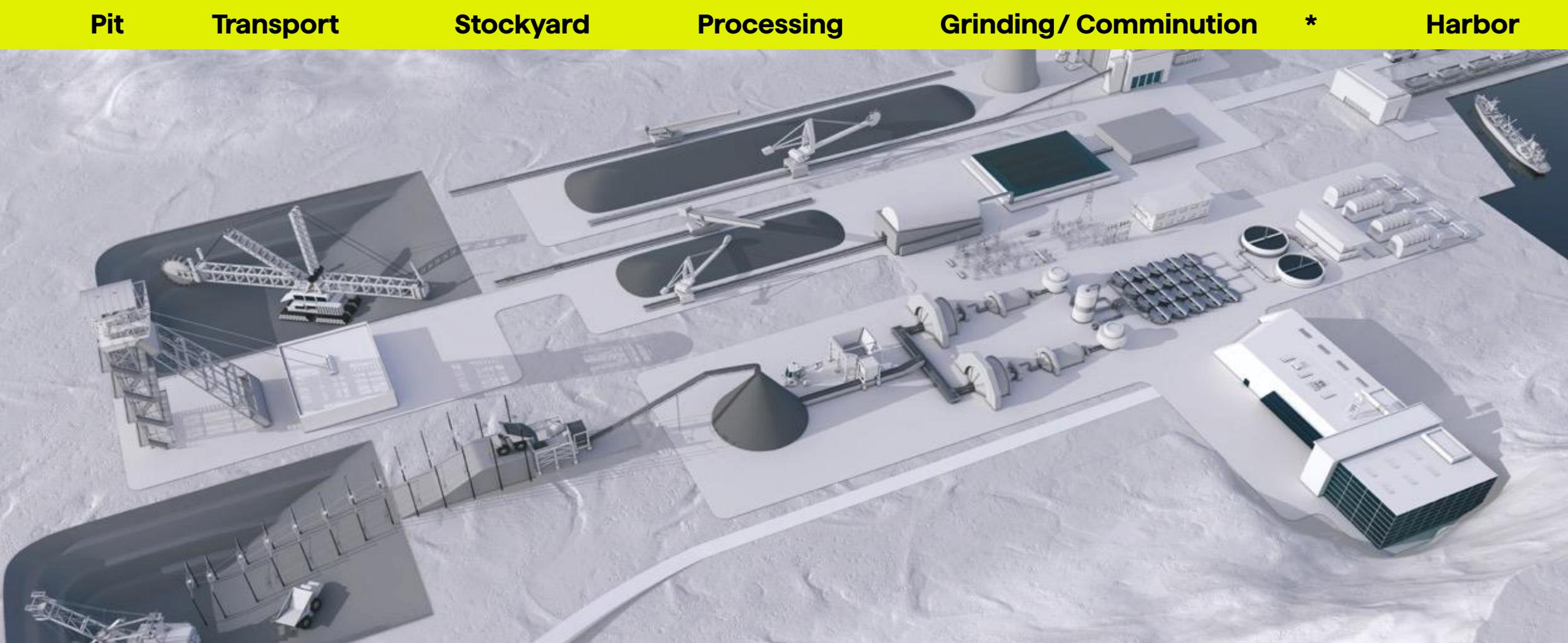
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Content

- 00 Mining Process
- 01 Current – Situation
- 02 Data availability
- 03 Task

Mining Processes – Value Chain based on three Types of Excavation



* Leaching / Electrowinning / Water Treatment / Flotation / Pellet Plants

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Open Pit mining

Short Introduction

Truck and shovel operation / discontinuous mining



Continuous mining



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3rd biggest Copper mine in the world



