



Patrik M. Westerlund, Business Unit Process Industries - June 9, 2015

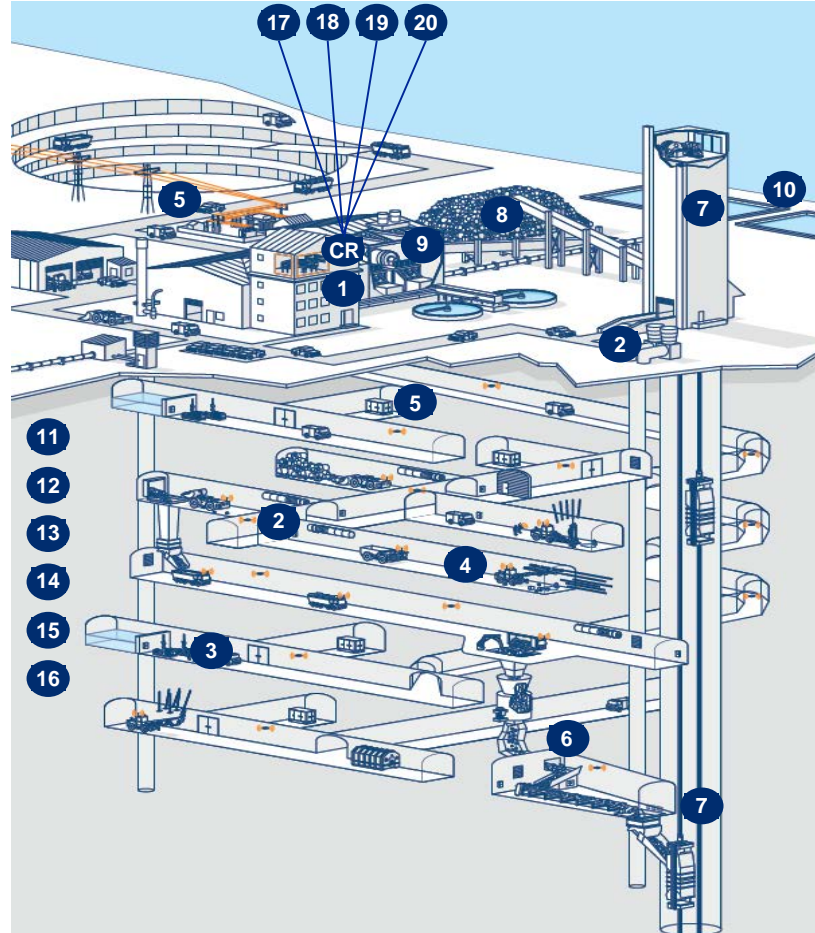
Next level mining Enabling technologies and applications – Part 2

