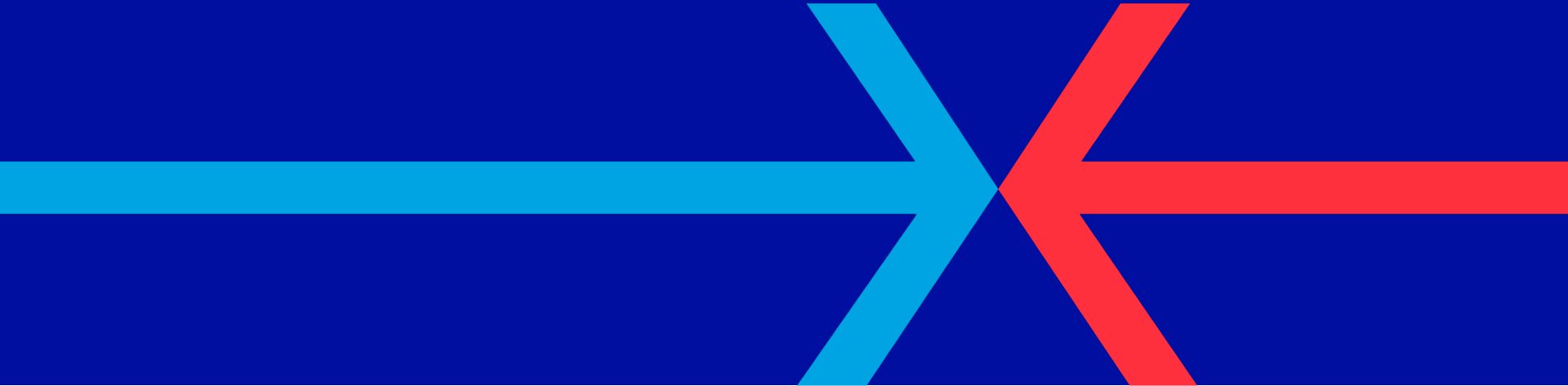
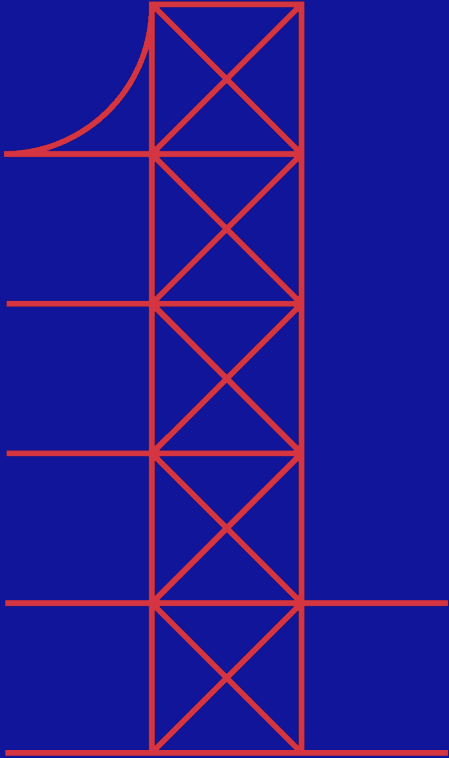


Global Partner in Rail for Power Supply

Building the infrastructure to power the world





Introduction to Linxon

We combine SNC-Lavalin's project management expertise and Hitachi Energy's industry leading technological knowledge into a company dedicated to turnkey electrical AC substations

... we are Linxon.

51%
SNC-
Lavalin

49%
Hitachi
Energy

We are building the infrastructure

to power the world with carbon free energy



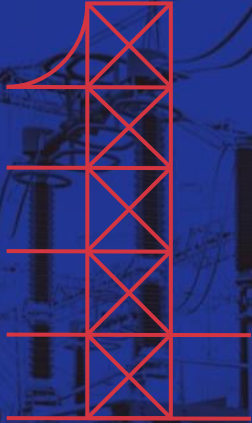
Value proposition

Linxon combines Engineering / Construction capabilities (SNC-Lavalin) and high-quality products (Hitachi Energy)

so that customers benefit from efficient and continuously improved solutions and increased industrial productivity.

Linxon is driving sustainability by building vital infrastructure for the energy transition. We help cities grow, industries expand and communities thrive by building a crucial part of the power transmission grid.

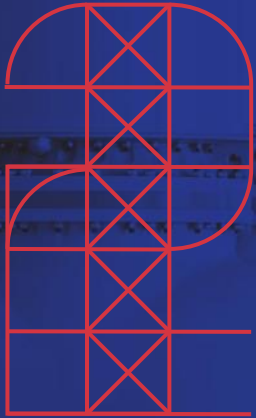
Our pillars



Act

as a business partner

- Single source of responsibility minimizes risk and reduces project complexity for our customers
 - Transparent and open communication helps to better prioritize customer requirements
 - Collaborative approach to deliver complete projects according to schedule
 - Single point of contact for after sales service
-



Offer

dedicated domain
expertise

- An unwavering commitment to the highest safety and quality standards
 - Linxon brings unrivaled technology and application know-how
 - Proven track record of delivering end to end, grid compliant solutions in multiple regions
 - Ability to manage complexity as demonstrated by extensive global references
-



Bring

long-term value

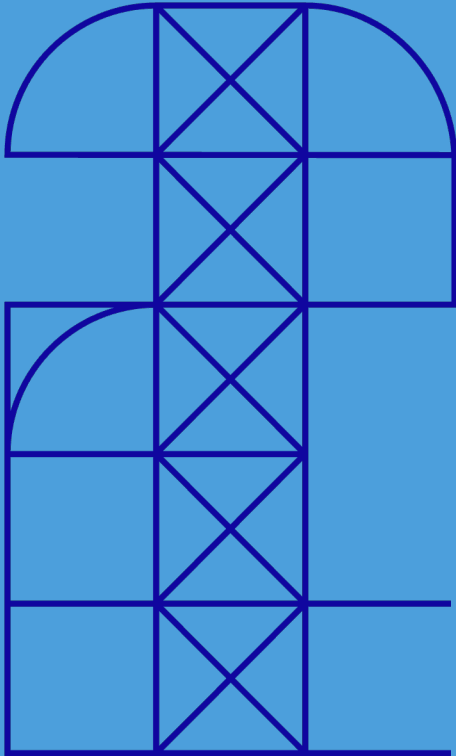
- Combining world class power technologies and project delivery
 - Enabling stronger, smarter and greener solutions
 - Future-proofed project execution helps our customers to be ready for the next generation of the grid
 - Predictable and cost-efficient lifecycle solutions
-

Our business scope

Linxon offers engineering, procurement and construction services for High Voltage Alternating Current (AC) substation projects.

