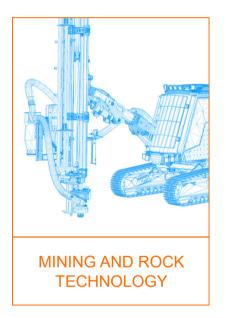
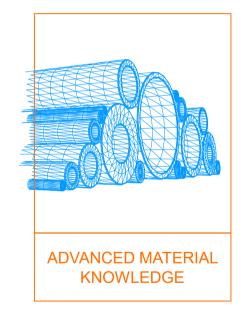


SANDVIK WORLD-LEADING POSITIONS

PRODUCT AREAS

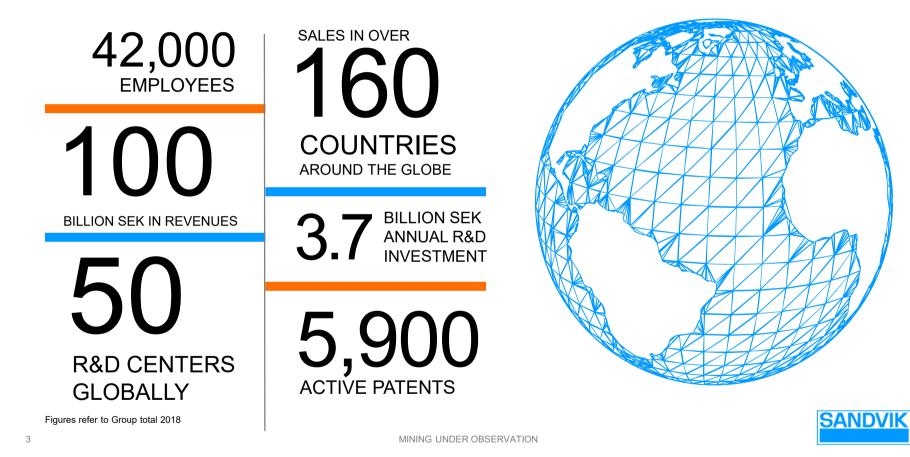






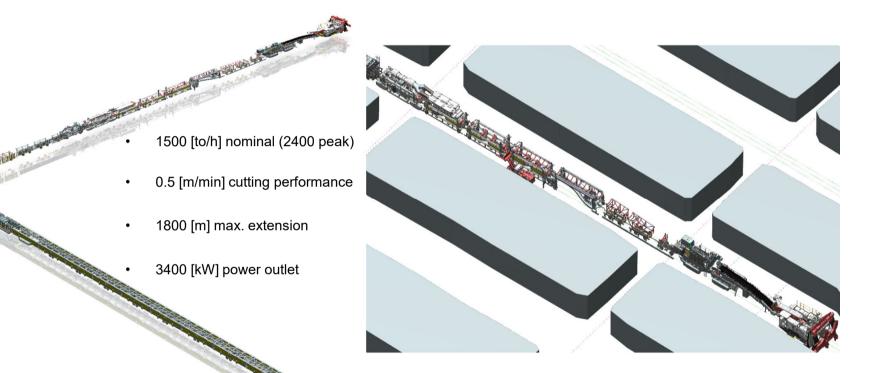


SANDVIK – COMPANY KEY FIGURES



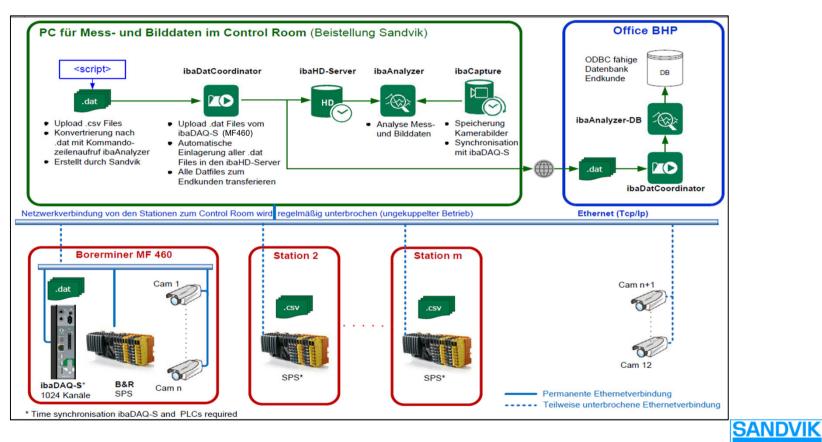
MINING SYSTEM MF460 & PO140

4

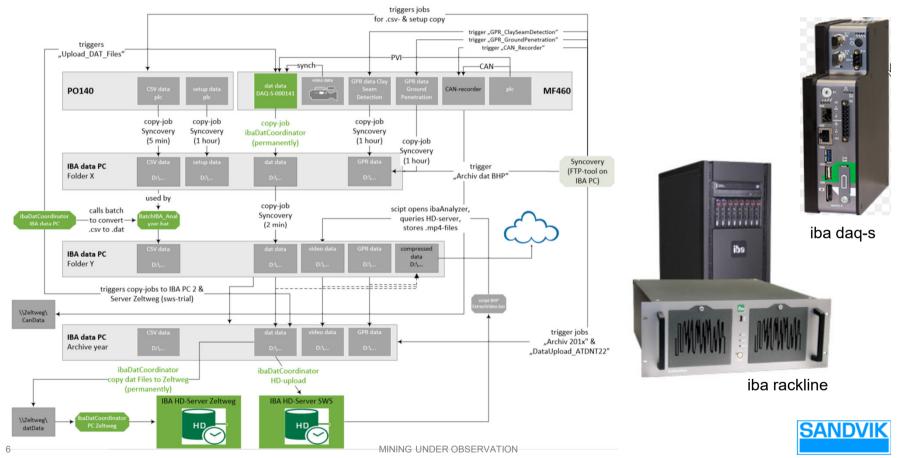




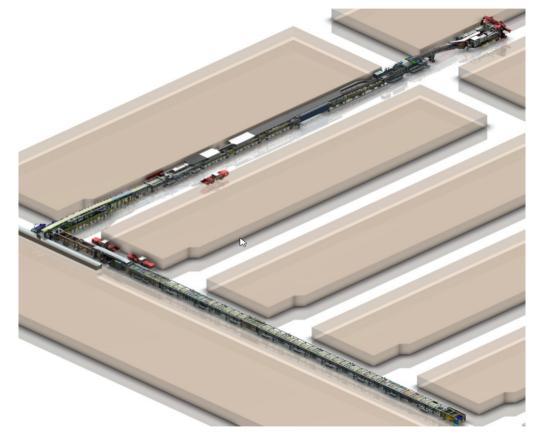
IBA SYSTEM - CONCEPT



IBA SYSTEM – SYSTEM OVERVIEW



EXAMPLES: STARTUP OF MINING SYSTEM



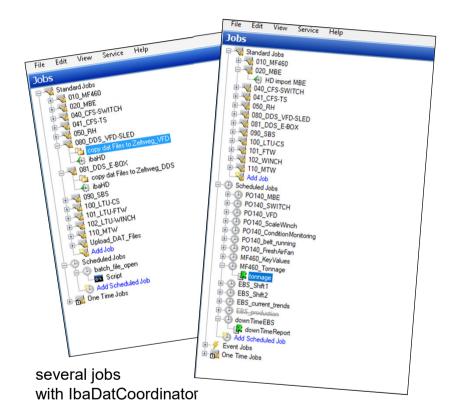
7







DATA STORAGE

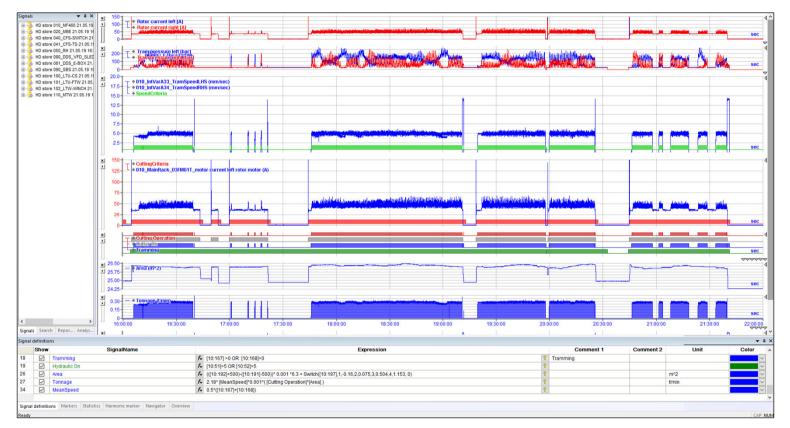


many different HD stores

	J Save project 📴 Load project	. 💿 Create su	upport file				
Service							
Status:	Running			🗣 Start 📢	Stop 📢	Restart	
Port:	9180 🗢		E	Auto-start when Wind	ows starts		
icense							
Customer:	Sandvik Mining and Construction G Required B		UP date:	05.12.20	05.12.2017		
License number:	EUP date:			30.03.2019			
	V401590 - 97 00 01 00 54 83 86 81 (SmarxOS)	V401590 - 97 00 01 00 54 83 86 81		None			
		20F that p	chou.	Inone			
License time limit:	Unlimited						
License options:	ibaQPanel (0)	ibaQPanel (0) A Offline analys		0			
			Connected/licensed HD clients:		0/2		
			ensed HD stores: 12/14				
							_
lame	Storage path		Signals	Size limit	Time limit	Active	