Shovel loading



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Current Situation



Nominal load: 300t
Average load: 290t

Trucks:
Connection between
extraction site and
crusher

Mine site Western Australia - Pit, primary Crushers, Belt Conveyors

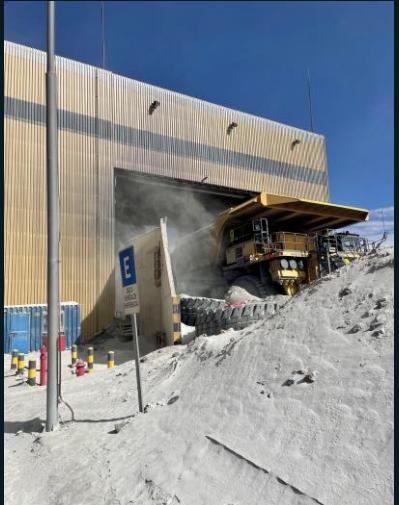


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Current Situation

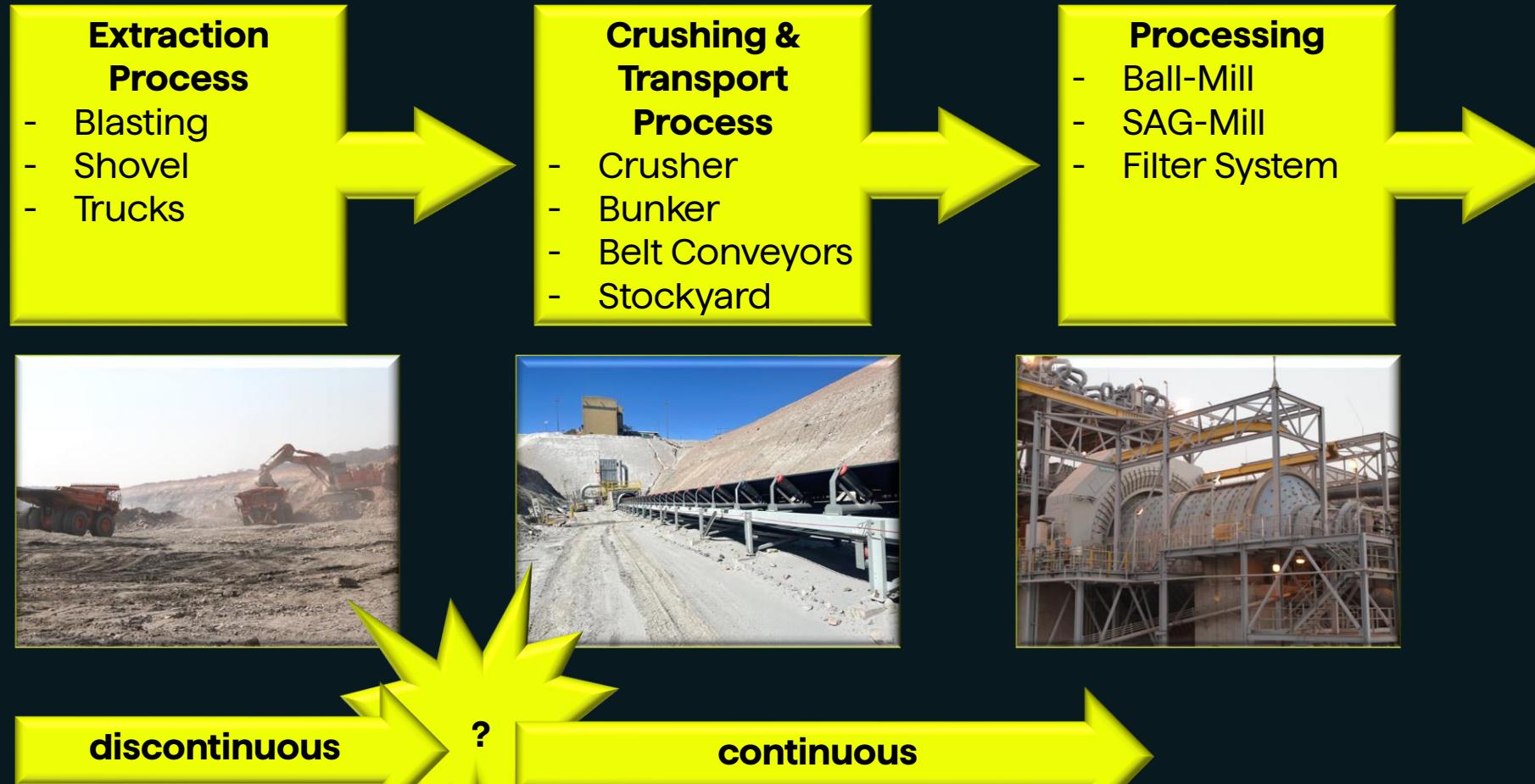


Crusher station:
Interface between
discontinuous and
continuous transport



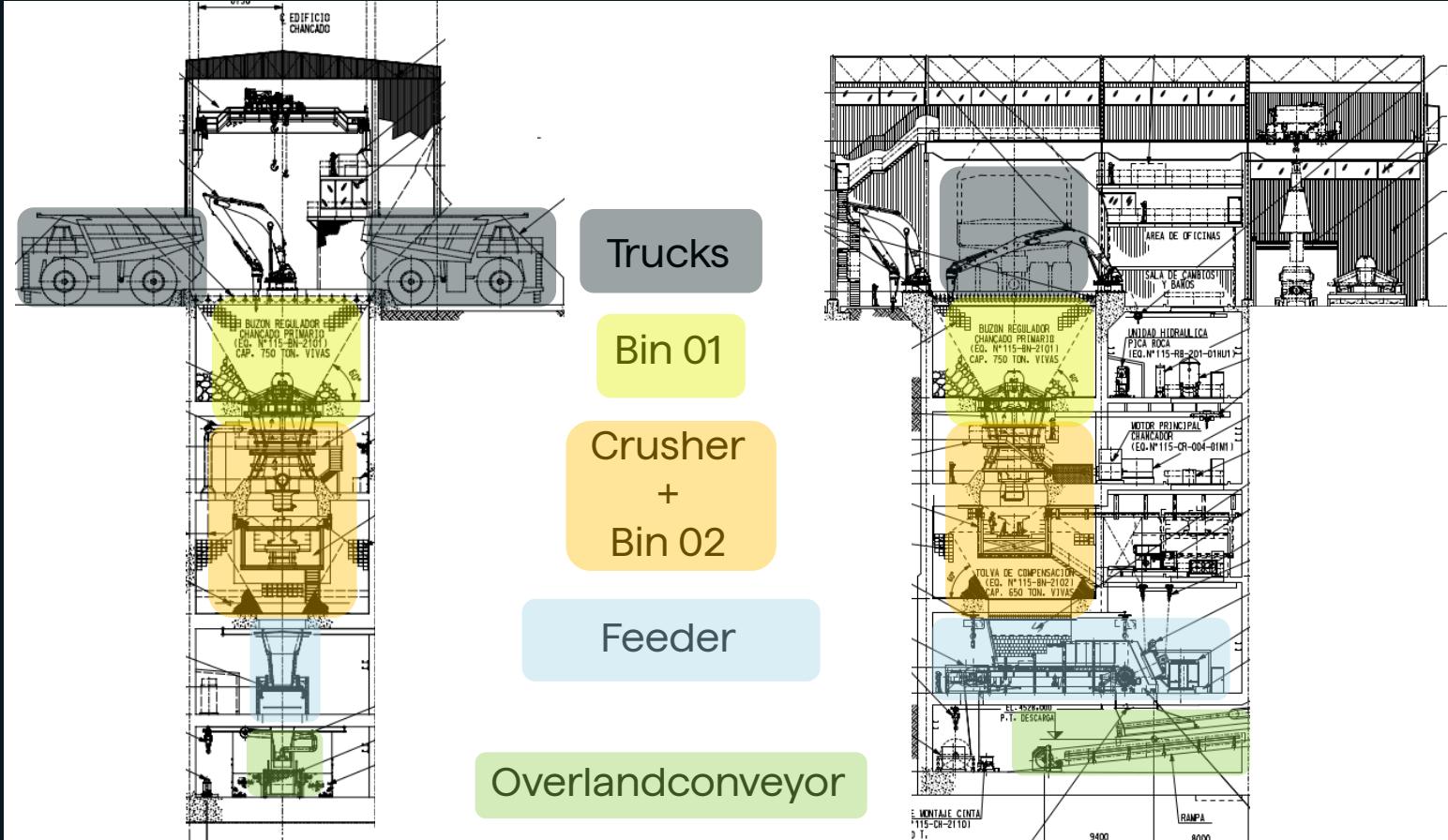
Current Situation

What does the transport process for the copper ore look like?



The typical path of copper ore in a mine.

Current Situation



Crusher station:
Interface between
discontinuous and
continuous transport

Current Situation

Technical data:

Bin 01 volume : 750 t

Bin 02 volume: 650 t

Crusher capacity: 10.000 t/h

Feeder capacity: 11.400 t/h bei 0,5 m/s

Feeder variable speed: 0 ... 0,5 m/s

Overland conveyor capacity: 12.000 t/h

Overland conveyor fix speed : 6,67 m/s

Crusher station:
Interface between
discontinuous and
continuous transport

Current Situation

Technical data, requirements:

General availability: 73 %

Truck:

Dumping time: 70 s

Shunting time: 30 s

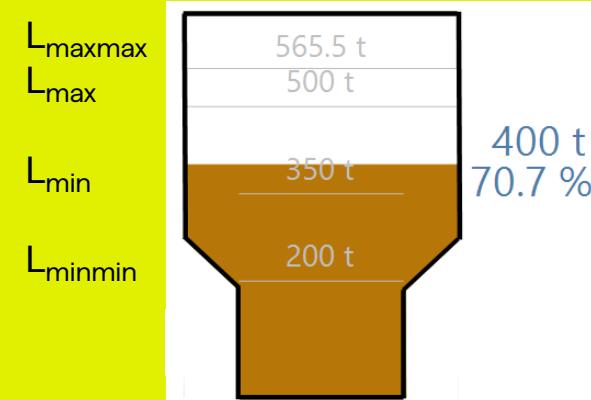
Truck dumping possible → traffic light = green:

- Place for one Truck load (ca.300t) in the Bin 01
- „upcoming“ enough space for one Truck load in the Bin 02
- Crusher is active
- Feeder under Bin 01 is active
- Overland conveyor is active

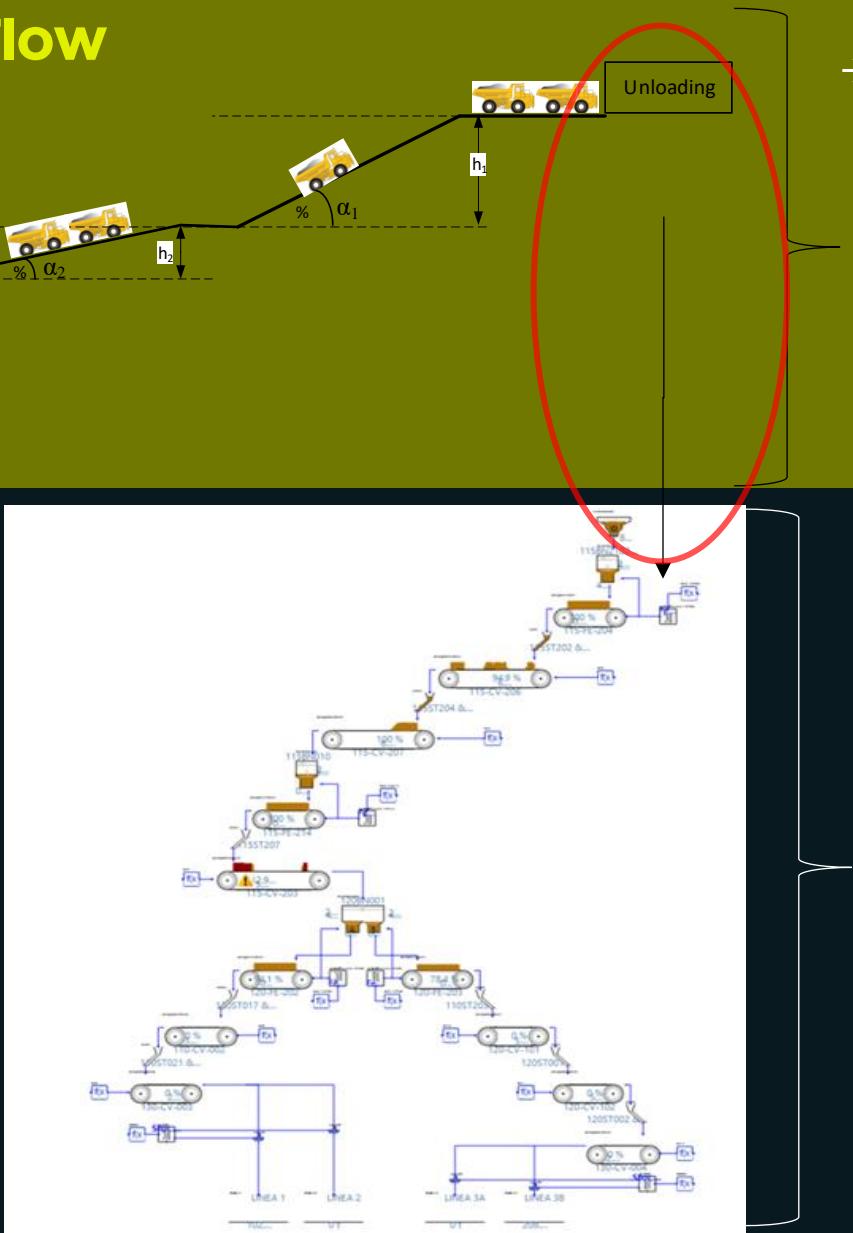
Conditions for the different Feeder speeds (Feeder-Capacity)

- Filling Level Bin 02 is between Lmin and Lmax in optimum
- Reach under Lminmin → Stop Feeder
- Reach more than Lmaxmax → Stop Crusher (No go)