Linxon serves 6 main customer segments:

1. Transmission System Operators / Utilities
2. Conventional Power Generation
3. Renewable Power Generation
4. Rail Transportation
5. Data centers
6. Battery energy storage (BESS)



Expertise and Know-how

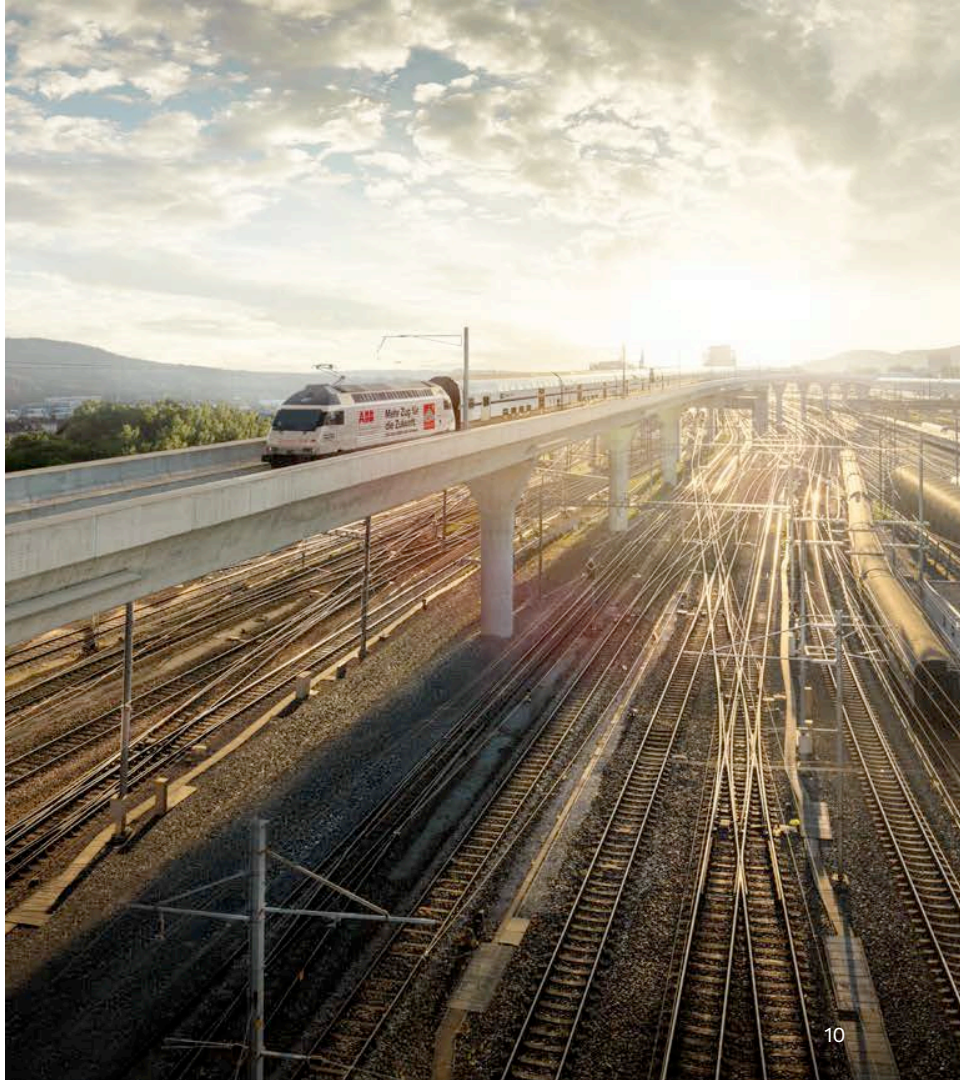
A true EPC company with dedicated
product experts

Linxon portfolio

for turnkey electrical infrastructure

Transportation

- Traction power substations (built in place and containerized solutions)
- Switching and paralleling stations
- AC & DC applications
- Wayside energy storage systems
- Feasibility and reliability studies – RAMS
- System studies and traction power simulations
- SCADA systems for railway applications
- Design, erection, testing and commissioning of Third Rails and Power Rails from 750vDC to 3000vDC consisting
- High Speed, Metro, Light rail and Monorail applications