Process and power control systems core

Areas of automation at Garpenberg Above and under ground integration

Many underground and above ground autonomous systems for different applications

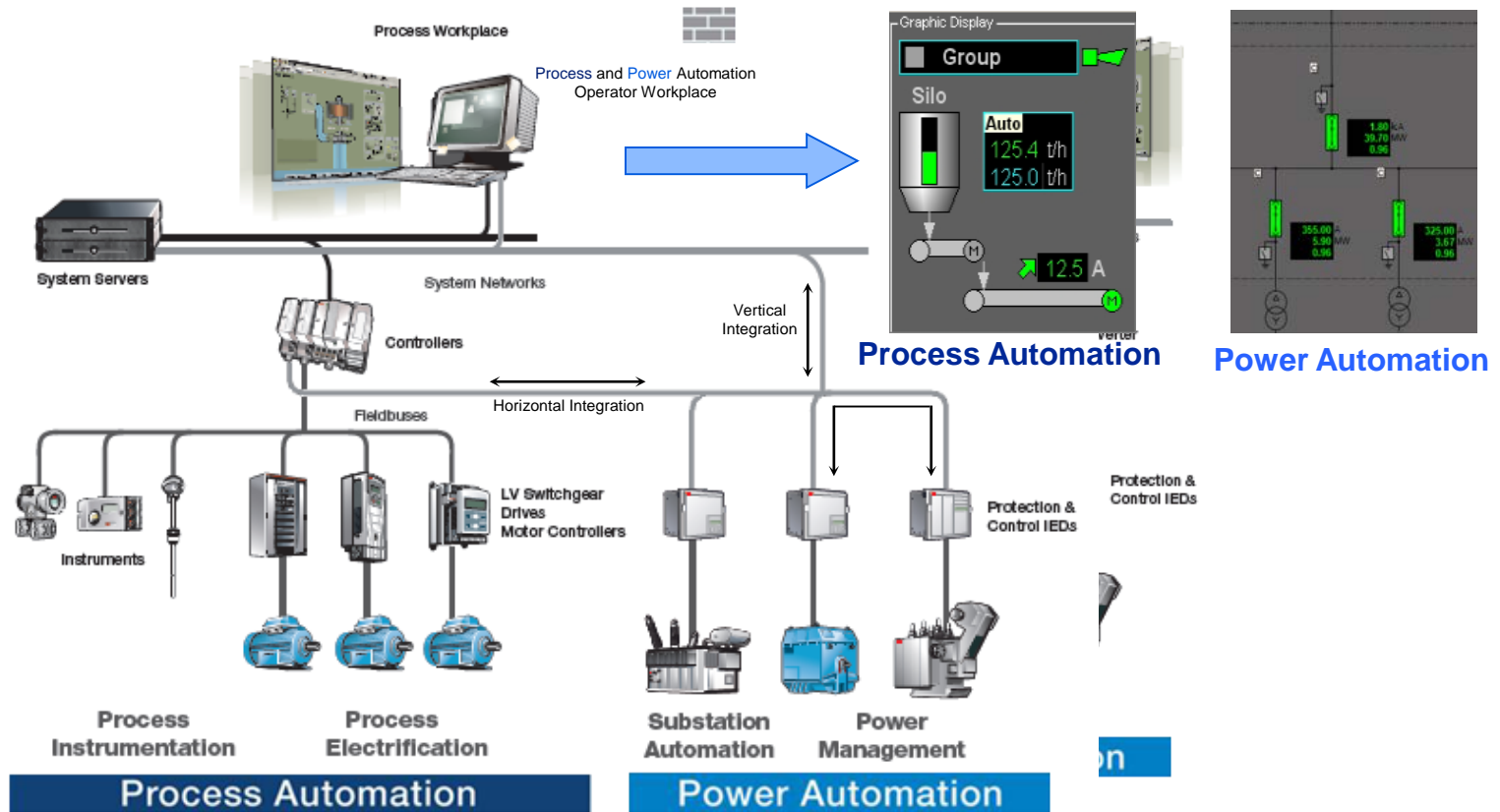
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Almost all integrated into System 800xA



1. Process control System 800xA
2. Mine ventilation system
3. Dewatering and water system
4. Pressurized air system
5. Sub stations (HV, MV and LV)
6. Crushers, rock breakers and conveyors
7. Mine hoist, loading and unloading station
8. Ore storage (stockyard system)
9. Grinding, flotation and dewatering
10. Environment and tailing dam
11. Process instrumentation, positioners & valves
12. Motors & drives systems
13. Facility/building automation (BAC)
14. PA system (radio)
15. Video system
16. Underground comm. network
17. Production and Energy management
18. Stop/log reporting system
19. Maintenance system
20. Document management system