Crusher station:
Interface between
discontinuous and
continuous transport



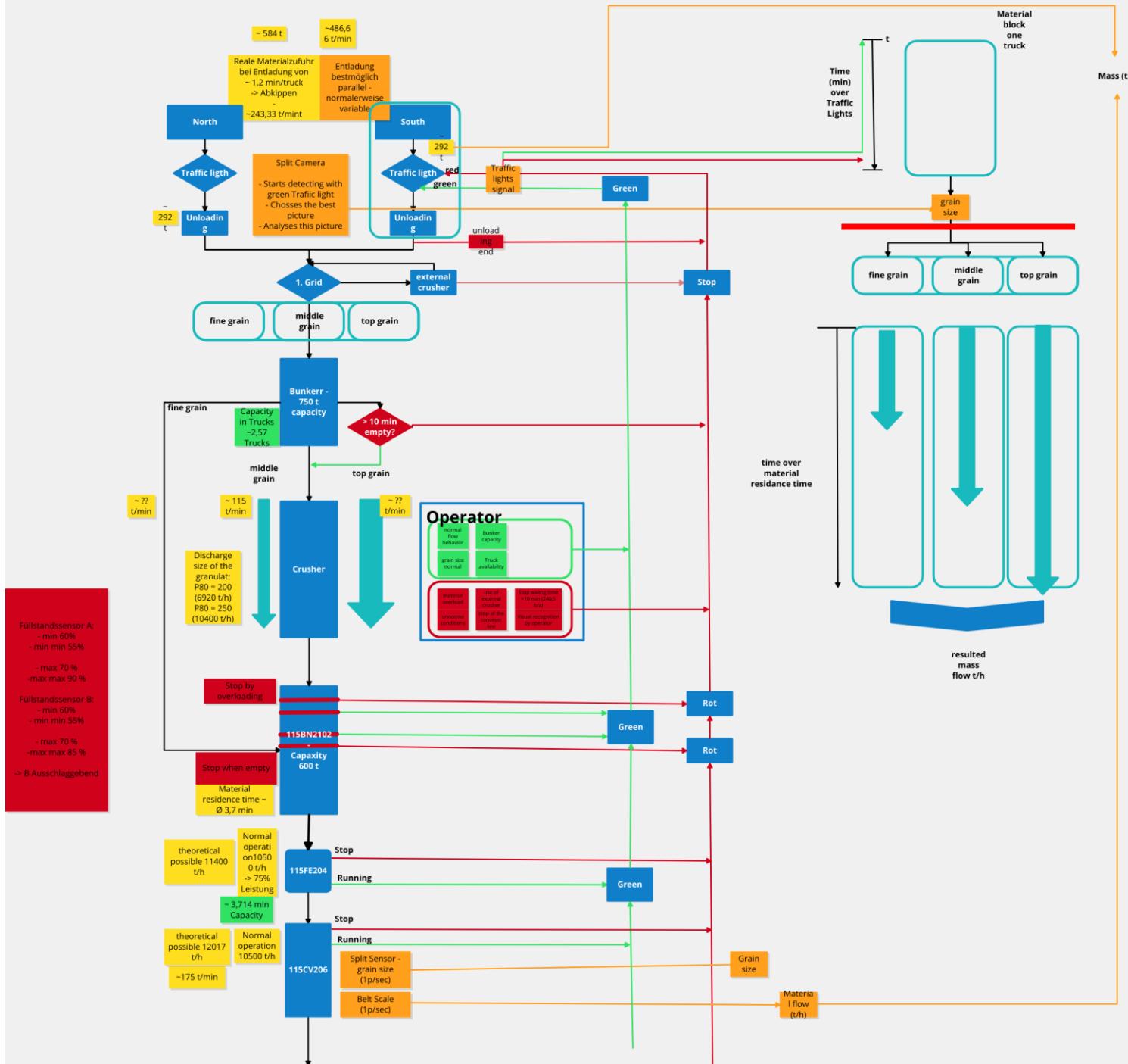
Process Flow



→ Discontinuous transportation is represented by

→ Continuous transportation is represented by

Process - Introduction



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Use Case - Process Model



Goal – Is there a correlation in the data to find indications for optimized interface between dis- and continuous transport process

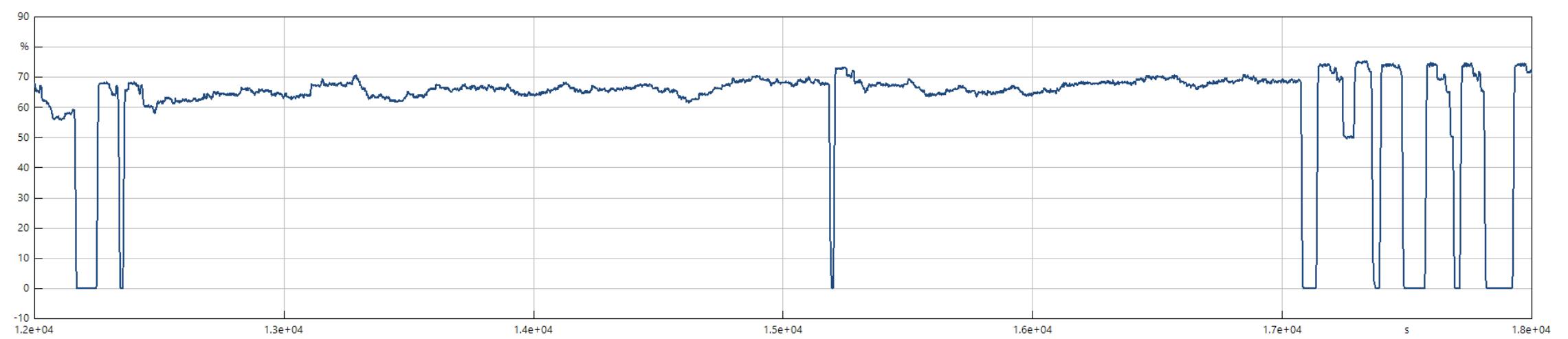
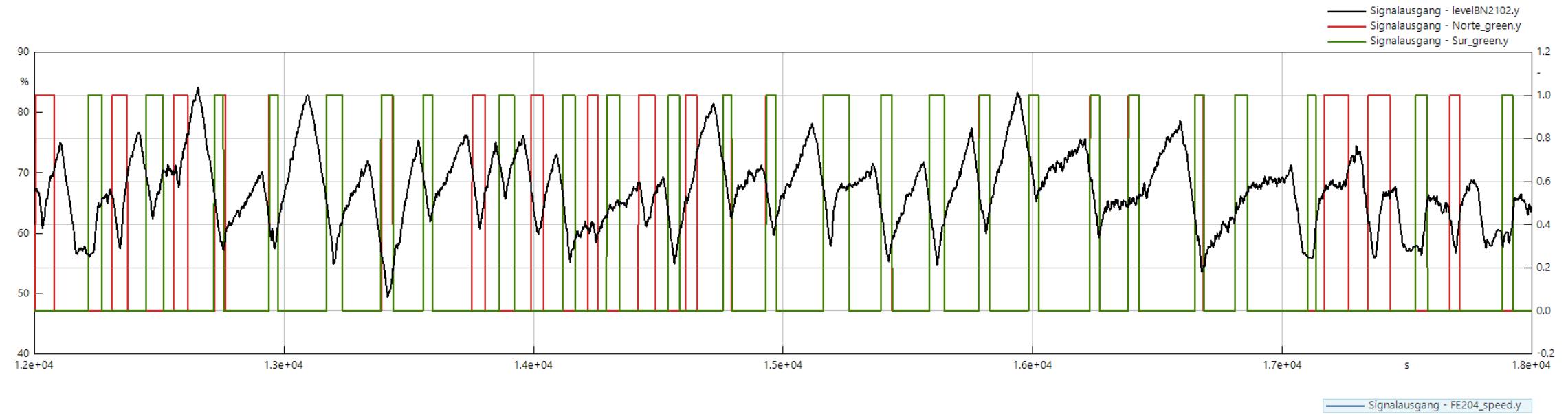
Definition of conditions that ensure that a conveying capacity of at least 10,000 t/h is achieved at the interface between discontinuous and continuous material transport.

- Optimizing the Truck unloading!!

- Considering the existing technical boundary conditions
- Analysis of the measured data on the actual state

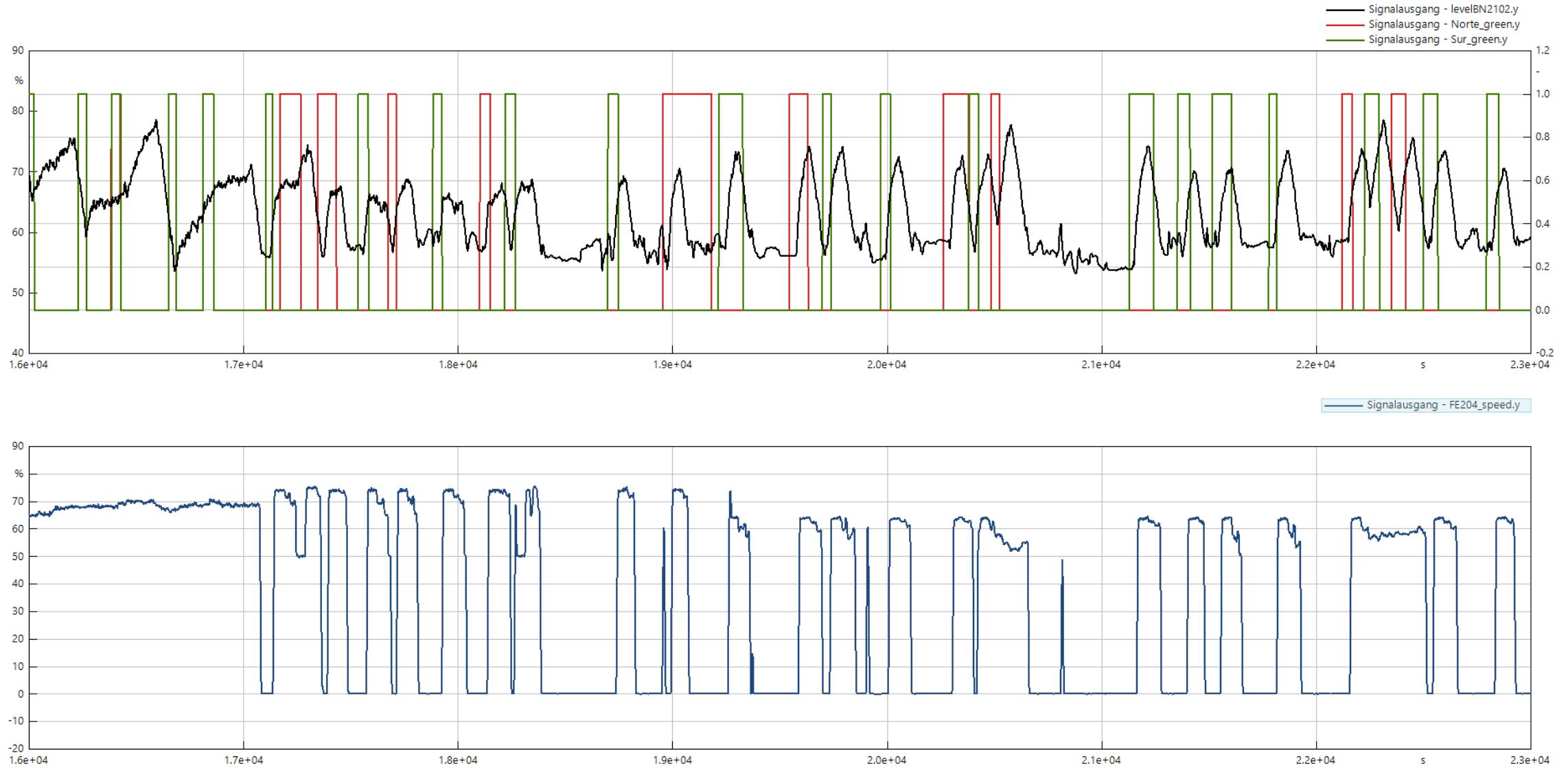
Thank you.