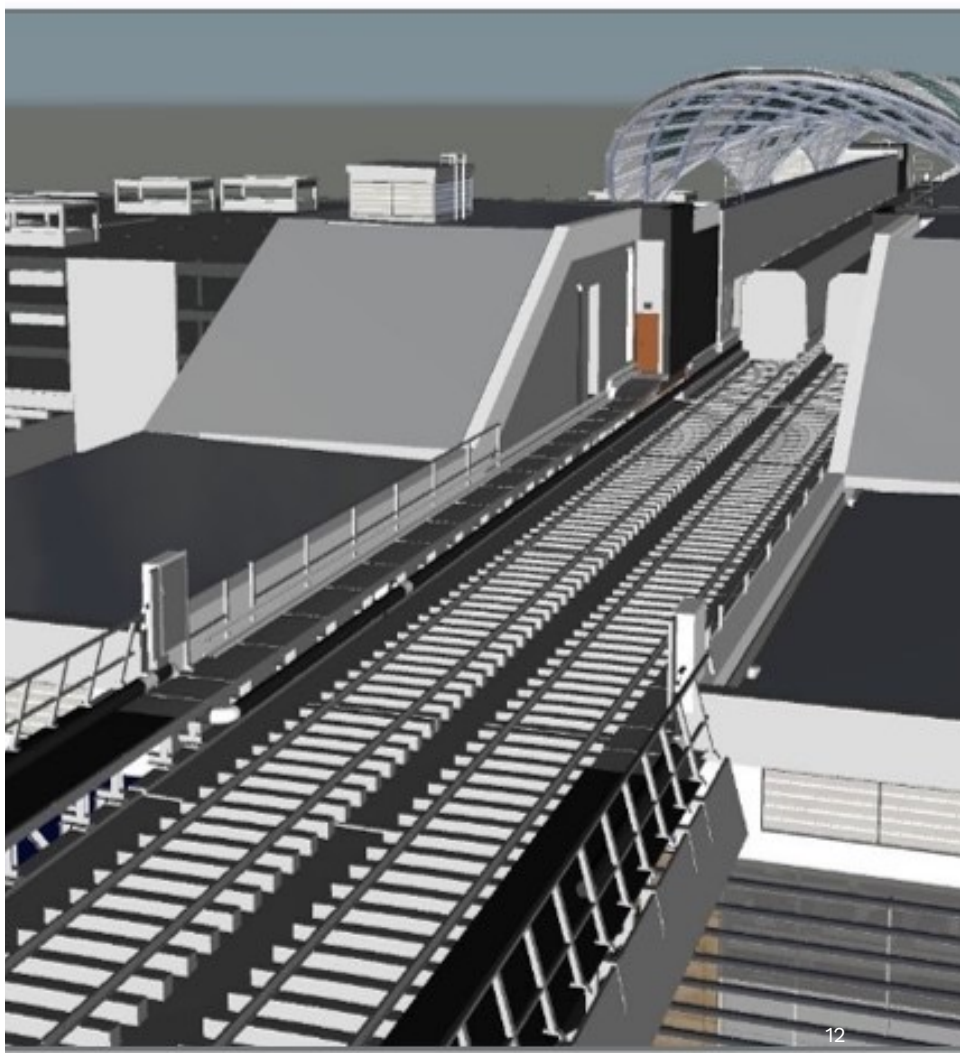
Technology competence

Linxon's application knowledge and experience supports our customers in dealing with complex technical requirements:

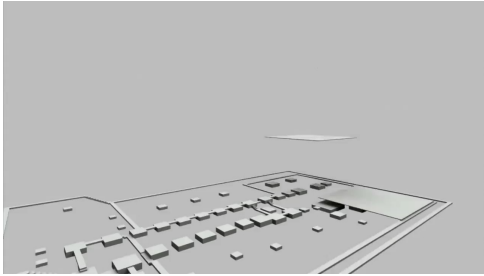
- GIS, AIS or hybrid substation solutions
- Achievement of grid compliance
- Managing renewable generation within the grid system
- Grid stabilization and improving power quality
- Integrating series or shunt compensation
- Reactive power compensation (statcom)
- Design and delivery of digital substations
- Leading edge protection and control design
- After sales service including predictive and preventive maintenance solutions

Linxon capabilities

- Leveraging the model information
- Resolving problems before construction
- Enabling collaboration (time and cost saving through the projects)
- Multi-disciplinary coordination

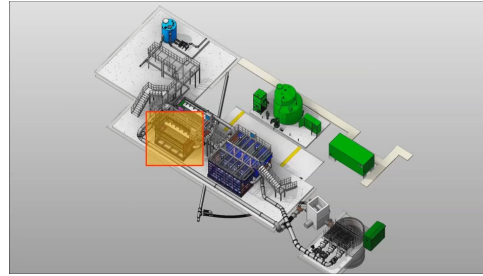


Linxon capabilities



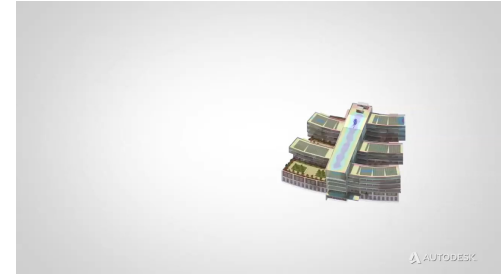
Construction scheduling

Reducing the interfaces with civil and trackwork contractors



Asset information modelling

Optimizing the Operation and Maintenance



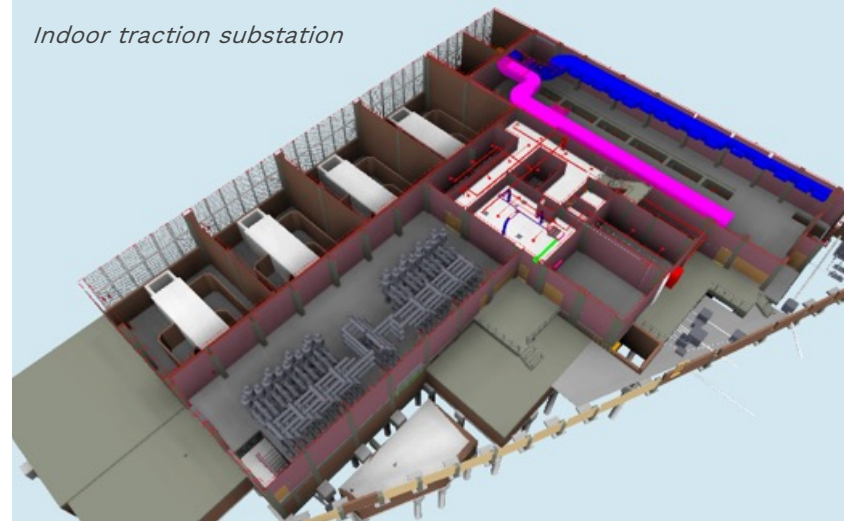
Cost and quantity take off

Optimizing the cost for construction

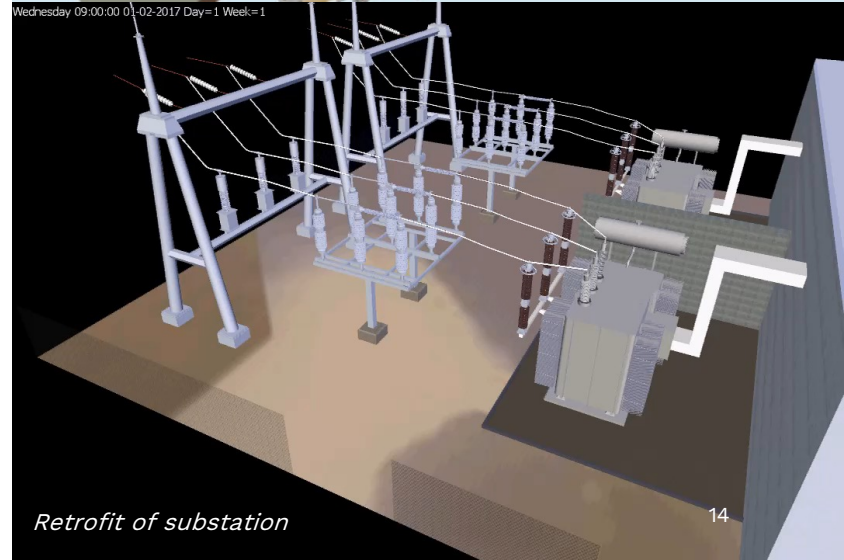
Optimizing the construction

- Asset replacement strategy
- Design analysis
- Compatibility analysis
- 4D construction

