



SME 2012: Ulf Richter, Global Portfolio Manager – Belt Conveyor Systems

Large Belt Conveyors

BU Minerals Conveyors

We provide ...

Electrical equipment for

- Uphill
- Downhill
- Horizontal
- Overland
- Stockpile
- Machine conveyors

... SINCE 1960!

so far >300 conveyors, all climates, >720km

New trends in conveyor design

Hardrock mining



Capacity	up to 20.000 tph
Particle Size	up to 450 ... 600 mm
Belt width	2.200 mm
Belt Speed	7.0 ... 7.2 m/sec
Maximum Drive Size for standard conveyor drives (c/w bevel hecial gear box)	3.500 kW
Drive Size for gearless drives	> 3.500 kW with up to 8.000kW
Maximum Belt Quality	St 10.000

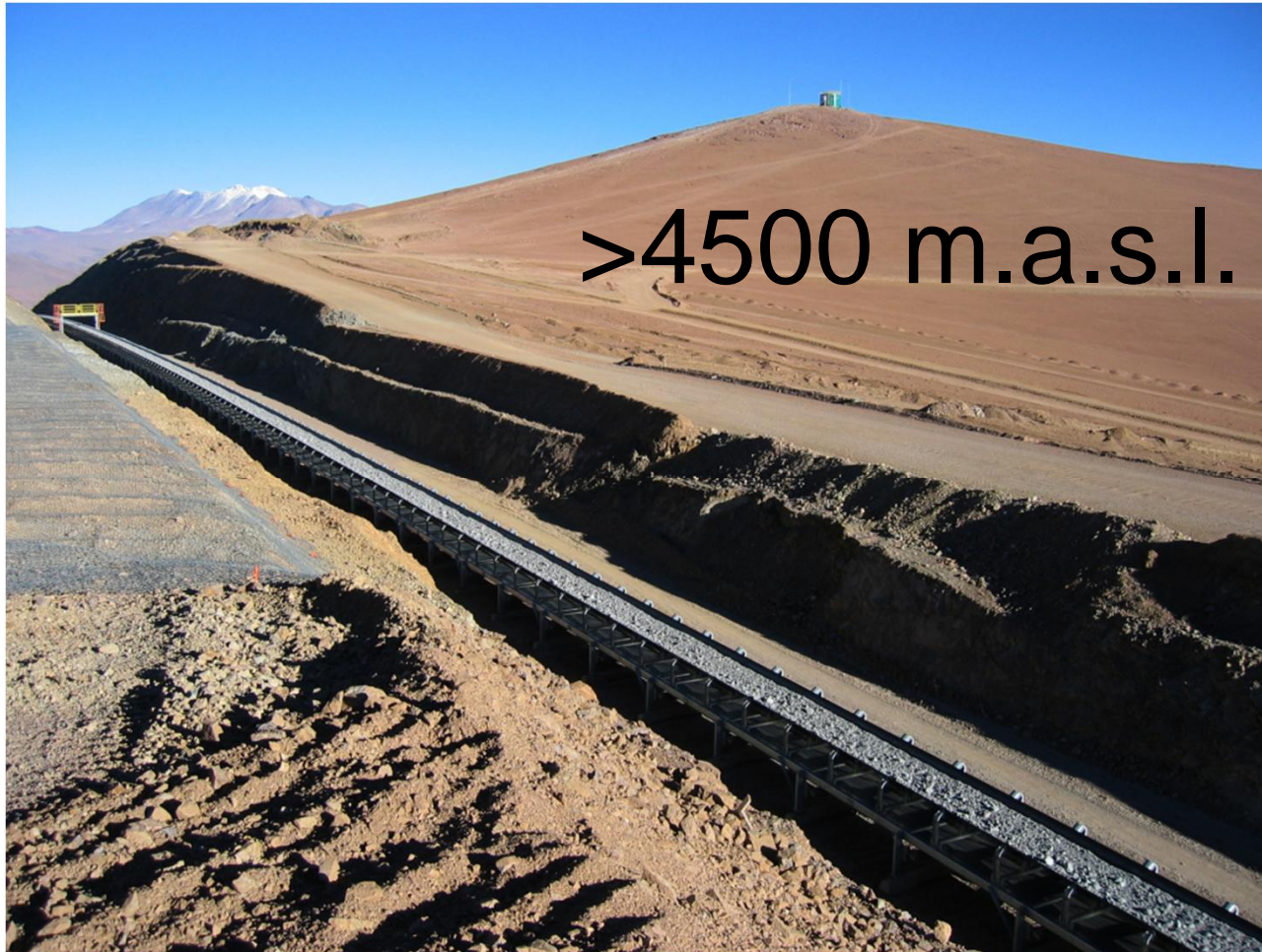
BU Minerals Conveyors Portfolio



- Engineered Solutions for
 - Drive
 - Control & Automation
 - Erection & Commissioning
 - Services
- R&D

Some References

Collahuasi/Chile



- Hardrock
- ACS6000 MV Drives
- Uphill / downhill
- 10.000tph

Some References

Coal Conveyor Welzow South/ Germany

- 98% availability (total)

- 9 main flights (>9km in total)

- 8.300tph

- ABB LV drives

- Automatic belt speed adjust

- Advanced conveyor control



Some References

Tianjin Coke – Overland Conveyor (7.6km)