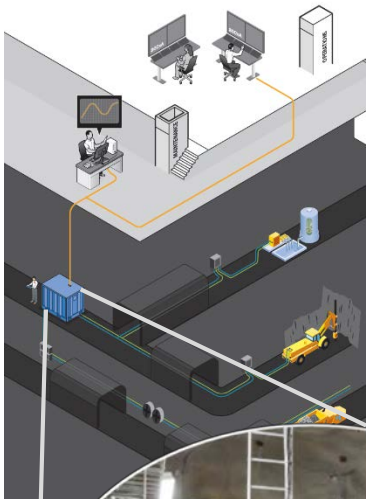
Underground mining

Electrical integration into the same plant control system



Underground mining

Electrical mobility



How we can help

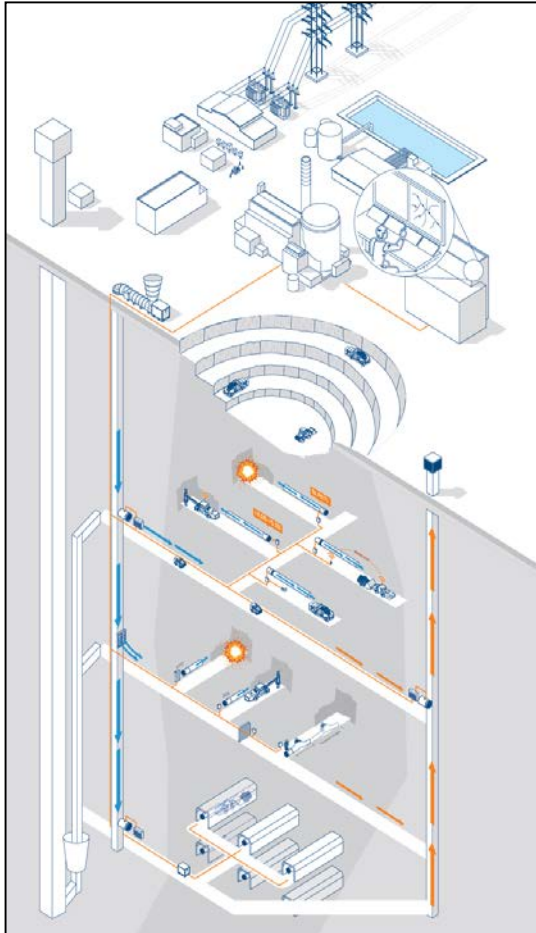
- Complete electrical integration of the underground power network - from MV substations down to each consumer
- Careful selection of superior components of latest technology - applied for underground mining environment
- Modularized container concept for underground substations
- Energy measurement at all levels

Top benefits

- Centralized supervision and control of power distribution
- Easy to identify faults and predict needs for expansion
- Increased safety
- Intelligent and robust power network
- Minimized maintenance
- Suitable for mobile machines and fixed equipment
- Easy to deploy and expand
- Energy optimization