Constrained in the second s	Storage path D:\04 IBA HD stores\HD-DATA-010 M	F460	Signals 599	Size limit 31.4 / 500 GE	Time limit 200.5 / 200 days	Active	
BHD store 010_MF460	Storage path D:\04_IBA_HD_stores\HD-DATA-010_M D:\04_IBA_HD_stores\HD-DATA-020_M			31,4 / 500 GE	200,5 / 200 days	X	
HD store 010_MF460	D:\04_IBA_HD_stores\HD-DATA-010_M	BE	599	31,4 / 500 GE 2,1 / 100 GE	200,5 / 200 days 200,2 / 200 days	×	
HD store 010_MF460 HD store 020_MBE HD store 040_CFS-SWITCH	D:\04_IBA_HD_stores\HD-DATA-010_M D:\04_IBA_HD_stores\HD-DATA-020_M	BE FS-SWITCH	599	31,4 / 500 GE 2,1 / 100 GE 0,6 / 100 GE	200,5 / 200 days 200,2 / 200 days 199,4 / 200 days	X X X	
HD store 010_MF460 HD store 020_MBE HD store 040_CFS-SWITCH HD store 041_CFS-TS	D:\04_IBA_HD_stores\HD-DATA-010_M D:\04_IBA_HD_stores\HD-DATA-020_M D:\04_IBA_HD_stores\HD-DATA-040_C	BE FS-SWITCH FS-TS	599 149 55	31,4 / 500 GE 2,1 / 100 GE 0,6 / 100 GE 1,1 / 100 GE	200,5 / 200 days 200,2 / 200 days 199,4 / 200 days 199,4 / 200 days	X X X	
HD store 010_MF460 HD store 020_MBE HD store 040_CFS-SWITCH HD store 041_CFS-TS HD store 041_CFS-TS HD store 050_RH	D:\04_IBA_HD_stores\HD-DATA-010_M D:\04_IBA_HD_stores\HD-DATA-020_M D:\04_IBA_HD_stores\HD-DATA-020_M D:\04_IBA_HD_stores\HD-DATA-040_C0 D:\04_IBA_HD_stores\HD-DATA-041_C0 D:\04_IBA_HD_stores\HD-DATA-050_R0	BE FS-SWITCH FS-TS H	599 149 55 60	31,4 / 500 GE 2,1 / 100 GE 0,6 / 100 GE 1,1 / 100 GE 0,8 / 100 GE	200,5 / 200 days 200,2 / 200 days 199,4 / 200 days 199,4 / 200 days 200,5 / 200 days	× × × ×	