Indoor traction substation



Wednesday 09:00:00 01-02-2017 Day=1 Week=1



Retrofit of substation

Execution capabilities of Linxon



- Engineer customized solutions conventional/digital
- Provide FEED study and conceptual designs at an early stage
- Life cycle analysis
- Engineer project interfaces with in-house capabilities worldwide
- Reliable partner for developers & utilities
- Execute fast track high voltage turnkey projects via in-house construction management
- Execute brownfield, greenfield, urban and remote projects globally
- Implementing world class project controls to deliver projects on target
- Skilled resources ready to support warranty periods and long term service agreements

Partner approach

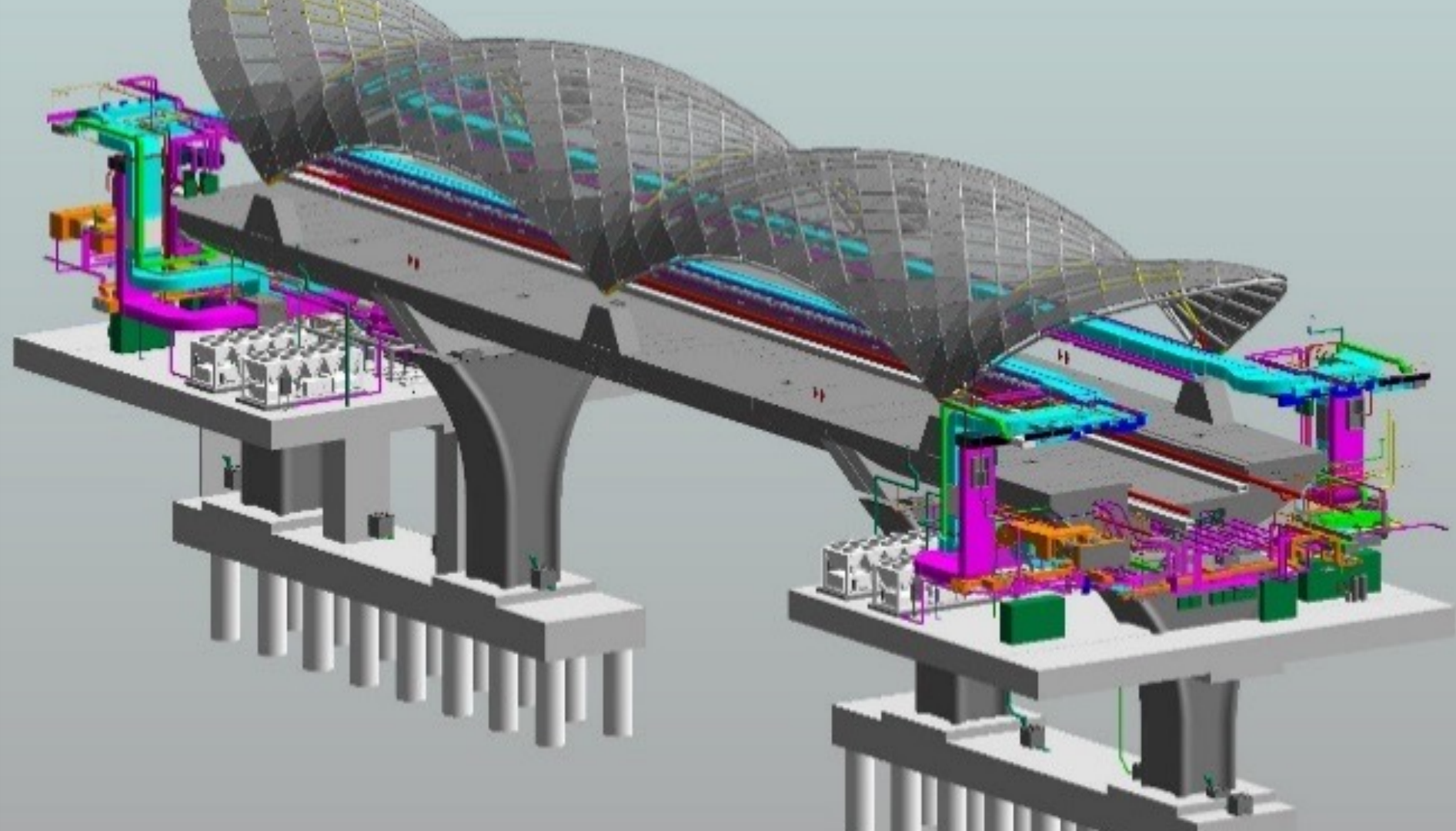
Concept to commissioning

Early engagement to develop feasible and optimal solutions for our clients

In-house engineering with our own OEM supervisors

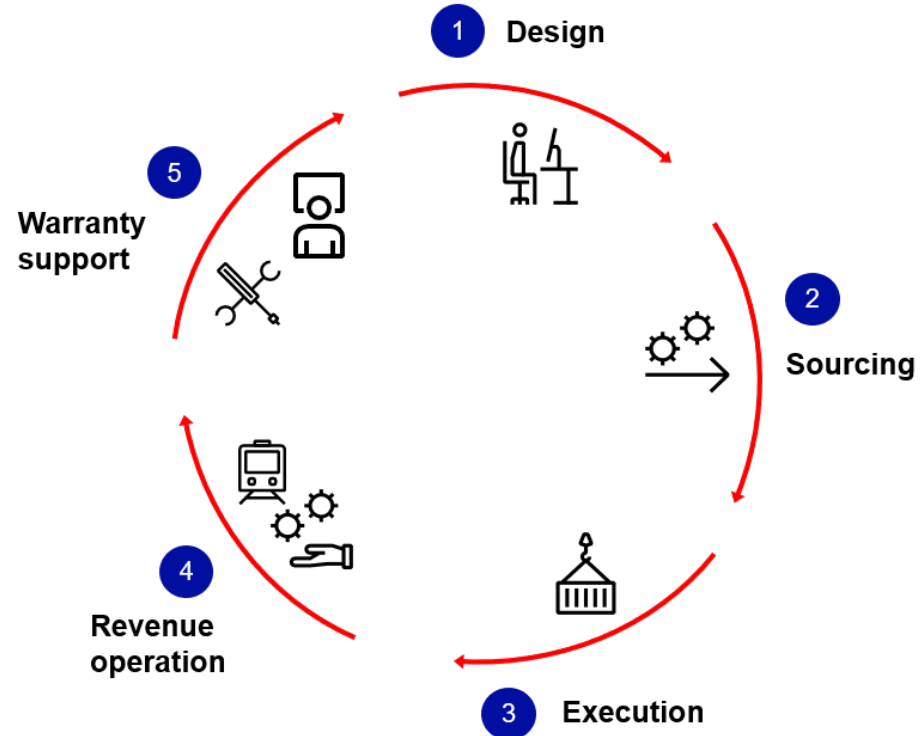
Innovative solutions and project sequencing to work within challenging site limitations