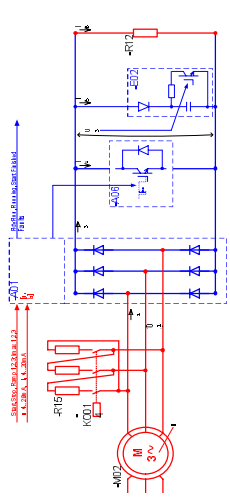


Drive Solutions

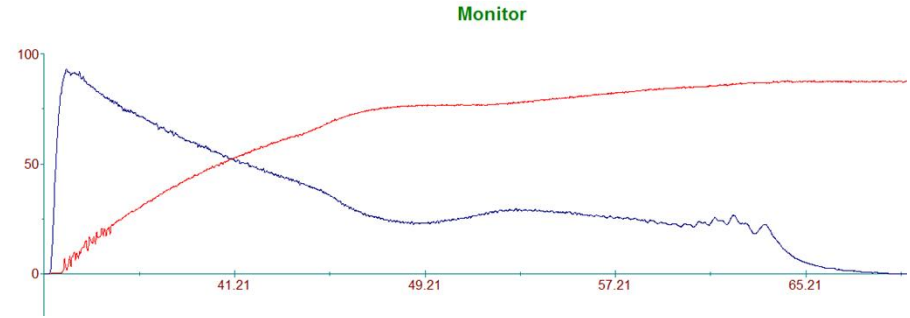
- Resistor Starters (binary, electronic)
- Variable Speed Drives
 - Drives Load Share Software (MCCP)
 - Simulation
 - Mining Drive and Motor
 - Gearless Conveyor Drive (**GCD**)

Drive Solutions

Electronic Compact Resistor Starter (ECOSS)



Overburden Bridge F60/ Germany



Strain gauge torque measurement

- One contactor/ resistor only
- Controlled, smooth starting torque
- Fieldbus integration in DCS
- Commissioning by Drive Window

Drive Solutions

Variable Speed Drives

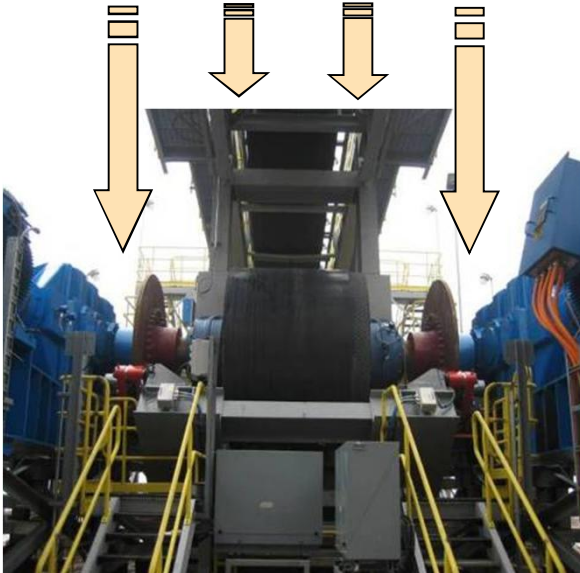
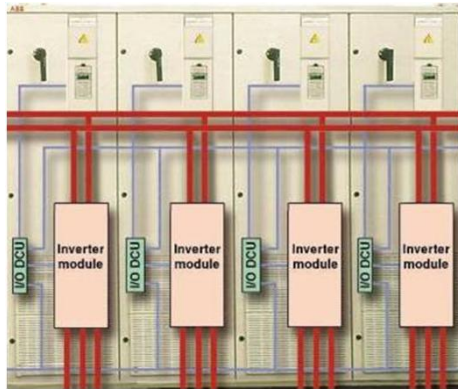


- Softly controlled start/ stop
 - Decrease or **increase** speed
 - Saving in energy
 - Equalize load on flight
 - Eliminate slip
 - Reduction of audible noise, dust emission, spillage
-
- Overall higher flexibility of conveyor system

Drive Solutions

MCCP – Mining Conveyor Control Program

- ACS800
- ACS1000
- ACS2000
- ACS6000

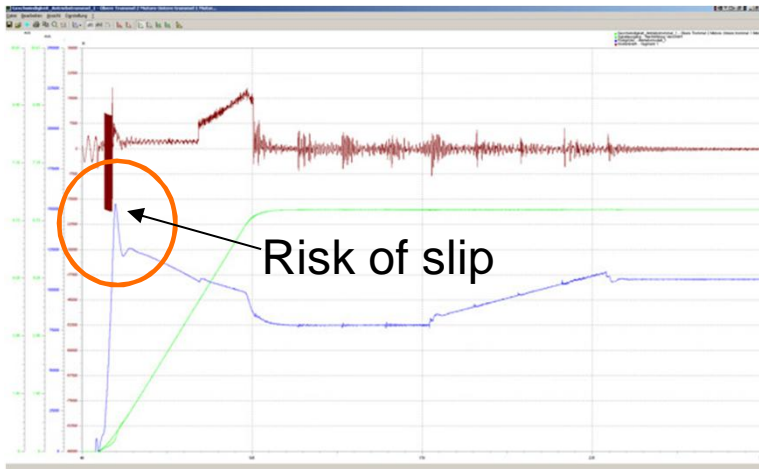


MCCP
Load Share

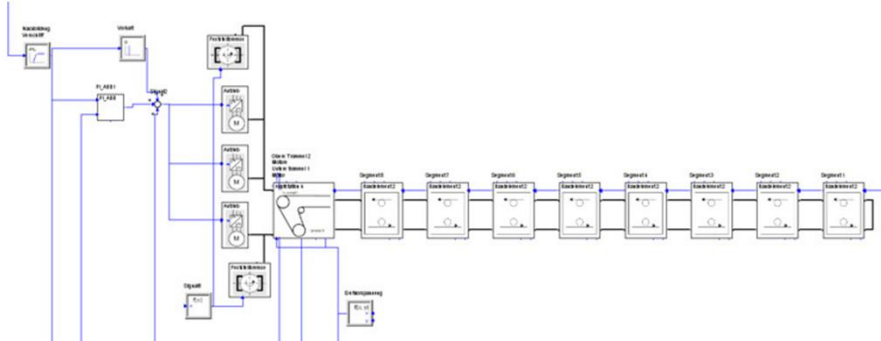
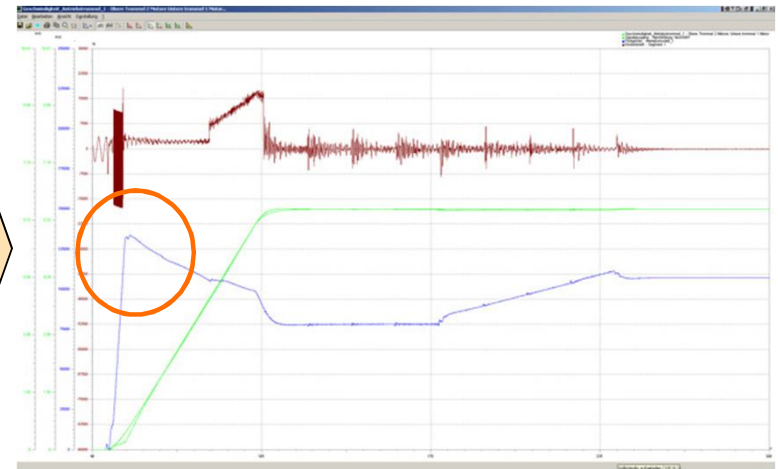