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Level ranges between 50% and 85%, feeder can work constantly with speed appr.65% . This results is a constant material flow.

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The filling level is between 52% and 78%, the feeder works at about 75% speed (later with 65%). It often comes to on/off of the feeder and thus to a discontinuous material flow.

Infos

What is the Bond Work Index?

The bond work index is a measure of the crushing and grinding resistance of ores and is determined using the bond grindability test. Its value represents an ore property and is used for the planning of industrial comminution plants.

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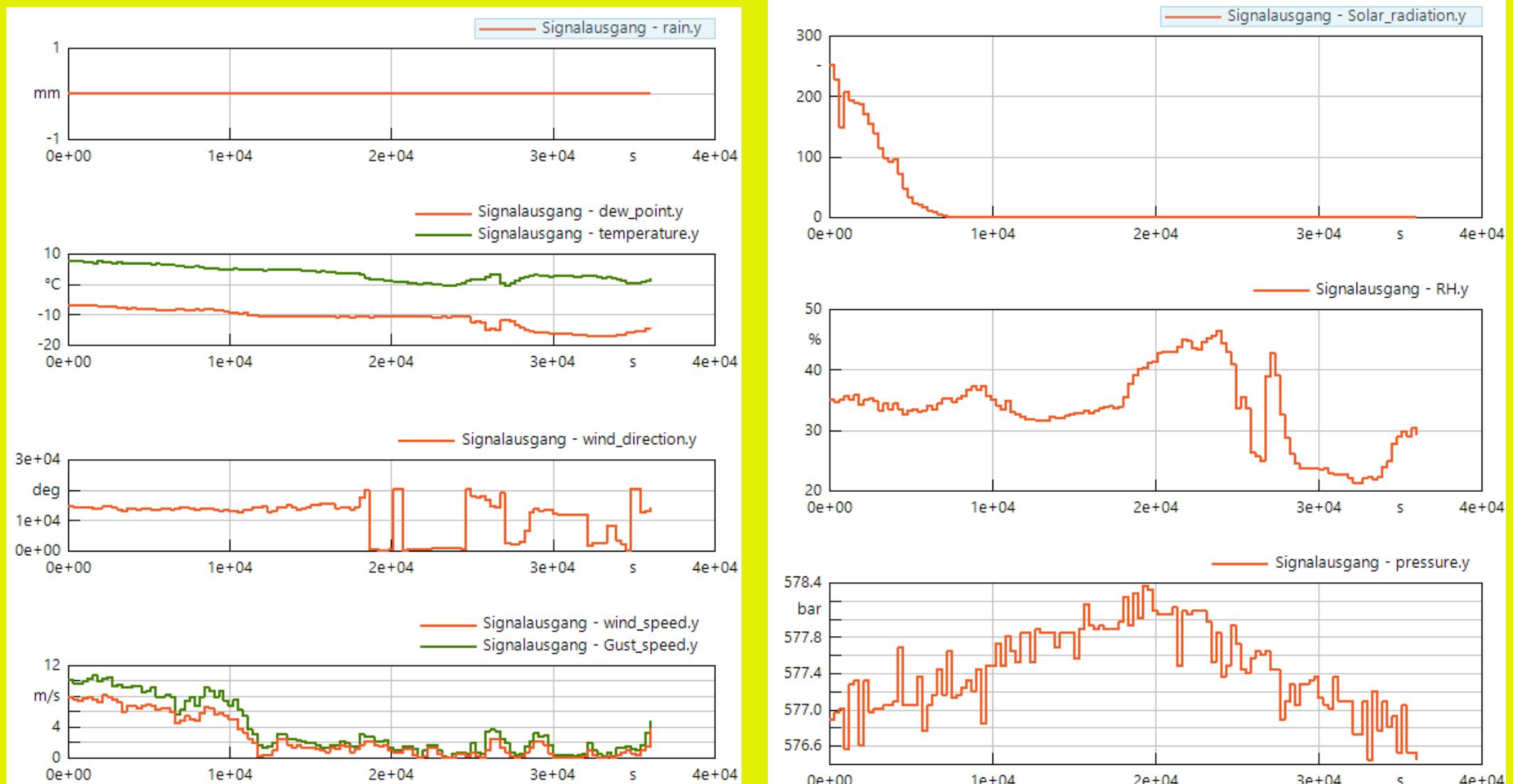
Conveying capacity unsteady : $I_u = \text{Nutzlast Truck[t]} \times \text{Anzahl Truck[-]} / \text{Zeit[h]}$ → [t/h]

Conveying capacity steady : $I_s = \text{Meterlast[t/m]} \times \text{Gurtgeschwindigkeit[m/s]}$ → [t/h]

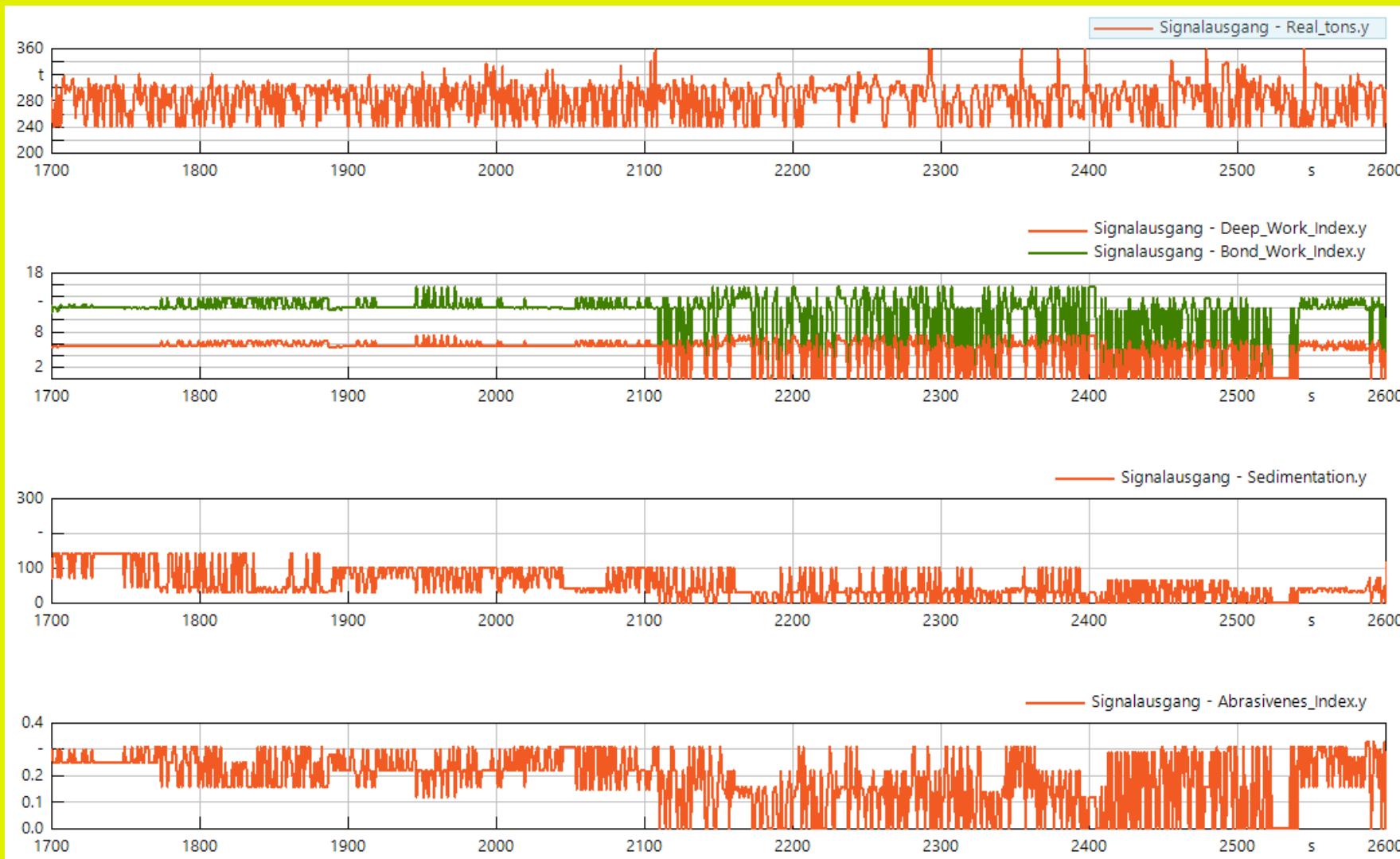
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Example Measurement data: customer_tags_list