HD store 010_MF460 W D store 020_M8E HD store 040_CFS-SWITCH HD store 041_CFS-TS HD store 050_RH HD store 080_DDS_VFD_SLED	D:\04_IBA_HD_stores\HD-DATA-010_M D:\04_IBA_HD_stores\HD-DATA-020_M D:\04_IBA_HD_stores\HD-DATA-020_M D:\04_IBA_HD_stores\HD-DATA-040_C0 D:\04_IBA_HD_stores\HD-DATA-041_C0 D:\04_IBA_HD_stores\HD-DATA-050_R0	BE FS-SWITCH FS-TS H DS_VFD_SLED	599 149 55 60 457	31,4 / 500 GE 2,1 / 100 GE 0,6 / 100 GE 1,1 / 100 GE 0,8 / 100 GE 1,1 / 100 GE	200,5 / 200 days 200,2 / 200 days 199,4 / 200 days 199,4 / 200 days 200,5 / 200 days 199,4 / 200 days	× × × × ×	
0 HD store 010_MF460 0 HD store 020_MBE 0 HD store 040_CFS-SWITCH	M. 010-ATA-040; A. 2014; Active: A 2014; </td <td>BE FS-SWITCH FS-TS H DS_VFD_SLED DS_E-BOX</td> <td>599 149 55 60 457 83</td> <td>31,4 / 500 GE 2,1 / 100 GE 0,6 / 100 GE 1,1 / 100 GE 0,8 / 100 GE 1,1 / 100 GE 3,5 / 100 GE</td> <td>200,5 / 200 days 200,2 / 200 days 199,4 / 200 days 199,4 / 200 days 200,5 / 200 days 199,4 / 200 days 199,4 / 200 days</td> <td>× × × × × × × ×</td> <td></td>	BE FS-SWITCH FS-TS H DS_VFD_SLED DS_E-BOX	599 149 55 60 457 83	31,4 / 500 GE 2,1 / 100 GE 0,6 / 100 GE 1,1 / 100 GE 0,8 / 100 GE 1,1 / 100 GE 3,5 / 100 GE	200,5 / 200 days 200,2 / 200 days 199,4 / 200 days 199,4 / 200 days 200,5 / 200 days 199,4 / 200 days 199,4 / 200 days	× × × × × × × ×	