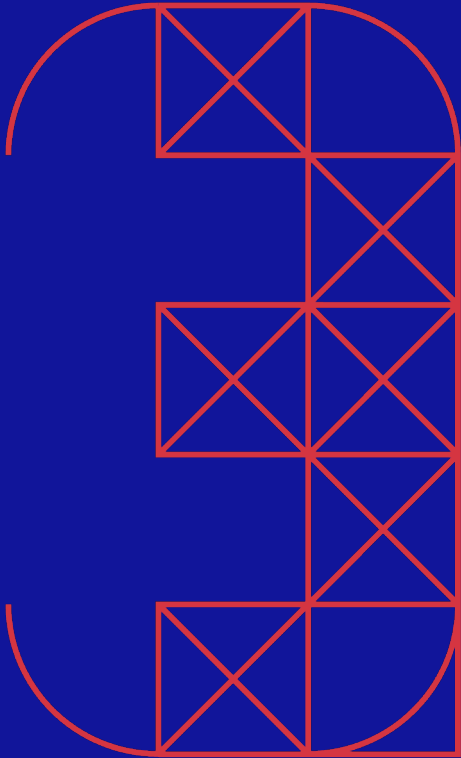




Reliable partner

- A skilled, reliable and committed partner for the complete portfolio.
- Predictable and cost-efficient solutions for sustainable business.
- Grid-complaint solutions.
- Compact and modular design with a high degree of integration.
- Compliance to EMC and stray currents.
- Compliance to RAMS requirements.





Transportation solutions

Safety, quality and integrity
in everything we do

Your one-stop partner for integrated solutions



Very high speed



Mainline and freight



Urban mass transit



Light rail systems



Monorail and people mover



Electrical busses

From Grid to Vehicle

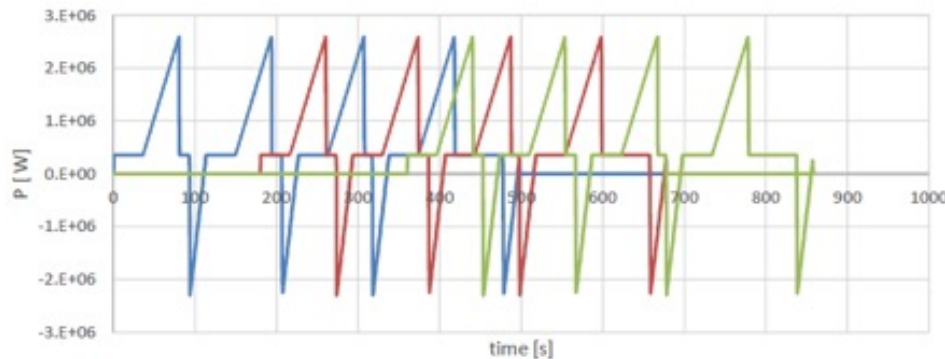
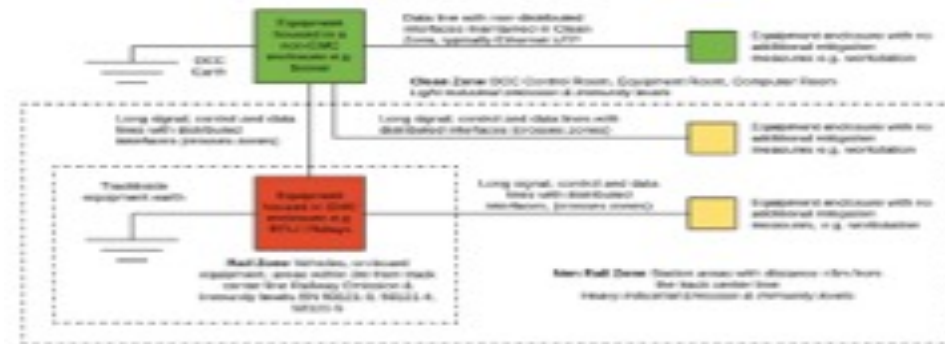
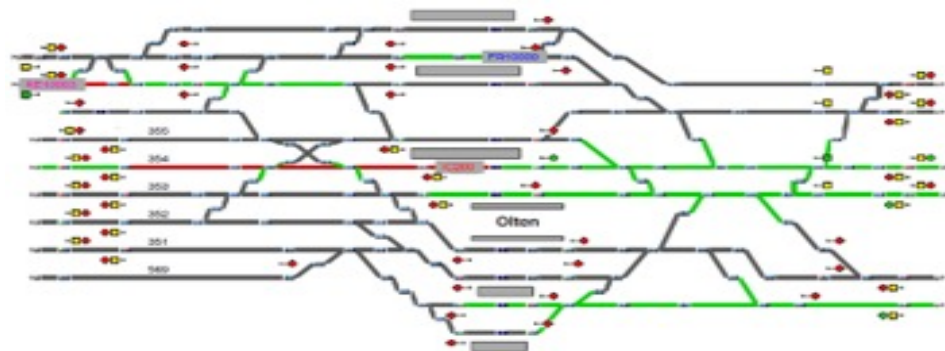
Solutions with complete scope and studies in Power Supply



Rail electrification technical studies

Simulation studies conducted in railway networks

- Traction load flow studies
- AC load flow studies
- Harmonic analysis
- Short circuit studies
- Insulation coordination studies
- Relay coordination studies
- Arc flash studies
- Induced voltage studies
- Earthing and bonding studies
- EMC control plan and studies
- Energy management system studies



Grid connectivity

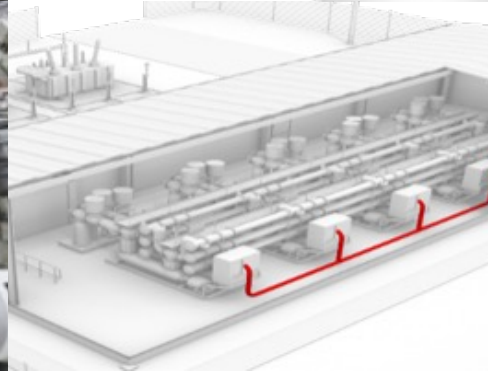
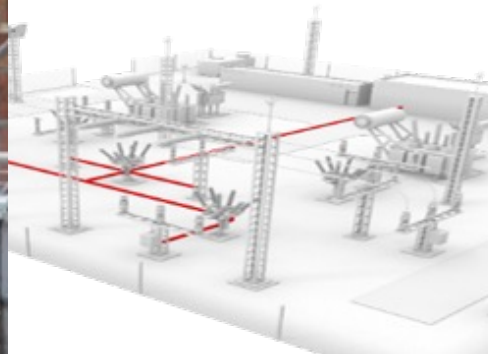
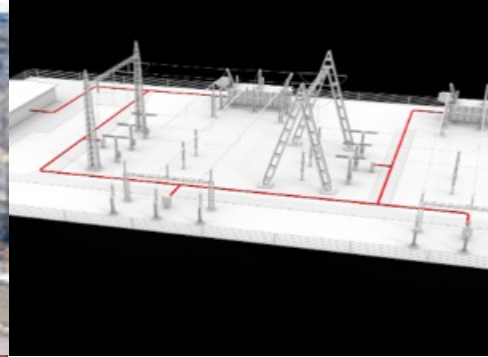
Reliable power connections