Wheather data



Example Measurement data: dispatch file



Further data in the dispatch file:

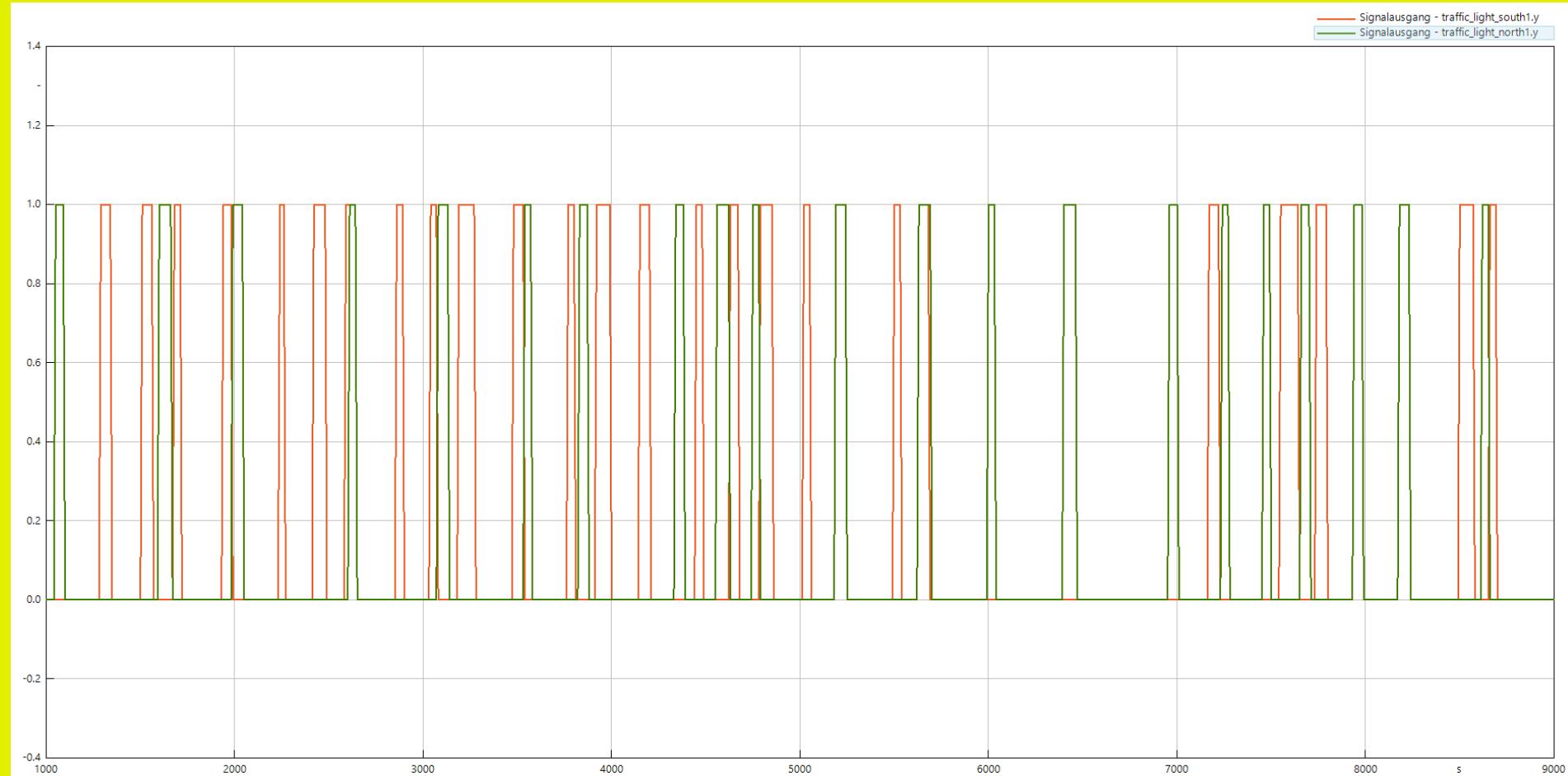
- Shift day
- Shift start
- Shift name
- Shovel
- Truck
- Origin
- Destination
- Truck arrival date
- Truck Discharge date
- Copper grade
- Soluble copper grade
- Py
- Iron
- Arsenic
- Mo
- Copper recovery
- Kao
- Piro
- Cp
- Bn
- III
- Mus
- Sulfide
- PH

Example Measurement data: crusher_data

Traffic lights north and south

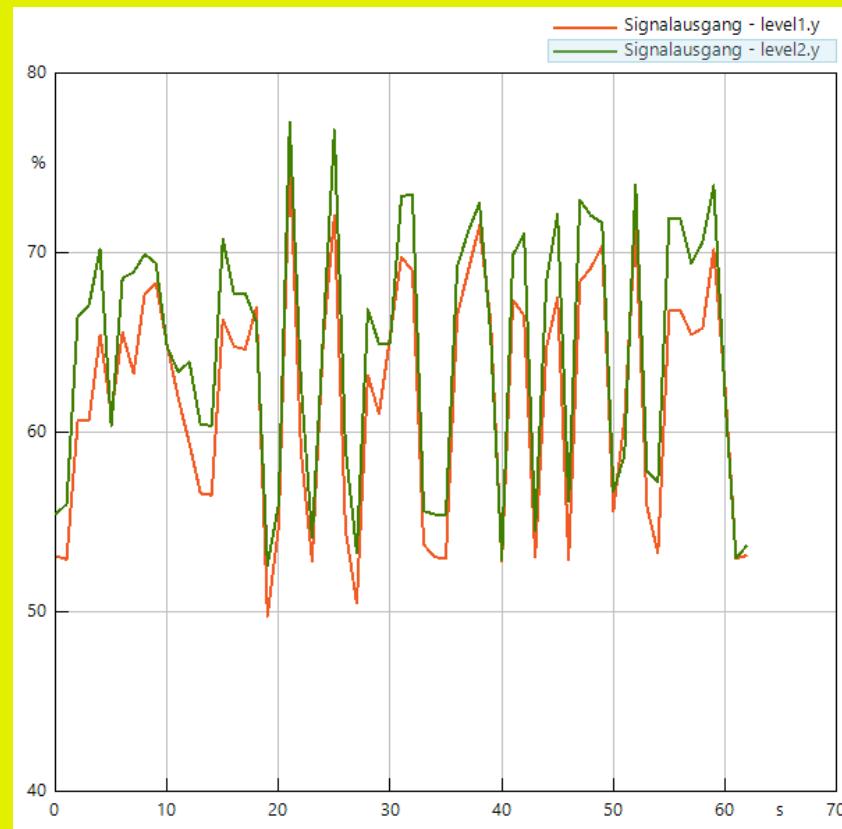
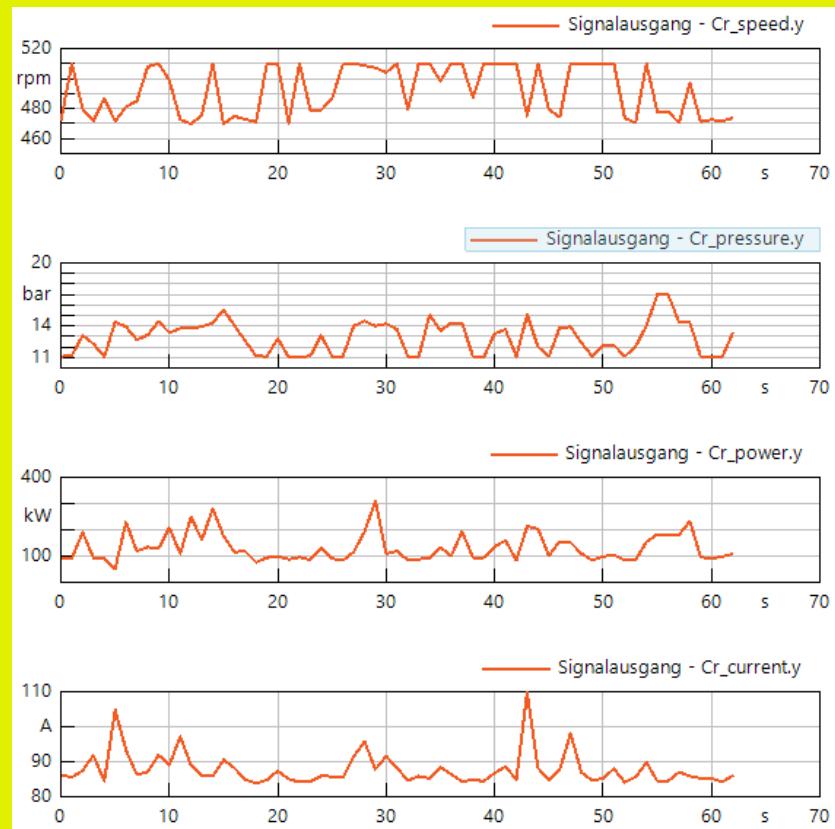
Further data in the crusher data file:

- Div. temperatures motors
- Data from Split-System



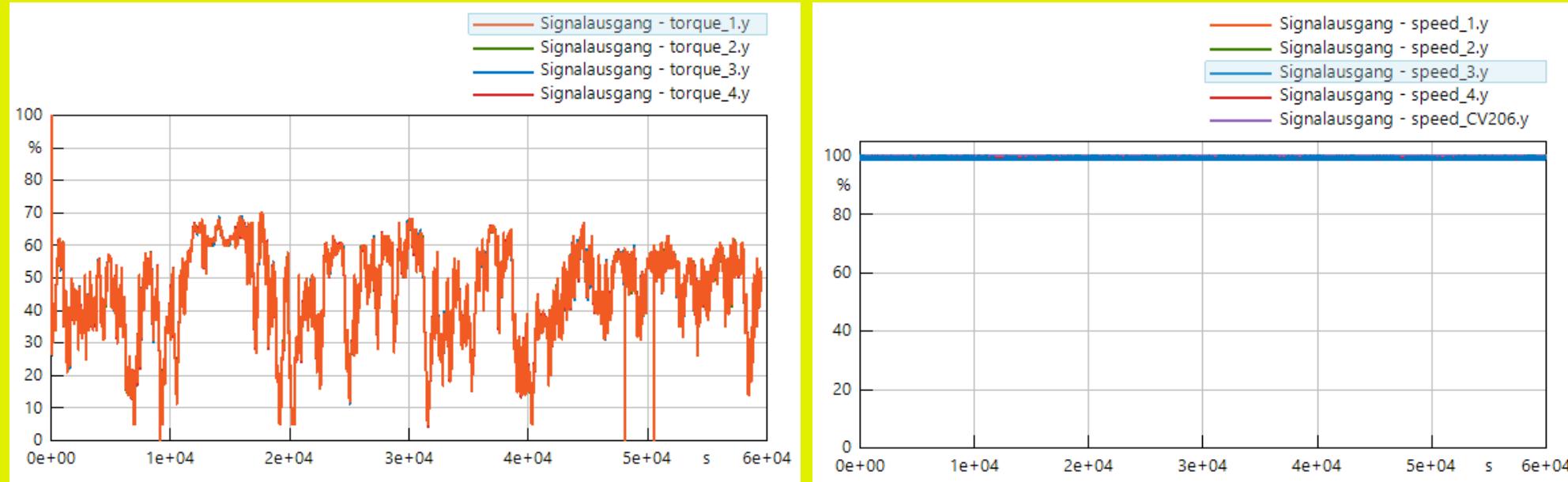
Example Measurement data: crusher_data

Crusher data & bin level



Example Measurement data: crusher_data
Feeder

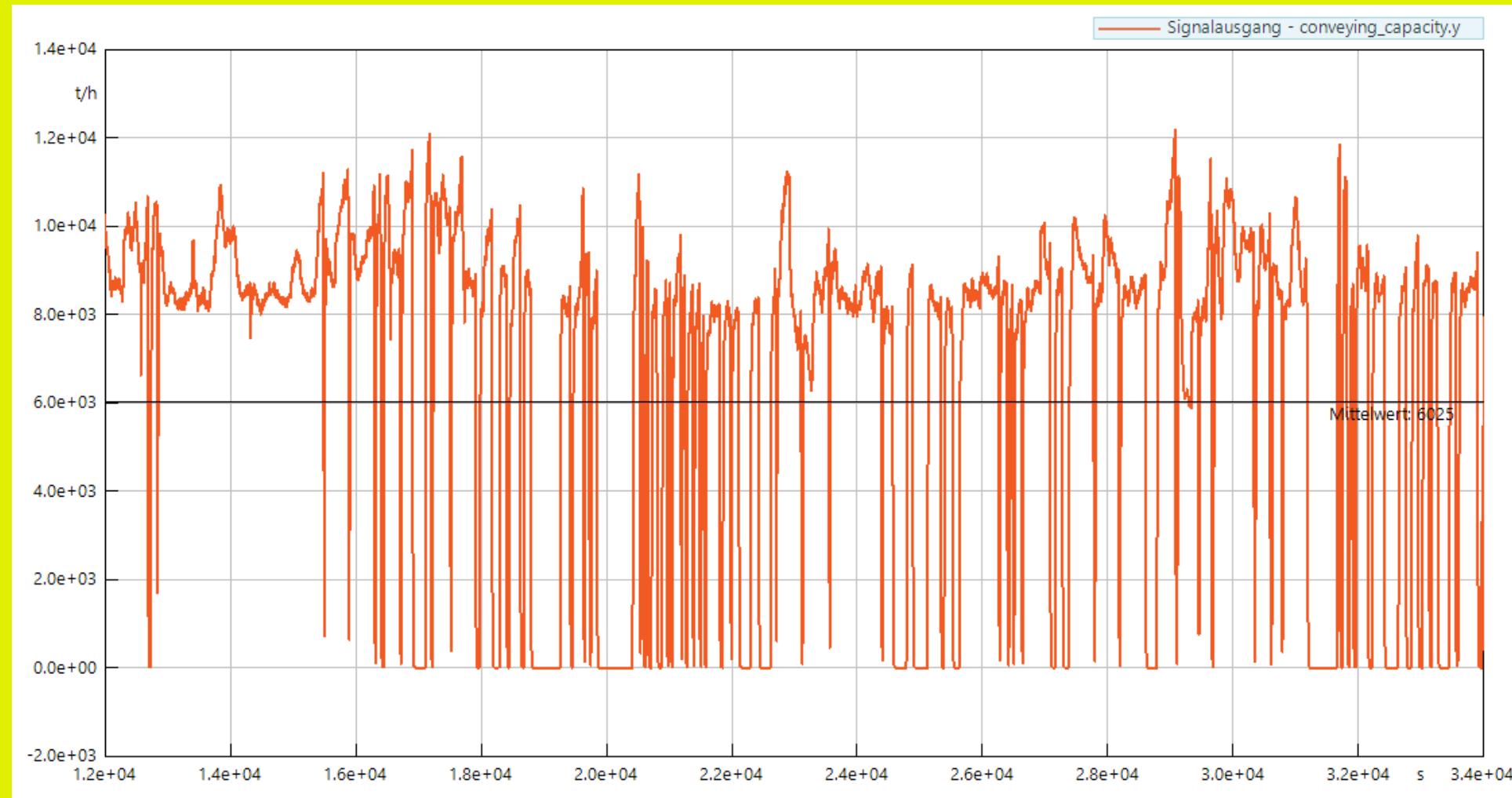
Example Measurement data: customer_tags_list motor data CV206



- Further data in the customer tags list-file:
- Div. temperatures motors & gearboxes
 - Motor current, vibration-tension pulley, status gearbox on/off, winch data (current, speed, tension), slip but all values → only 1 value per minute
 - The same motor data is available for CV207.

Example Measurement data: customer_tags_list

Data belt scale



Crusher_data_for_analysis - Legende

data	timestamp	114CR004_RDT_Est6	115RACV20_6Y6	115RACV20_6Y9	115RACV20_6P20	115RACR00_4L2P80	115YL12011_A	115RACR00_4L1Y8	115AIX010	115AIX001	115AIX008	CO13_V030_4S01	115RACR00_4L1Y3	115RACR00_4L2Y5	115RACR00_4L1P20	115RACV20_6P80	CO13_V030_6P03	115AIX003	115AIX005	115AIX006
unit / format	dd.mm.yyy y. hh:min:sec	°C	%	%	%	%	on / off	%				rpm	%	%	%	%				
description																				
Zeit-stempel	motor winding temperatur e 20	split system 1 inch opening	split system 0.185 inch opening	split system size p20	split system loza sur p80 inch opening	split system loza sur p80 inch opening	traffic light status (south)	split system loza norte 0.25 inch opening	i-crucher 2d - zone 3 level	i-crucher 3d-surface zone 1 volume	i-crucher 2d - zone 1 level	crusher motor rotational speed	split system loza norte 2 inch opening	split system loza sur 3 inch opening	split system loza norte p20 inch opening	split system size p80	hidroset pressure crusher	i-crucher 3d-surface zone 3 volume	i-crucher 3d-surface total volume	i-crucher 3d-surface north volume
Asset	all	crusher	split GF 206	split GF 206	split GF 206	split crusher	station	split crusher				crusher	split crusher	split crusher	split crusher	split GF 206	crusher			
Frequenc	sec	min	min	min	min	min	sec	min	sec	sec	sec	*1)	min	min	min	min	*1)	sec	sec	sec

data	115AIX007	CO13_TI120_32-B	115RACV20_6Y2	115RACR00_4L2Y6	115RACR00_4L1P80	115AIX012	L2Y4	115RACR004_Y4	115RACV206_L1Y1	115RACR004_L1Y1	115AIX011	115AIX002	115FE204_S_SM_MV_SLIP	115RACR004_L1Y9	115RACR004_L1Y5	115RACV206_Y3	115RACR004_L2Y3	CO13_V0306_T01	115YL12013_A	115RACV206_Y7	115RACR004_L2Y8
unit / format		°C	%	%	%		%	%	%			-	%	%	%	%	°C	on / off	%	%	
description	i-crucher 3d-surface south volume	motor winding temperatur e 10	split system 4 inch opening	split system loza sur 1 inch opening	split system loza norte p80 inch opening	i-crucher 2d - north zone level	split system loza sur 1.25 inch opening	split system loza norte 1.25 inch opening	split system loza norte 8 inch opening	i-crucher 2d - zone 4 level	i-crucher 3d-surface - zone 2 volume	slip between belt and pulley	split system loza norte 0.185 inch opening	split system loza norte 3 inch opening	split system loza sur 2 inch opening	motor winding temperature 12	traffic light status (north)	split system loza sur 0.5 inch opening	split system loza sur 0.25 inch opening	split system loza sur 0.25 inch opening	
Asset		crusher	split GF 206	split crusher	split crusher		split crusher	split GF 206	split crusher			feeder	split crusher	split crusher	split GF 206	split crusher	crusher	station	split GF 206	split crusher	
Frequenc	sec	min	min	min	min	sec	min	min	min	sec	sec	sec	min	min	min	min	min	sec	min	min	