KD store 010_MF460 KD store 020_M6E KD store 020_CFS-SWITCH LD store 030_CFS-SWITCH LD store 030_CFS-SWITCH LD store 030_CFS-SWITCH LD store 030_CS	D:\D4_IBA_ID_stores\D2-DATA-010_IM D:\D4_IBA_PD_stores\D2-DATA-020_IM D:\D4_IBA_PD_stores\D2-DATA-040_CI D:\D4_IBA_PD_stores\D2-DATA-040_CI D:\D4_IBA_PD_stores\D2-DATA-041_CI D:\D4_IBA_PD_stores\D2-DATA-041_CI D:\D4_IBA_PD_stores\D2-DATA-041_CI D:\D4_IBA_PD_stores\D2-DATA-041_CI D:\D4_IBA_PD_stores\D2-DATA-041_CI D:\D4_IBA_PD_stores\D2-DATA-040_CI D:\D4_IBA_PD_stores\D2-DATA-040_CI D:\D4_IBA_PD_stores\D2-DATA-040_CI D:\D4_IBA_PD_stores\D2-DATA-040_CI	BE FS-SWITCH FS-TS H DS_VFD_SLED DS_E-BOX IS	599 149 59 60 455 83 226 91 27	31,4 / 500 GE 2,1 / 100 GE 0,6 / 100 GE 1,1 / 100 GE 0,8 / 100 GE 1,1 / 100 GE 3,5 / 100 GE 1,5 / 100 GE 1,1 / 100 GE	200,5 / 200 days 200,2 / 200 days 199,4 / 200 days 200,5 / 200 days 200,5 / 200 days 199,4 / 200 days 199,4 / 200 days 200,4 / 200 days 200,4 / 200 days	X X X X X X X X X	
K0 HD store 010_MF460 KHD store 020_M8E KHD store 040_CFS-SWITCH KHD store 041_CFS-TS KHD store 041_CFS-TS KHD store 050_RH KHD store 050_RFL KHD store 050_RFL KHD store 050_RFL	Div04_JBA_H0_storest/0-DATA 401_M0 Div164_JBA_H0_storest/0-DATA 402_M0 Div164_JBA_H0_storest/0-DATA 402_M0 Div164_JBA_H0_storest/0-DATA 401_C0	BE FS-SWITCH FS-TS H DS_VFD_SLED DS_E-BOX 3S