Underground mining

Mine ventilation and dewatering management system



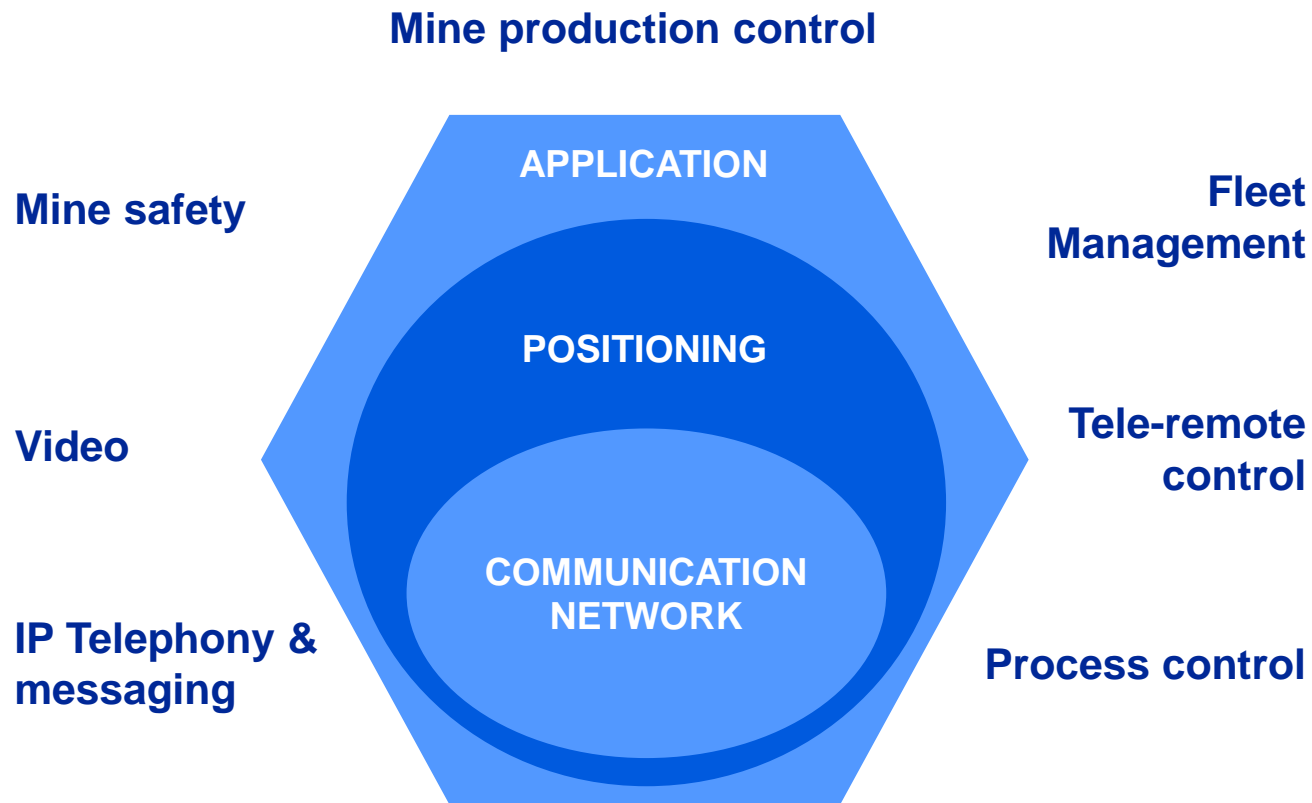
How we can help

- To provide control and monitoring of fans, louvers and ventilation doors within ABB 800xA System, together with air quality and air flow sensors
- To ensure full scale ventilation on demand solution with automatic control of all fans, louvers and controllable ventilation doors
- To perform online optimization of main ventilation fans using airflow sensor feedback – ABB SmartAir™ optimizer
- To ensure optimal operation and supervision of the complete dewatering system - from the mobile drainage pumps to large pumping stations

Top benefits

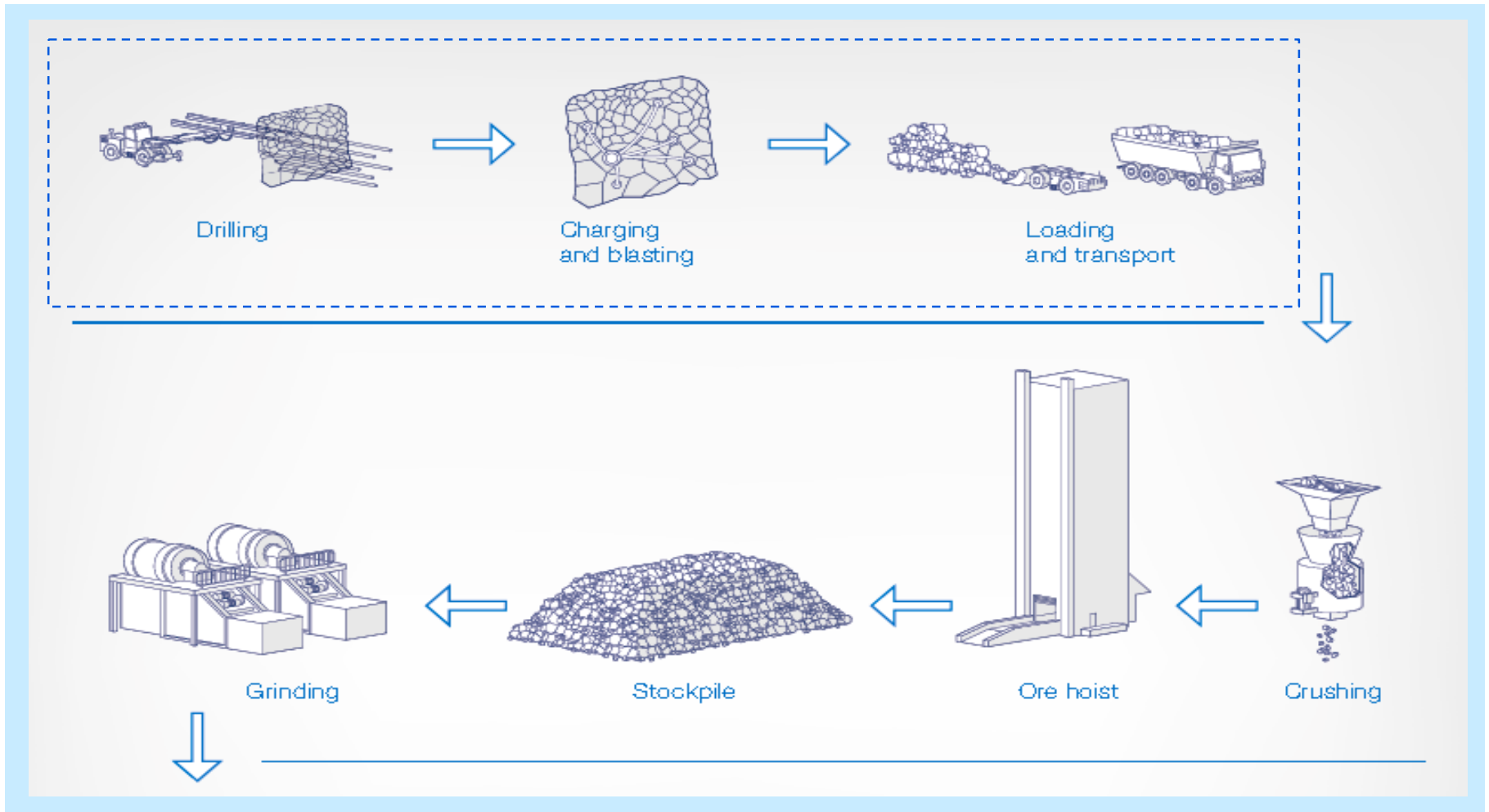
- Reduced energy costs and increased safety by improved operator supervision and control
- Improved air quality by providing fresh air where needed
- Energy savings up to 30-50% per year
- True mine wide control & optimization of air flows and air quality while minimizing energy consumption in real-time.
- Energy savings
- Fully automatic control of multi-staged pump stations
- Reduce maintenance costs