- Conveyor drives soft starting, load share and monitoring
- ABB LV and MV drives
- Geared or gearless
- Proofed conveyor drive control

Drive Solutions Conveyor Simulation Model

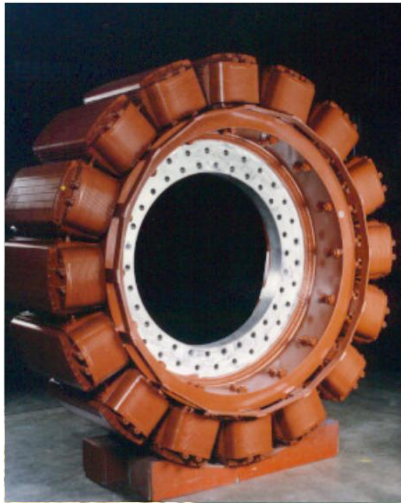


OFF Site
Tuning



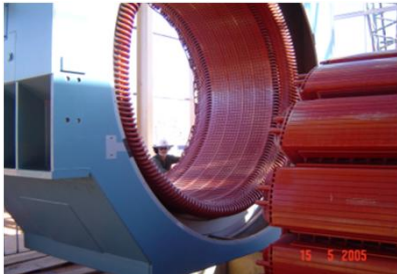
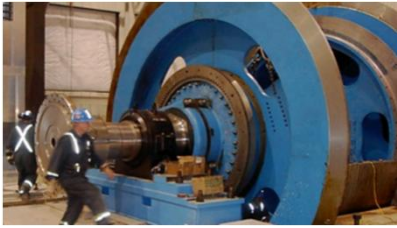
- On Site Tuning is time wasting
- OFF – Site Tuning with Simulation
- Identify control issues
- Determine basic controller settings