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*1) Data every second is stored in a separate file

Crusher_data_for_analysis - Legende

data	115AIX009	CO13_115FE 204TIT	115FE204_0 2M1RUN	114CR004_R DT_Est5	115RACR004 L2Y9	115AIX013	CO13_V0304 E01	114CR004_R DT_Des1	115RACR004 L1Y2	115RACV206 Y5	115AIX004	CO13_115FE 204PIT	114CR004_R DT_Est2	114CR004_R DT_Est3	CO13_TI120 32-A	115RACR004 L2Y7	115CR004M otor	114CR004_R DT_Est1	115RACR004 L1Y4	115RACV206 Y8
unit / format		°C	on / off	°C	%		kW	°C	%	%		%	°C	°C	%	A	°C	%	%	
description	i-crucher 2d - zone 2 level	Temperatur e System. Hydraulic	Operating Status- Stopped Motor N°1 U.H. Feeder	motor winding temperature	split system loza sur 0.185 inch opening	i-crucher 2d - south zone level	motor power consumption	motor winding temperature	split system loza norte 4 inch opening	split system 3 inch opening	i-crucher 3d- surface - zone 4 volume	Pressure Sys. Hydraulic	motor winding temperature	motor winding temperature	motor winding temperature	split system loza sur 0.5 inch opening	motor current	motor winding temperature 1.25 inch opening	split system loza norte 0.25 inch opening	
Asset		feeder	feeder	crusher	split crusher		crusher	crusher	split crusher	split GF 206		feeder	crusher	crusher	crusher	split crusher	crusher	crusher	split crusher	
Frequency	sec	min	*1)	min	min	sec	*1)	min	min	min	sec	min	min	min	min	min	*1)	min	min	
data	115RACR004 L2P20	115LIT12040 A	CO13_TT120 38	114CR004_R DT_Des2	114CR004_R DT_Est4	115RACR004 L2Y2	115LIT12040 E	115RACR004 L2Y1	115RACR004 L1Y7	115RACR004 L1Y6	115RACV206 Y1	115FE204_0 2M2RUN								
unit / format	%	%	°C	°C	°C	%	%	%	%	%	%	on / off								
description	split system loza sur p20 inch opening	level mailbox (Redundant sensors for bin level)	motor winding temperature	motor winding temperature	motor winding temperature	split system dome level (Redundant sensors for bin level)	split system loza sur 4 inch opening	split system dome level (Redundant sensors for bin level)	split system loza sur 8 inch opening	split system loza norte 0.5 inch opening	split system loza norte 1 inch opening	split system 8 inch opening	Operating Status- Stopped Motor N°2 U.H. Feeder							
Asset	split crusher	bin 02	crusher	crusher	crusher	split crusher	bin 02	split crusher	split crusher	split crusher	split GF 206	feeder								
Frequency	min	*1)	min	min	min	min	*1)	min	min	min	min	*1)								

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Customer_tags_list_data - Legende

data	timestamp	115TI13136	115TI13137	115TI13134	115CV207_TEMP_ACEI	TE_RED1	115TI13037	115TI12704	115TI12713	115TI12624	115TI13002	115TI13003	115TI12613	115CV207_REDUCER3_MOTOR_Conv	115CV207_FOLLOWER3_Current	115CV206_FOLLOWER4_Torque	115TI12725	115CV206_FOLLOWER4_Torque	115II1-12005	115CV207_FOLLOWER1_Torque	
	dd.mm.yyy hh:min:sec	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	on / off	°C	°C	°C	%	%	%	
description	Zeit-stempel	TEMP 5 BOBINA MOTOR 2 115CV207	TEMP 6 BOBINA MOTOR 2 115CV207	TEMP 3 BOBINA MOTOR 2 115CV207	Temperatura aceite reductor motor 1 115CV207	Temperatura reducto motor 1 115CV207	Temperatu re 3 of motor winding 1 Gearbox 1	Temperatu re 2 of motor winding 2 Gearbox 1	Temperatu re 4 motor winding 1 Gearbox 1	TEMP 3 POLEA COLA CV	TEMP 4 POLEA COLA CV	TEMP 2 POLEA COLA CV	TEMP 2 TENSOR CV 206	Current Motor 3 Status 3	TEMP 3 BOBINA MOTOR 3 115CV207	Temperatu re 4 of motor winding 3 Gearbox 1	Temperatu re 8 motor winding 3 Gearbox 1	Torque Motor 4	Winche current	Torque Motor 1	
Asset	all	GF207	GF207	GF207	GF207	GF207	GF206	GF206	GF206	GF206	GF207	GF207	GF207	GF207	GF207	GF207	GF206	GF206	GF206		
Frequency	sec	min	min	min	min	min	min	min	min	min	min	min	min	min	min	min	min	sec	min	sec	
data	115TI13036	115TI12723	115CV206_Speed	115TI13147	115CV207_TEMP_ACEI	TE_RED3	Rain	115CV206_FOLLOWER1_Torque	115VI12613	115CV207_FOLLOWER2_ActSpee	115TI13142	115TI13108	115CV206_FOLLOWER1_ActSpee	115CV206_FOLLOWER2_ActSpee	115CV206_FOLLOWER4_ActSpee	115TI12735	115CV207_SLIP_CONTROL_1_2_SLIP	115TI12733	115CV207Reducer2_Motor_Conv	115TI13102	115TI13124
	°C	°C	°C	°C	°C	m	%										on / off	°C	°C		
description	Temperatu res 6 Gearbox 1	Temperatu re 2 of motor winding 3	cmdic-colla-def- ct-cnby1-mech1- belt1-lspd2p	TEMP 6 BOBINA MOTOR 3 115CV207	Temperatura aceite reductor motor 3 115CV207	weather- rain	Torque Motor 1	Vibration 2 tail pulley	cmdic-colla-def- ct-cnby3-elec1-mtr2- aspd1p	TEMP 1 BOBINA MOTOR 3 115CV207	Temperatu re 8 Gearbox 2	speedMo1	speedMo2	speedMo4	Temperatu re 4 of motor winding 4 Slip head pulley	Temperatu re 2 of motor winding 4 Motor Status 2	Temperatu re 2 of motor winding 4 Gearbox 2 Gearbox 3	Temperatu re 2 Gearbox 2	Temperatu re 4 Gearbox 3		
Asset	GF207	GF206	GF206	GF207	GF207	all	GF206	GF206	GF207	GF207	GF207	GF206	GF206	GF206	GF206	GF207	GF206	GF207	GF207		
Frequency	min	min	min	min	min	min	sec	min	sec	min	min	sec	sec	sec	min	min	min	min	INNOMOTICS	min	

*1) Data every second is stored in a separate file

Customer_tags_list_data - Legende

data					115CV207_FOLLOWER_2_Current		Temperatu						115CV206_FOLLOWER_4_Current					Wind				115CV206_SLIP_CONTROL_PROM_SLIP
	Dew Point	115TI12702	115TI12668		115TI13041	Temperatu	re	115TI12706	115TI12722	115TI13065	115TI13140	115TI13110	115VI12614	115TI13145	115TI13005	Wind	Direction	115TI12736	115TI12681	115TI12682		
	°C	°C	°C		°C	°C	°C	°C	°C	°C	°C		°C	°C	°C	°	°C	°C	°C	°C	-	
description	weather-dew point	Temperature 1 of motor winding 1	Temperature 8 Gearbox 3	Current Motor 2	TEMP 2 POLEA MOTRIZ MOTOR 1 CV 207	weather-temperatur e	Temperature 5 of motor winding 1	Temperature 1 of motor winding 3	TEMP 4 BOBINA MOTOR 1	TEMP DESCANSO 1 MOTOR 3	TEMP 1 POLEA MOTRIZ MOTOR 2/3	Current	Vibration tension pulley	TEMP 4 BOBINA MOTOR 3	TEMP 2 POLEA COLA CV 207	weather-wind direction	Temperature 5 of motor winding 4	Temperature 1 Gearbox 4	Temperature 2 Gearbox 4	Temperature 4 Slip means		
Asset	all	GF206	GF206	GF207	GF207	all	GF206	GF206	GF207	GF207	GF207	GF206	GF206	GF207	GF207	all	GF206	GF206	GF206	GF206		
Frequency	min	min	min	min	min	min	min	min	min	min	min	min	min	min	min	min	min	min	min	min		
data	115TI13125	115TI12712	115TI12626	115TI12685	115CV207_Speed	115TI13032	115TI12628	115TI13061	115TI13146	115TI13141	Wind Speed	115TI12647	115CV207_Reducer1_Motor_Conv	115TI13062	115CV207_TEMP_ACEI_TE_RED2	115LI12702_MV	115TI12714	115TI12625	115TI12666	115CV207_FOLLOWER_3_ActSpee d		
	°C	°C	°C	°C	%	°C	°C	°C	°C	°C	m/s	°C	on / off	°C	°C		°C	°C	°C	°C	%	
description	Temperature 5 Gearbox 3	Temperature 1 of motor winding 2	Temperature 6 Gearbox 1	Temperature 5 Gearbox 4	cmdic-colla-defect-cnby3-mech1-belt1-lspd2p	Temperatu	Temperatu	TEMP DESCANSO 2 MOTOR 1	TEMP 5 BOBINA MOTOR 3	TEMP DESCANSO 2 MOTOR 3	weather-	Temperatu	TEMP 1 BOBINA MOTOR 1	Temperatu	ra aceite reductor	Counterwei	Temperatu	Temperatu	Temperatu	cmdic-colla-defect-cnby3-elec1-mtr3-aspd1p		
Asset	GF207	GF206	GF206	GF206	GF207	GF207	GF206	GF207	GF207	GF207	all	GF206	GF207	GF207	GF207	GF207	GF206	GF206	GF206	GF207		
Frequency	min	min	min	min	sec	min	min	min	min	min	min	min	sec	min	min	min	min	min	min	sec		