Turnkey delivery of bulk substation includes the design, supply, erection, testing and commissioning

- AIS / hybrid / GIS
- Transformer
- SCADA
- Other auxiliary items
- Associated civil works for bulk station
- Power quality systems

Key benefits

- Project management, planning and design
- Layout and plot plan
- Maintenance costs
- Scrappage costs
- Limiting power quality issues with power utility

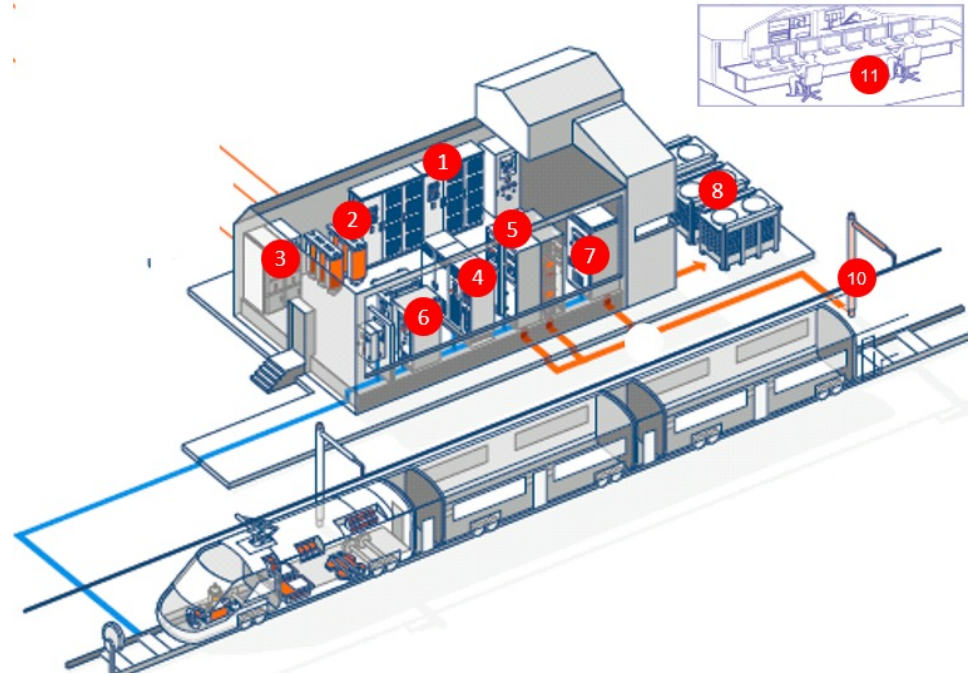


DC rail infrastructure

Complete solutions for DC rail applications

DC traction system and auxiliary substation

1. Indoor medium voltage
2. Traction transformer
3. Rectifier unit
4. DC switchgear
5. Negative return panel
6. Distribution and special transformers
7. Braking energy management systems
8. Resistor units
9. Power rail systems
10. SCADA systems