Gearless Conveyor Drive (GCD) Development in Partnership

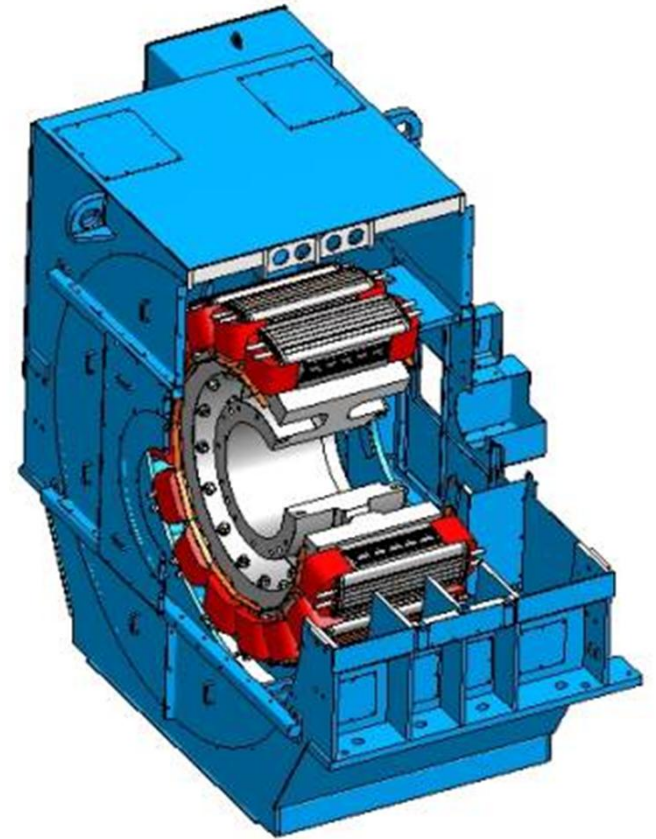


Low speed & bearing-less solution

ABB Motor and Frequency Converter

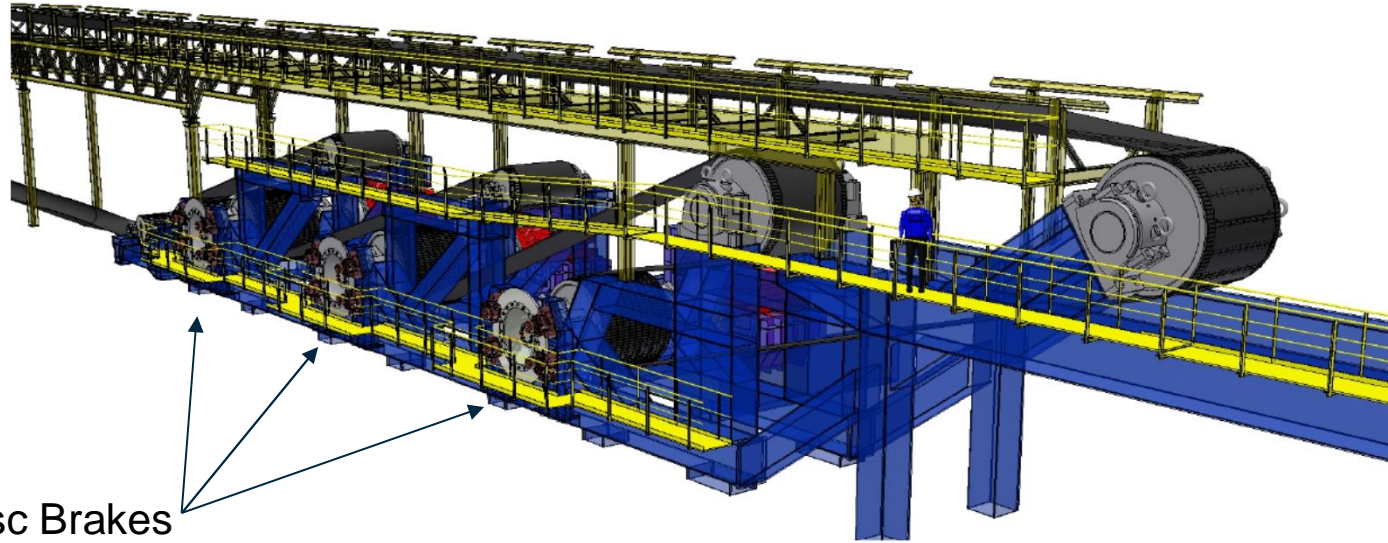


- Synchronous Motor
- Power range 2.5 ... 7 MW
- Motor pole number 8, 12, 16
- Motor speed 45 ... 100 rpm
- Shaft heights 800 – 2500 mm
- Air gap 10 – 14 mm
- Standardized and well approved synchronous motor used in many demanding applications
- Voltage Source Inverter