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Customer_tags_list_data - Legende

data	115TI13123	115CV206_FOLLOWER_3_Torque	115TI12734	115WIT126	115TI12621	115TI12644	115TI12688	115-XI1-12005	115TI13063	115TI13034	Solar Radiation	115TI12707	115TI12645	115TI12686	115TI13105	115CV207_SLIP_CONTROL_3_4_SL	IP	115TI12705	115TI12715	115TI12717	115TI13133
	°C	%	°C	t/h	°C	°C	°C	%	°C	°C	W/m²	°C	°C	°C	°C	-	°C	°C	°C	°C	
description	Temperatures 3 Gearbox 3	Torque Motor 3	Temperatu re 3 of motor winding 4	belt scale	Temperatu res 1	Temperatu res 4	Temperatu res 8	Winche	TEMP 2 BOBINA MOTOR 1	Temperatu res 4	weather-solar radiation	Temperatu re 6 of motor winding 1	Temperatu res 5	Temperatu res 6	Temperatu res 5	Slip tail pulley	Temperatu re 4 of motor winding 1	Temperatu re 4 of motor winding 2	Temperatu re 6 of motor winding 2	TEMP 2 BOBINA MOTOR 2	
Asset	GF207	GF206	GF206	GF206	GF206	GF206	GF206	GF206	GF207	GF207	all	GF206	GF206	GF206	GF207	GF206	GF206	GF206	GF206	GF207	
Frequency	min	sec	min	sec	min	min	min	min	min	min	min	min	min	min	min	min	min	min	min		
data	115TI13126	115TI12703	115CV206_FOLLOWER_3_Current	115TI13066	RH	Gust Speed	115TI12648	115TI13143	115WIT126	115TI13031	115TI13127	115TI12687	115TI13132	115CV207_FOLLOWER_2_Torque	115TI13040	115TI13106	115TI12623	115TI12663	115CV206_SLIP_CONTROL_3_4_SL	115TI12615	
	°C	°C		°C	%	m/s	°C	°C	t/h	°C	°C	°C	°C	%	°C	°C	°C	°C	°C		
description	Temperatu res 6 Gearbox 3	Temperatu re 2 of motor winding 1	Current Motor 3	TEMP 5 BOBINA MOTOR 1	weather-moisture	weather-linear speed / gust speed	TEMP 2 BOBINA MOTOR 3	Temperatu res 8	belt scale	Temperatu res 1	Temperatu res 7	Temperatu res 7	Temperatu res 7	TEMP 1 POLEA MOTRIZ MOTOR 2	Temperatu res 6	Temperatu res 3	Temperatu res 3	Slip tail pulley	TEMP 2 POLEA COLA CV 206		
Asset	GF207	GF206	GF206	GF207	all	all	GF206	GF207	GF206	GF207	GF207	GF206	GF207	GF207	GF207	GF206	GF206	GF206	GF207		
Frequency	min	min	min	min	min	min	min	min	sec	min	min	min	min	sec	min	min	min	min	min		

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data	115-WI-12500A	115CV206 Reducer2_Motor_Conv	115VI12612	115CV207 FOLLOWER_1_Current	115TI13035	115TI13128	115TI12627	115-WI-12500B	115TI13130	115TI13101	Pressure	115TI12614	115TI13067	115CV207 Reducer1_Motor_Conv	115TI13121	115TI13122	115TI12726	115TI12737	115TI12662	115-SI-12005
		on / off			°C	°C	°C		°C	°C	bar	°C	°C	on / off	°C	°C	°C	°C	°C	
description	Winche Tension A	Motor Status 2	Vibration 1 tail pulley	Current Motor 1	Temperatu res 5 Gearbox 1	Temperatu res 8 Gearbox 3	Temperatu res 7 Gearbox 1	Winche Tension B	TEMP DESCANSO 1 MOTOR 2 115 CV 207	Temperatu res 1 Gearbox 2	weather-pressure	TEMP 1 POLEA COLA CV 206	TEMP 6 BOBINA MOTOR 1 115CV207	Motor Status 1	Temperatu res 1 Gearbox 3	Temperatu res 2 Gearbox 3	Temperatu re 5 of motor winding 3	Temperatu re 6 of motor winding 4	Temperatu res 2 Gearbox 3	Winche Speed
Asset	GF206	GF206	GF206	GF207	GF207	GF207	GF206	GF206	GF207	GF207	all	GF206	GF207	GF207	GF207	GF207	GF206	GF206	GF206	
Frequency	min	sec	min	min	min	min	min	min	min	min	min	min	sec	min	min	min	min	min	min	
data	115TI13033	115TI12716	115CV206 Reducer3_Motor_Conv	115TI12665	115VI12615	115TI13135	115CV206 FOLLOWER_3_ActSpee d	115CV206 Reducer4_Motor_Conv	115TI12664	115TI13103	115CV206 FOLLOWER_2_Current	115TI12642	115CV206 SLIP_CONT ROL_1_2_SL IP	115TI13060	115TI13004	115TI12732	115TI12683	115CV207 FOLLOWER_3_Torque	115TI13111	
	°C	°C	on / off	°C	°C	°C	A	%	on / off	°C	°C		°C		°C	°C	°C	°C		
description	Temperatu res 3 Gearbox 1	Temperatu res 5 Motor winding 2	Motor Status 3	Temperatu res 5 Gearbox 3	Vibration 2 tension pulley	TEMP 4 BOBINA MOTOR 2 115CV207	Current Motor 1	speedMo3	Motor Status 4	Temperatu res 4 Gearbox 3	Temperatu res 3 Gearbox 2	Current Motor 2	Temperatu res 2 Slip head Gearbox 2	TEMP DESCANSO 1 MOTOR 1 115 CV 207	TEMP 1 POLEA COLA CV 207	Temperatu re 1 of motor winding 4	Temperatu res 3 Gearbox 4	Torque Motor 3	TEMP 2 POLEA MOTRIZ MOTOR 2/3 CV 207	
Asset	GF207	GF206	GF206	GF206	GF206	GF207	GF206	GF206	GF206	GF206	GF207	GF206	GF206	GF207	GF207	GF206	GF206	GF207		
Frequency	min	min	min	min	min	min	min	sec	sec	min	min	min	min	min	min	min	min	min		

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data	115TI13107	115TI12622	115TI12646	115TI12667	115TI12684	115CV207_FOLLOWER_1_ActSpee d	115CV206_Reducer1_Motor_Con v	115CV206_FOLLOWER_2_Torque	115TI12641	115TI12612	115CV207_SLIP_CONT_ROL_PROM _SLIP	115TI12727	115TI12643	115TI12661	115TI13064	115TI13131	115TI12724	115TI13104
	°C	°C	°C	°C	°C	%	on / off	%	°C	°C		°C	°C	°C	°C	°C	°C	°C
descripti on	Temperatu res 7 Gearbox 2	Temperatu res 2 Gearbox 1	Temperatu res 6 Gearbox 2	Temperatu res 7 Gearbox 3	Temperatu res 4 Gearbox 4	Temperatu res 3- elec1-mtr1- aspd1p	cmdic-colla-def- ct-cnby3-	Motor Status 1	Torque Motor 2	Temperatu res 1 Gearbox 2	TEMP 1 POLEA TENSOR CV 206 Slip	Temperatu re 6 of motor winding 3	Temperatu res 3 Gearbox 2	Temperatu res 1 Gearbox 3	TEMP 3 BOBINA MOTOR 1 115CV207	TEMP DESCANSO 2 MOTOR 2 115 CV 207	Temperatu re 3 of motor winding 3	Temperatu res 4 Gearbox 2
Asset	GF207	GF206	GF206	GF206	GF206	GF207	GF206	GF206	GF206	GF206	GF207	GF206	GF206	GF206	GF207	GF206	GF207	
Frequency	min	min	min	min	min	sec	sec	sec	min	min	min	min	min	min	min	min	min	

Dispatch- Legende

Shift Day	Shift Start Date	Shift Name	Shovel	Truck	Origin	Destination	Truck Arrival Date	Truck Discharge Date	Real Tons
Shift day	Shift start date	Current shift name	Shovel identifier	Unique identifier for the	Truck origin	Trucks intended destination	Timestamp when the truck	Timestamp when the truck	Weight of the cargo loaded
Copper Grade	Soluble Copper Grade	Py	Iron	Arsenic	Deep Work Index (Typo, issue created to fix column title)	Mo	Bond Work Index	Copper Recovery	TPH to Mills
Copper grade	Soluble copper grade	Pyrite	Iron	Arsenic	Drop work index	Molybdenum	Bond work index	Copper recovery in flotation	Tons per hour load to mills
Kao	Piro	Cp	Bn	Ill	Mus	Sulfide	PH	Sedimentation Rate	Abrasiveness Index
Kaolinite	Pyrophyllite	Chalcopyrite	Bornite	Illite	Muscobite	Sulfide	PH	Geo-metallurgical variable sedimentation rate	Geo-metallurgical variable abrasiveness index
Version Date	Manual Registration								
Last record modification	Unkown								