U-CS U-FTW	599 149 59 60 457 83 226 91 27 27 27	31,4 / 500 GE 2,1 / 100 GE 0,6 / 100 GE 1,1 / 100 GE 0,8 / 100 GE 1,1 / 100 GE 3,5 / 100 GE 1,5 / 100 GE 1,5 / 100 GE 2 / 100 GE	200,5 / 200 days 200,2 / 200 days 199,4 / 200 days 199,4 / 200 days 200,5 / 200 days 199,4 / 200 days 199,4 / 200 days 200,4 / 200 days 200,4 / 200 days 200,4 / 200 days	X X X X X X X X X X	
Vame I/b D store 010_MF460 0; H0 store 040_CFS-SWITCH 0; H0 store 040_CFS-SWITCH 0; H0 store 040_CFS-SWITCH 0; H0 store 050_RH 0; H0 store 050_RH 0; H0 store 050_SWITCH 0; H0 store 100_LTU-CS 0; H0 store 100_LTU-WIWCH 0; H0 store 101_UTW/WINCH 0; H0 store 101_UTW/WINCH	0.104_JBA_JO_stores1+0.0ATA-010_M 0.104_JBA_JO_stores1+0.0ATA-020_M 0.104_JBA_JO_stores1+0.0ATA-040_Q 0.104_JBA_JO_stores1+0.0ATA-041_Q 0.104_JBA_JO_stores1+0.0ATA-041_Q 0.104_JBA_JO_stores1+0.0ATA-040_Q 0.104_JBA_JO_stores1+0.0ATA-040_D 0.104_JBA_JO_stores1+0.0ATA-040_Q 0.104_JBA_JO_sto	BE FS-SWITCH FS-TS H DS_VFD_SLED DS_E-BOX DS_E-BOX U-CS U-CS U-FTW U-WINCH	599 149 59 60 455 83 226 91 27	31,4/500 GE 2,1/100 GE 0,6/100 GE 1,1/100 GE 0,8/100 GE 1,1/100 GE 1,5/100 GE 1,5/100 GE 1,5/100 GE 2/100 GE	200,5 / 200 days 200,2 / 200 days 199,4 / 200 days 200,5 / 200 days 200,5 / 200 days 200,5 / 200 days 199,4 / 200 days 200,4 / 200 days 200,4 / 200 days 200,4 / 200 days 200,4 / 200 days 200,2 / 200 days	× × × × × × × × × × ×	