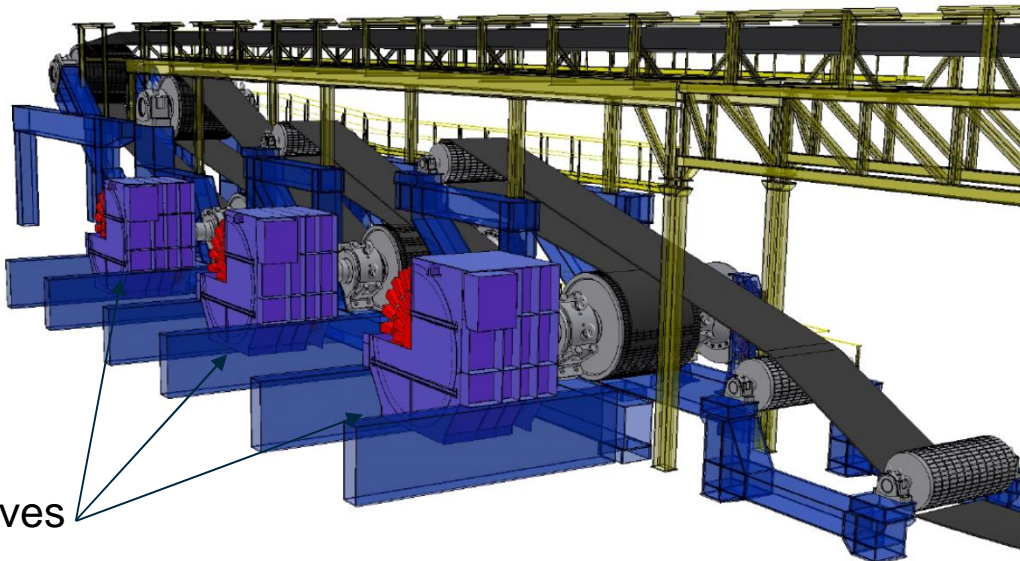


Head Drive Station

Three Drive Pulleys with Gearless Drives



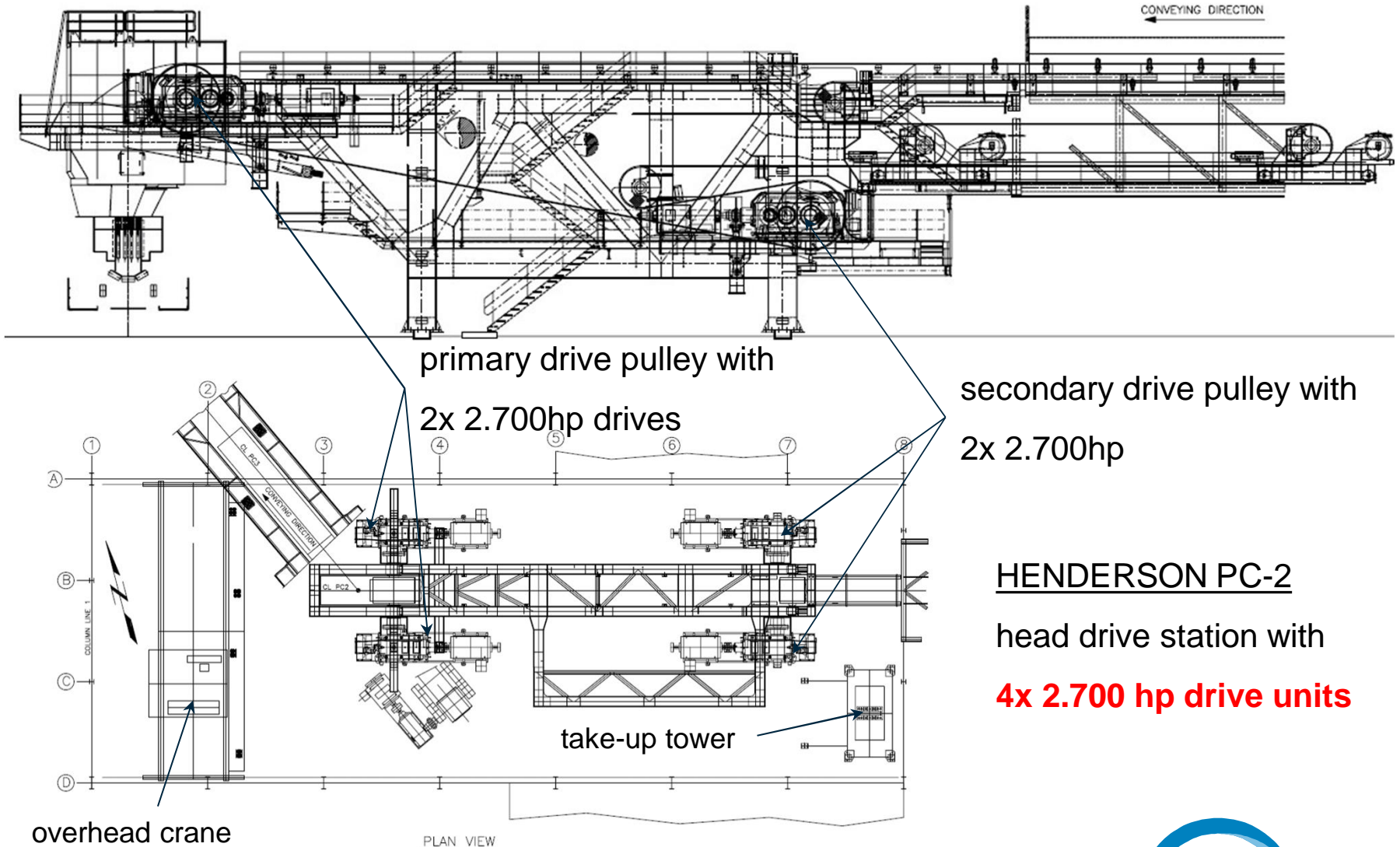
Disc Brakes



Gearless Drives

General arrangement of head drive station with gearless drives on one side and disc brakes on the opposite side

Conveyor installations with potential use of GCD Henderson Mine (USA) - PC-2 Conveyor