Underground mining Integration of mobile equipment and wireless communications

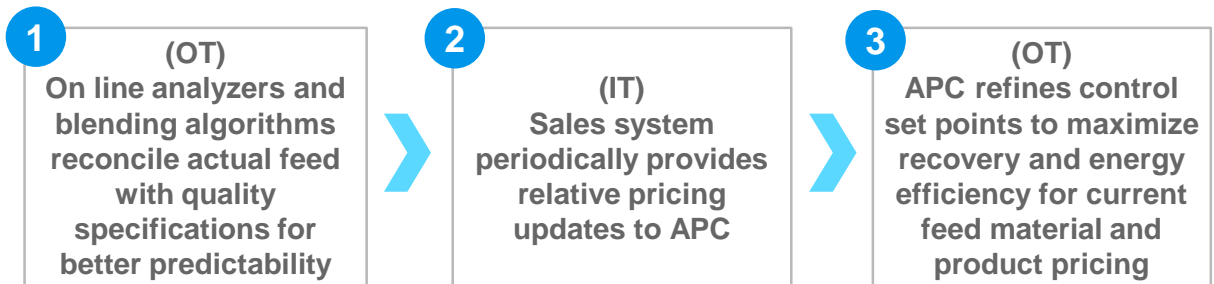
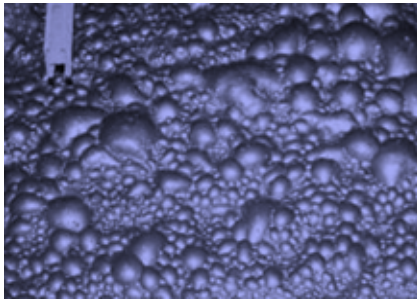
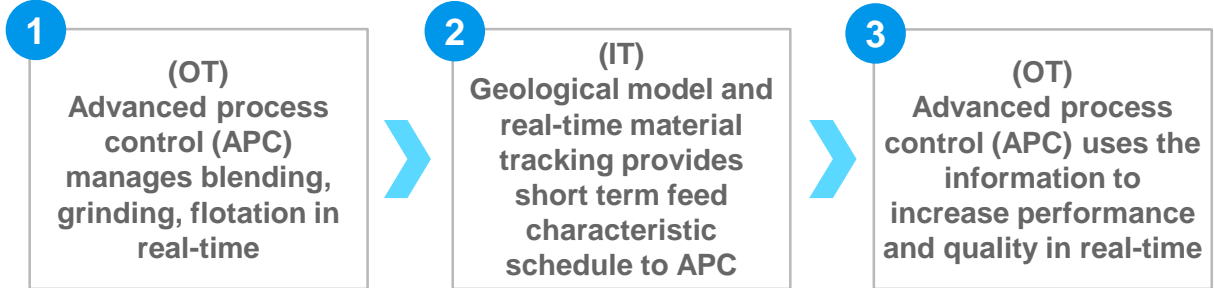


Underground mining

Integration of mobile machines completes the chain



Above ground mining Concentration process optimized



The old way

- Production, equipment and other control systems not integrated
- No information on relative product pricing
- No information on feed material
- Plant set points static

The new way

Increase plant recovery and optimize product mix based on current pricing and ore feed properties through leveraging APC across processes and business systems

ABB portfolio at Garpenberg

Value delivered



Garpenberg is the best integrated mine

-

Garpenberg is highly productive, energy and resource efficient

-

ABB portfolio enables this outstanding performance

Next Level mining

Q & A

Power and productivity
for a better world™