SANDVIK

DATA ANALYSIS – CUTTING PARAMETERS





9

DATA ANALYSIS – UTILIZATION/DOWNTIME

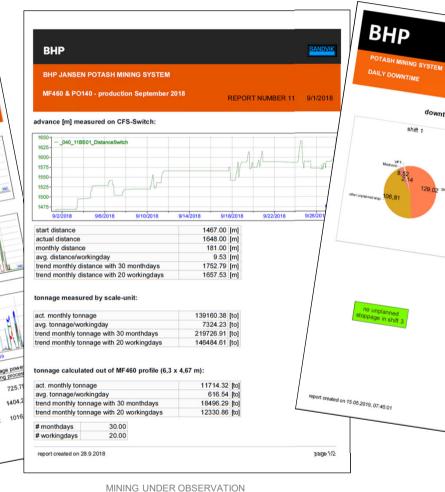
ignals		▼ 4 X								
• •-	HD stor	e 010_MF460 21.05.19 06:00:00.000 - 22.0	- DownTimeCategory				4			
÷-0		020_MBE 21.05.19 06:00:00.000 - 22.05.								
ē-🙆		e 040_CFS-SWITCH 21.05.19 06:00:00.000 1.0								
🖻 🔂		e 041_CFS-TS 21.05.19 06:00:00.000 - 22								
		0.50_RH 21.05.19 06:00:00.000 - 22.05.1 0.5								
6		e 080_DDS_VFD_SLED 21.05.19 06:00:00. e 081_DDS_E-BOX 21.05.19 06:00:00.000					sec			
ē- 🐻		090_SBS 21.05.19 06:00:00.000 - 22.05.					4			
🖻 🔂		e 100_LTU-CS 21.05.19 06:00:00.000 - 22	- ChangingPicks							
O O		e 101_LTU-FTW 21.05.19 06:00:00.000 - 22.05.19 06:0 e 102_LTW-WINCH 21.05.19 06:00:00.000	0.000							
		110_MTW 21.05.19 06:00:000 - 22.05								
		-								
							sec			
<		>	21.05.2019 08:00:00 21.05.2019 12:00:00 21.05.2019 16:0	:00 21.05.2019 20:00:00	22.05.2019 00:00:00	00.05.0040.0	0.4:00:00			
Signal	Searc	h Report info Analysis files	21.05.2019 08.00.00 21.05.2019 12.00.00 21.05.2019 10.0	21.05.2019 20.00.00	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	22.05.20191	04:00:00			
ignal	lefinitio	15					▼ # ×			
	Show	SignalName	Expression			Unit	Color ^			
1		SecondsPer24Hours	<i>f</i> ∞ 86400		8		•			
2 🕨		TimeVector	Time([SecondsPer24Hours],1)							
3		DownTimeYesNo	▲ [1_20.143]							
1		DownTimeActive	F IF(IsData[FillGaps([1_20:142]), XSize(0)), FillGaps([1_20:142]), 0)							
5		DownTimeCategory	🏂 IF(IsData(FillGaps([1_20:143]), XSize(0)), FillGaps([1_20:143]), 0)							
5		DownTimeIndex	🏂 IF(IsData(FillGaps([1_20:144]), XSize(0)), FillGaps([1_20:144]), 0)							
7		DownTimeOption	🕼 IF(IsData(FIIIGaps(1_20:145)), XSize(0)), FIIIGaps(1_20:145)), 0)							
3		Mirror_DowntimeCategory	🖈 Xiliror([DownTimeCategory])							
9		Mirror_DowntimeActive	🕅 XMirror([DownTimeCategory])							
10		Mirror_DowntimeIndex	XMirror([DownTimeIndex])							
11		Mirror_DowntimeOption	🖈 XMirror([DownTimeOption])							
12		midnight	Shi(IF((((1_020_LV49_CHour) > 23) OR ((1_020_LV49_CHour) < 1)) AND (((1_020_LV50_CMminute] > 59) OR ((1_020_LV50_CMminute] < 1)) AND (((1_020_LV51_CMsecond) 🐑							
13		Mirror_shift1								
14		Mirror_shift2	IF(([TimeVector]>= (1/3*Max[TimeVector]))) AND ([TimeVector] < (2/3*Max[TimeVector]))) ,1,0)							
15		Mirror_shift3	⊮ IF([TimeVector] < (1/3*Max([TimeVector])),1,0)							
16		nextShift_old	▲ IF ((((1_20:107] = 13) AND ((1_20:108] > 59) OR ((1_20:107] = 14) AND ((1_20:108] < 1) AND ((1_20:107] = 21) AND ((1_20:108] > 59) OR ((1_20:107] = 22) AND ((1_20:107) = 22) AND							
17		nextShift	IF(OneShot ([Mirror_shift3]) OR OneShot ([Mirror_shift3]), 1, 0)							
18		PlannedMaintenance	SelResetl((Mirror_DowntimeCategory) = 1) AND ([Mirror_DowntimeIndex] = 1), Not(XMirror([DownTimeActive])), 1)							
19		ShiftChange	🔊 SetReset((Mirror_DowntimeCategory) = 1) AND ((Mirror_DowntimeIndex) = 2), Not(XMirror(DownTimeActive))), 1)							
20		ChangingPicks	SetReset((Mirror_DowntimeCategory) = 1) AND ((Mirror_DowntimeIndex) = 3), Not(XMirror([DownTimeActive])), 1)							
21		MoveLaser	🟂 SetReset((Mirror_DowntimeCategory) = 1) AND ((Mirror_DowntimeIndex) = 4), Not(XMirror([DownTimeActive])), 1)							
22		BSW_insert	SetReset(([Mirror_DowntimeCategory] = 1) AND ([Mirror_DowntimeIndex] = 5) AND ([Mirror_DowntimeOption] = 1), Not(XMirror([DownTimeActive])), 1)							
23		BSW_remove	🔊 SeReset(([Mirror_DowntimeCategory] = 1) AND ([Mirror_DowntimeIndex] = 5) AND ([Mirror_DowntimeOption] = 2), Nol(XMirror([DownTimeActive])), 1)							
24		MonorailCas_insert	fs SetReset(([Mirror_DowntimeCategory] = 1) AND ([Mirror_DowntimeIndex] = 6) AND ([Mirror_DowntimeOption] = 1), Not(XMirror([DownTimeActive])),1)							
25		MonorailCas remove	SetReset/(IMirror DowntimeCategoryl = 1) AND (IMirror DowntimeIndext = 6) AND (IMirror Downtime	Option1 = 2) Not(XMirror([DownTimeActive])) 1)	9		~ *			
ignal	definitio	ns Markers Statistics Harmonic marker Navi	tor Overview							
eady							CAP NUM			