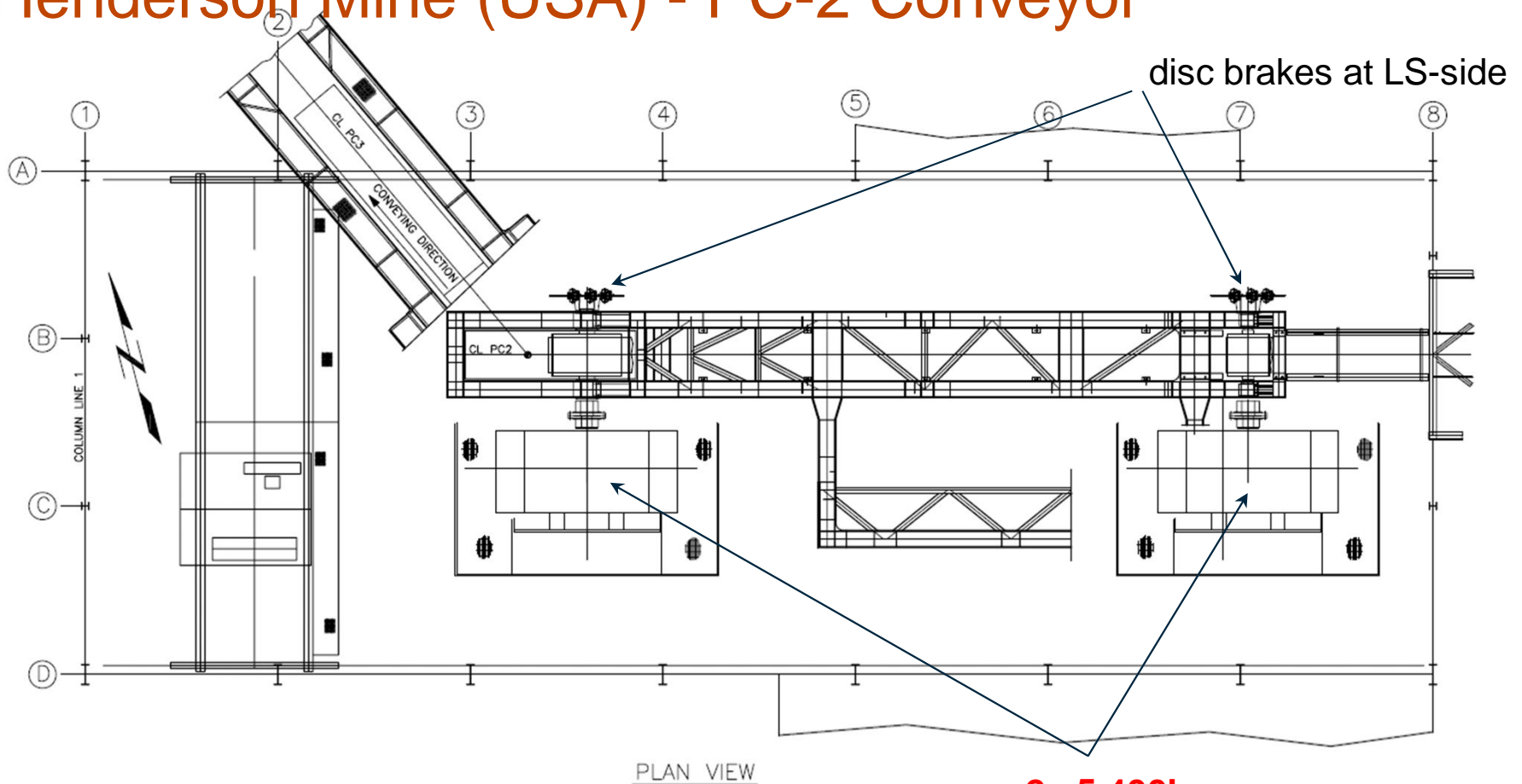
HENDERSON PC-2

head drive station with

4x 2.700 hp drive units

Conveyor installations with potential use of GCD

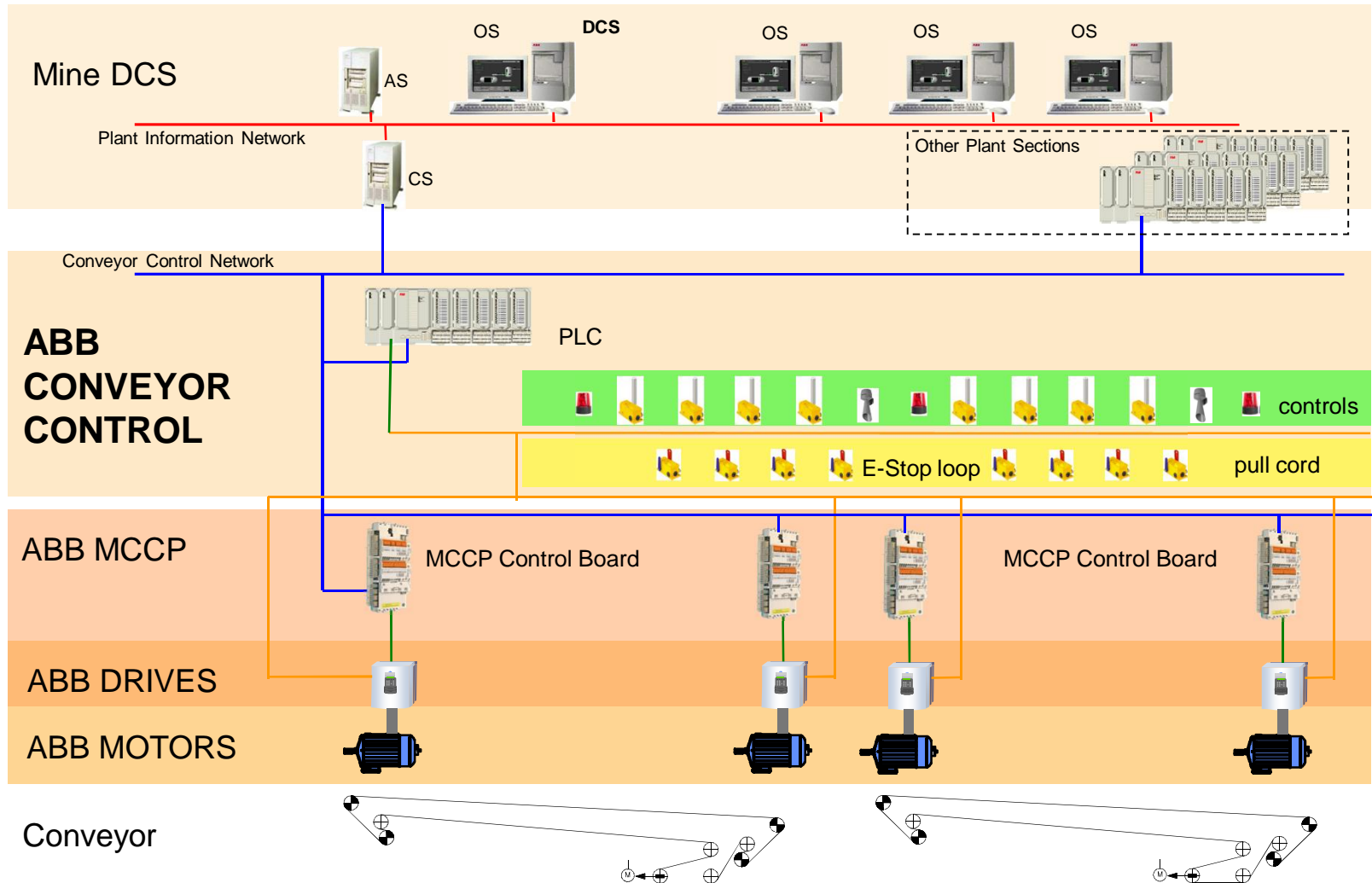
Henderson Mine (USA) - PC-2 Conveyor



HENDERSON PC-2

head drive station with **2x 5.400hp** gearless drives

Control and Automation Architecture



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Control and Automation

- Control Hardware Infrastructure
- Control Software & Libraries
- Material Tracking
- Belt Speed Adjust
- Conveyor Scan

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Control and automation

Belt speed adjust

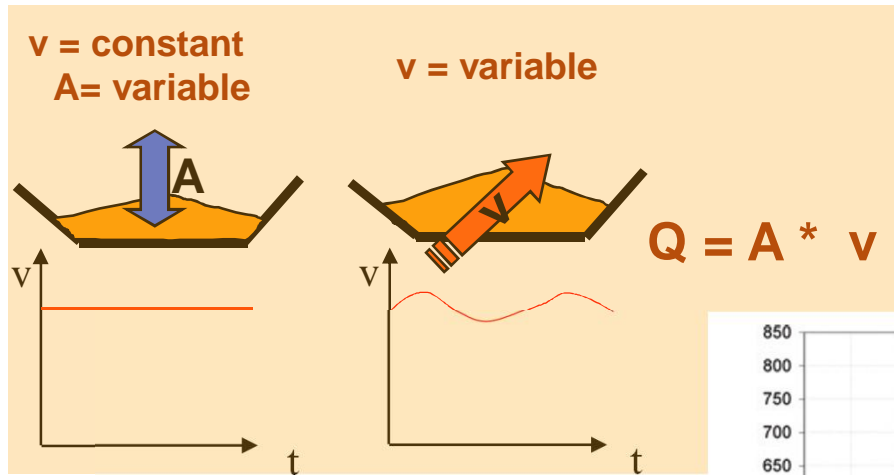


Typical case:

- Low conveying volume on conveyor
- Reduce speed!