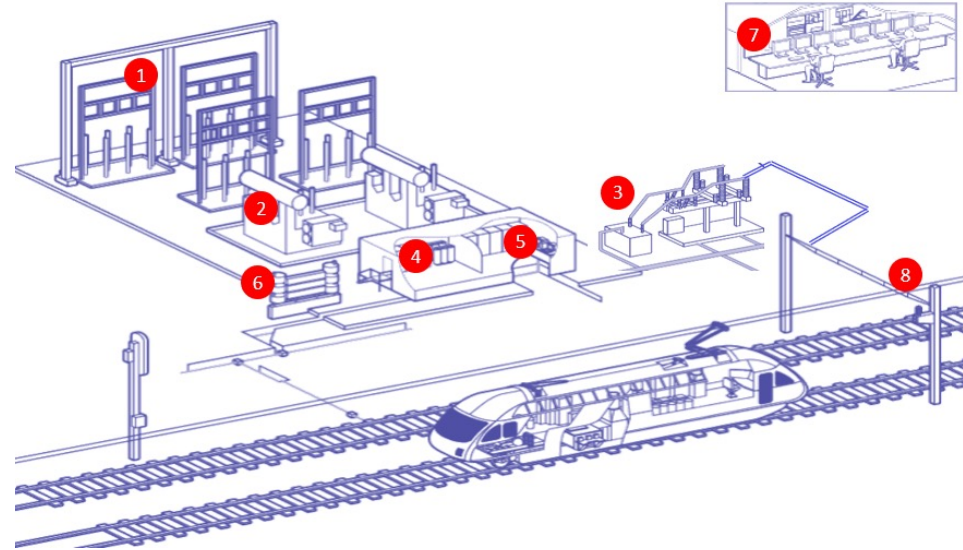


AC rail infrastructure

Complete solutions for AC rail applications

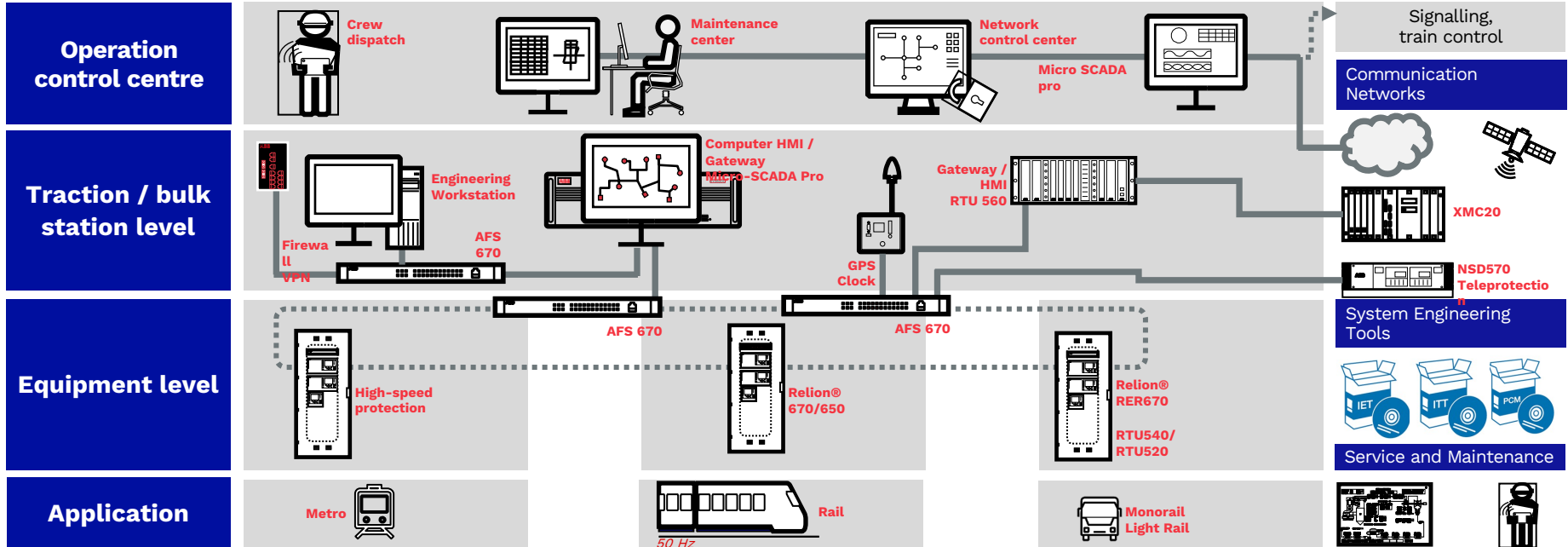
AC traction system and auxiliary substation

1. High voltage switchgear
2. Auto transformer
3. Traction transformer
4. Medium voltage switchgear
5. Substation automation and protection
6. SCADA system
7. Over head catenary system



Automation and control systems

Digital transportation networks and grid automation



Power rails and cable systems

Bringing the power to the vehicle

Scope of supplies

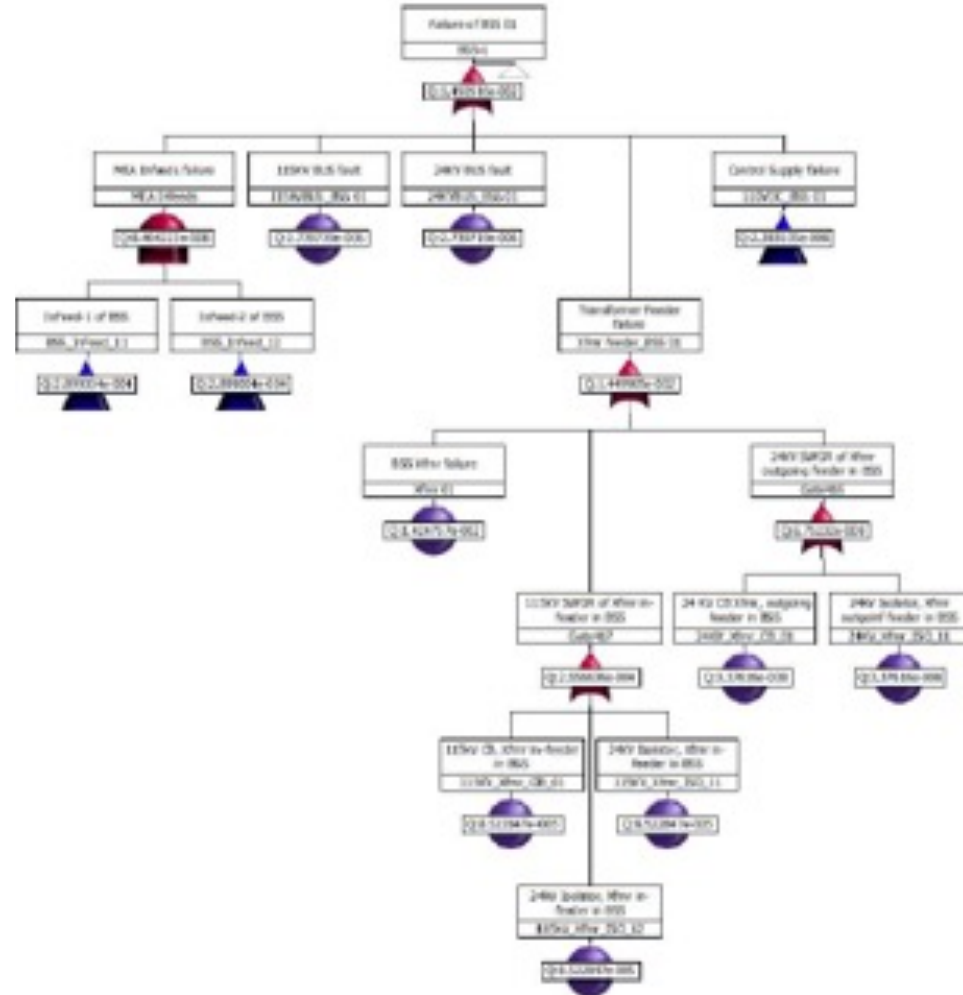
- Design, erection, testing and commissioning of third rails and power rails from 750vDC to 3000vDC
- Design, erection, testing and commissioning of cable systems
- Securing interfaces and optimizing potential issues.
- Power feed position and design adjusted to optimize the quantity and size of cables;
- Positioning of conductor rail at station platforms/walkways;
- Design is robust and safe considering stray current.