10

REPORTING





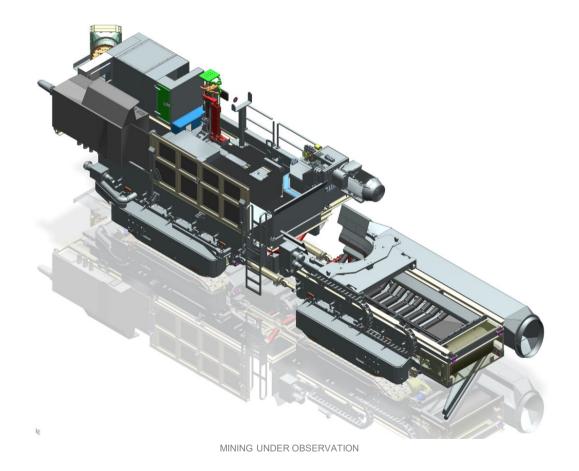
SANDVIK POTASH MINING SYSTEM from 14.05.2019, 06:00:00 to 15.05.2019, 06.00:00 downtime per shift - unplanned [min] report nr. 20 SWS may a shift 2 8,95 57,82 SWS conv. bet Page 3/9 **SANDVIK**

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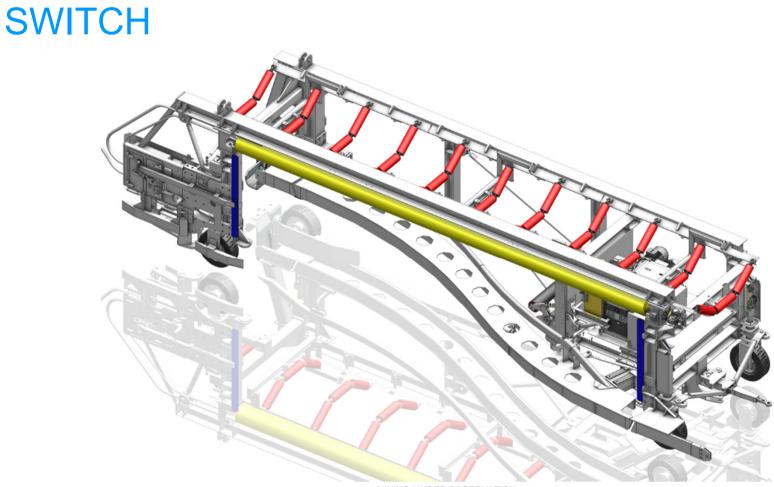
THANK YOU FOR YOUR ATTENTION!