Control and automation

Belt speed adjust



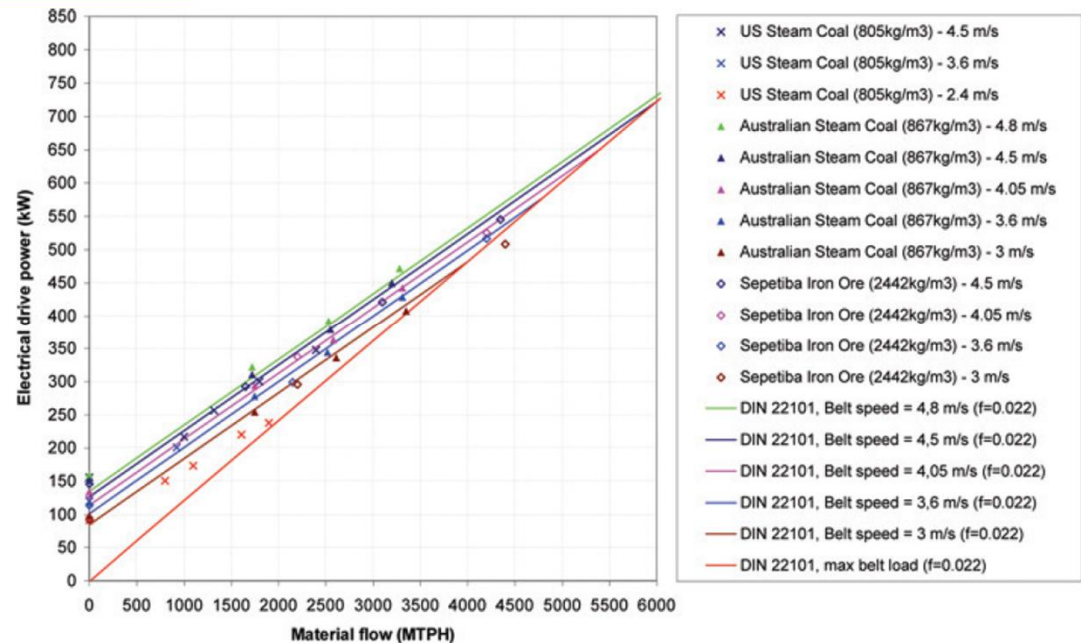
- Adapt speed to actual conveying capacity
- Save energy

A Methodology to Predict Power Savings of Troughed Belt Conveyors by Speed Control

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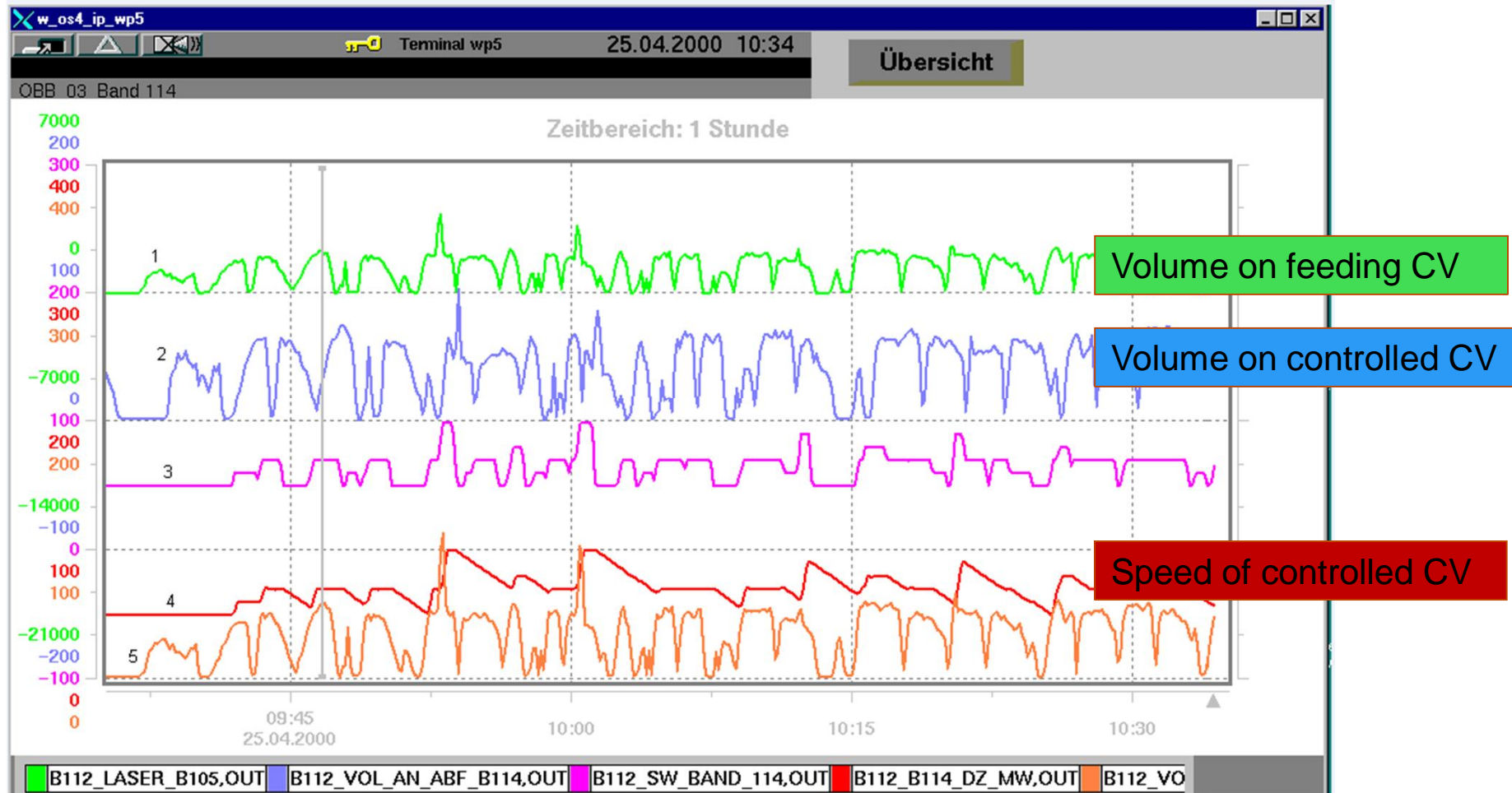
²Royal Haskoning, Industrial Concepts, Rotterdam, The Netherlands



Control and automation

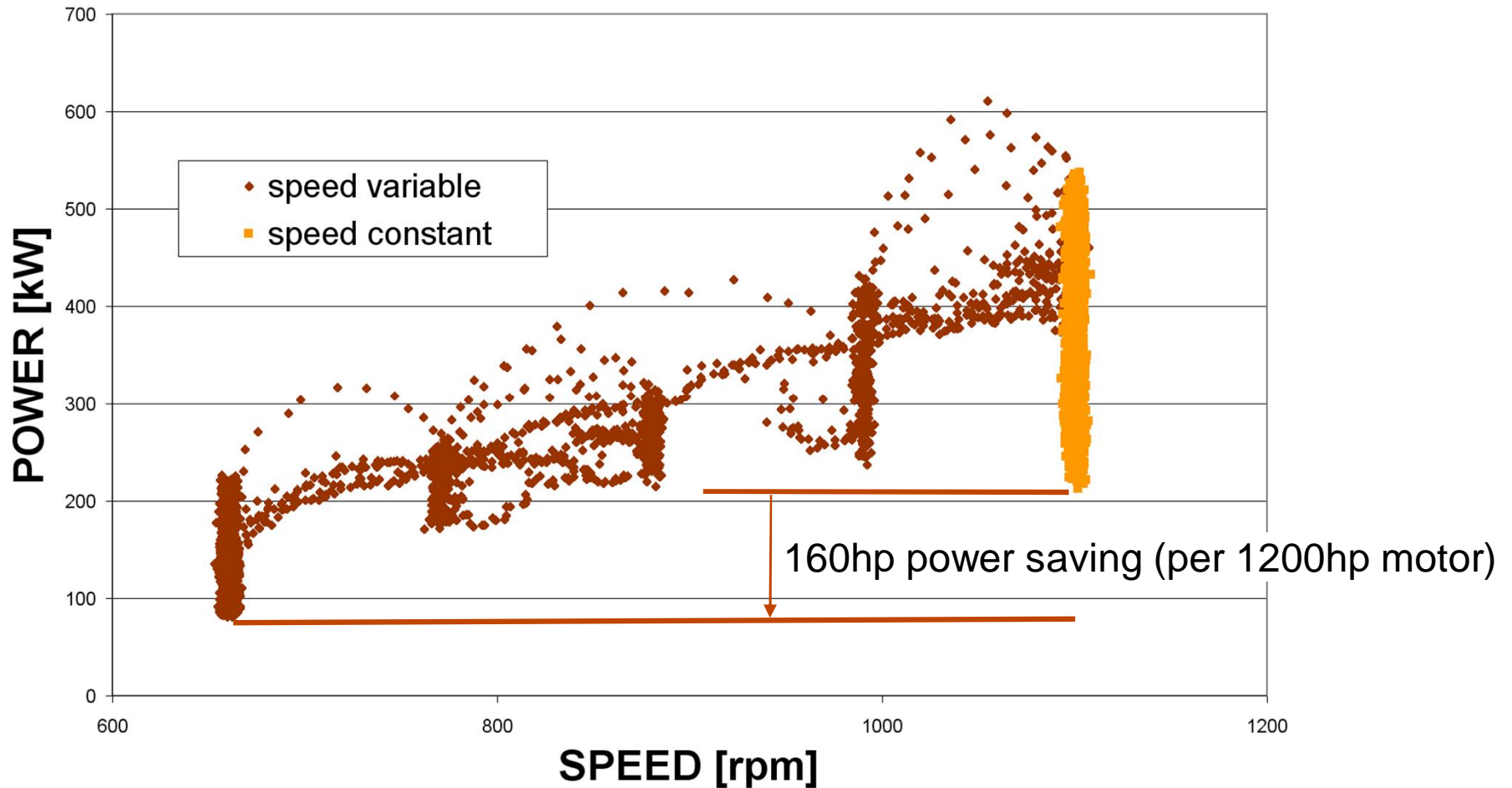
Belt speed adjust – ABB Solution

Nominal capacity = 8.300tph; 1 hour time frame



Control and automation

Belt speed adjust – ABB solution X–Y chart

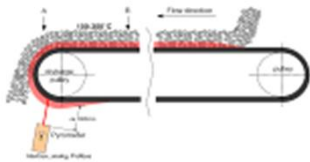


BU Minerals Conveyors

Conveyor Scan



Misalignment &
Longitudinal
Crack



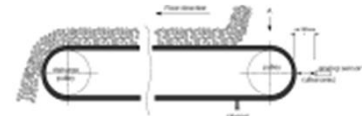
Temperature



Speed and Slip

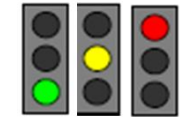
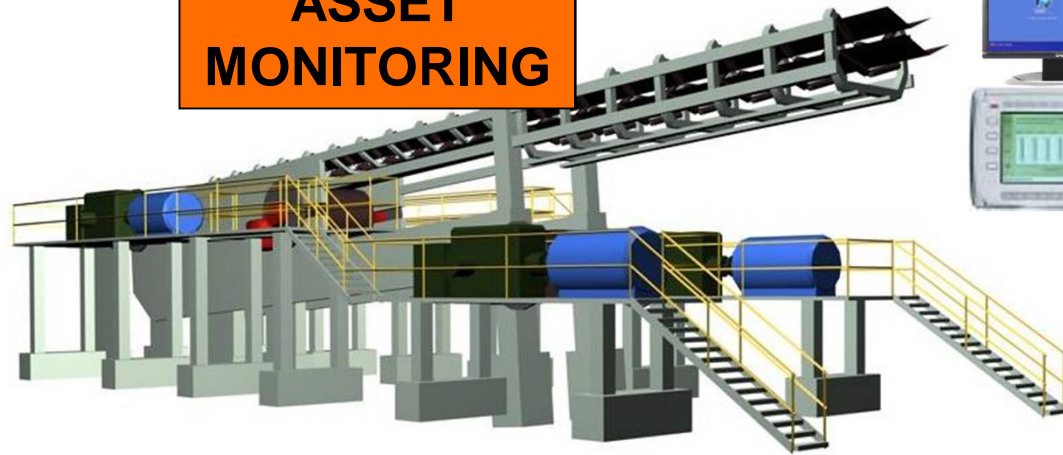


Belt Damage



Belt Thickness

**ASSET
MONITORING**



Early Alarms



Power and productivity
for a better world™