MBE – MOBILE BOOT END

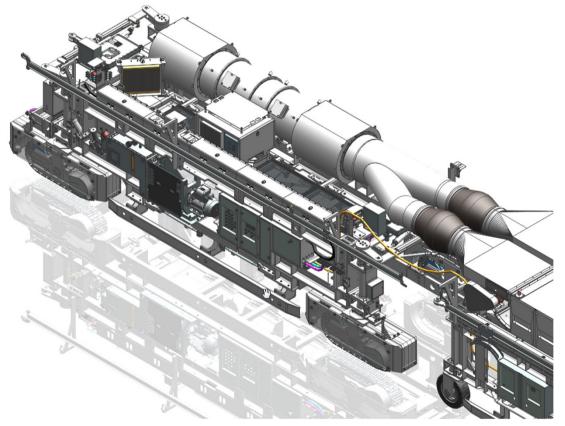






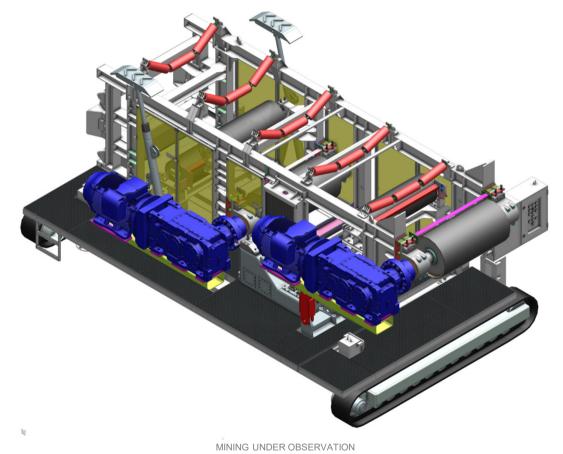


TUNNEL SECTION



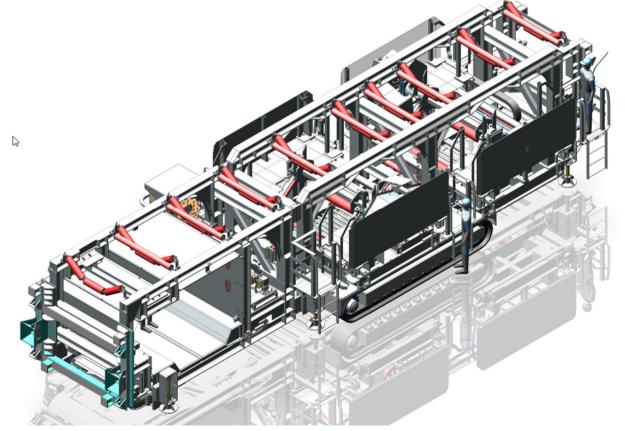


DRIVE-AND DISCHARGE SECTION



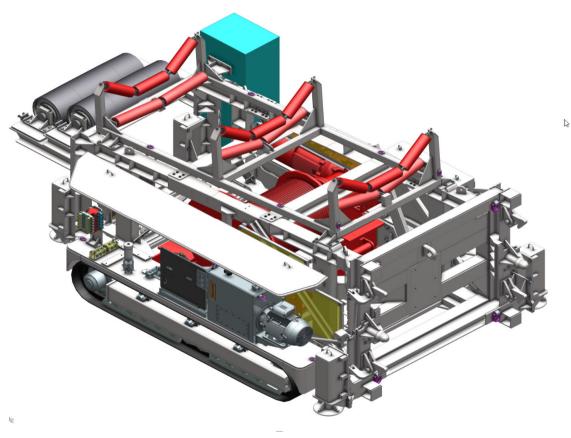


SPARE BELT SECTION





WINCH





MF460