RAMS Management Plan

Systematic and coherent approach to electric power supply

- Reliability analysis
- Availability analysis
- Functional analysis and block diagram
- Fault tree analysis for the system and associated subsystems
- System level failure modes, effects and criticality analysis (FMECAs)
- Reliability and safety critical items list
- RAM predication and apportionment
- Maintainability task analysis
- Interface hazard analysis
- Operation and supporting hazard analysis



Expert teams handling the periodic Checks

Maintenance

Optimizing connectivity, reliability and efficiency of assets

- Time Based Maintenance (TBM)
- Importance Based Maintenance strategy (IBM)
- Condition Based Maintenance (CBM)
- Reliability Centered Maintenance strategy (RCM)

Spare parts
Partial upgrades



24/7 phone
24/7 remote
24/7 on-site

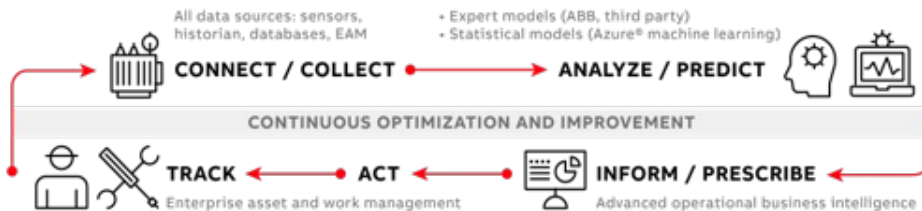
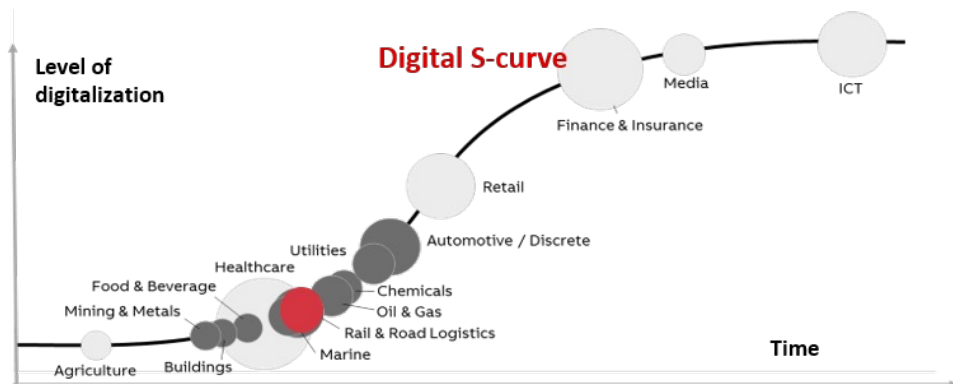
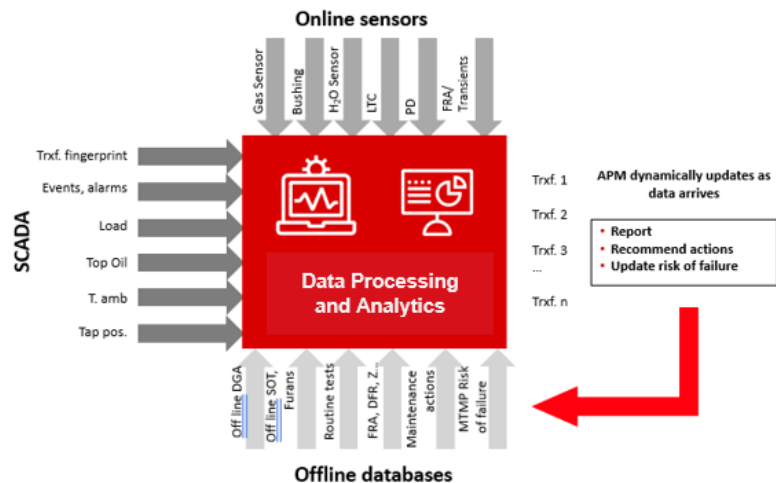
Condition
assessment
Simulation training

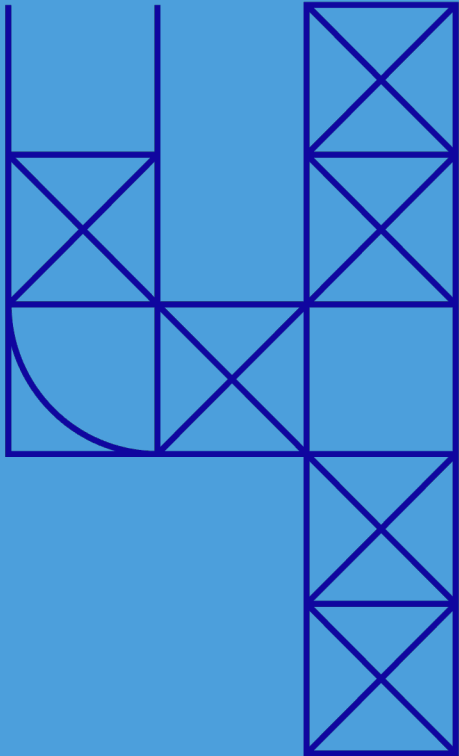
Updates
Maintenance
Security



Maintenance — Digitalization of assets

Systematic and coherent approach for electric power supply





**Our major
references**

Monorail network

Transportation – Pink and Yellow line

The challenge:

- Two monorail projects in Bangkok which transport millions of city commuters in the Greater Bangkok area
- Reducing air pollution and easing traffic congestion

Scope:

- Bulk substation, traction and service substations and critical equipment
- Complete turnkey solution which includes engineering, supply, installation testing and commissioning
- 115 kV AC/22 kV AC/750 kV DC

Benefits:

- The substation package will help power both monorail projects, thus bringing respite to millions of commuters in Bangkok, easing traffic congestion and reducing pollution
- Encourages a shift from road transport to more sustainable urban rail commuting

Location: Bangkok, Thailand
Customer: MRTA of Thailand
Year of commissioning: 2021



Rail electrification

Great Western Electrification Plan

The challenge:

→ In 2014, ABB Grid Integration (ABB EPC projects now delivered by Linxon) and UK Power Networks Services joined forces in a consortium to deliver a turnkey project for the creation of the new autotransformer feeder substations (25-0-25 kV) to deliver trackside power for Network Rail's Great Western Route Modernisation (GWRM) programme.

Scope:

→ Engineering/design, manufacture, installation and commissioning of 25kV substations (switchgear, transformers & automation including

Benefits:

→ The project is a critical element in the electrification of the Great Western railway to make travel more reliable, greener and smoother for passengers, as well as quieter for people living near the railway.

Location : Southern England, United Kingdom

Customer: Network Rail Infrastructure Ltd.

Year of commissioning: 2020



Power Supply with Third Rail

Bangalore Metro Phase I, India

The challenge:

- Turnkey power supply for the first phase of the modern Bangalore Metro, comprising two corridors – the East-West corridor of 17.9 km length with 17 stations and the 20.8 km long North-South corridor with 21 stations

Scope:

- Design, supply, installation and commissioning of four distribution substations rated at 66/33 kV
- 38 auxiliary and 27 traction substations
- Transformers, switchgear, capacitors, relays and the associated cables
- SCADA (Supervisory Control And Data Acquisition) system

Benefits:

- Efficient and seamless management of various parameters of the power network, high system reliability and space saving design with compact

Location: Bangalore, India

Customer: Bangalore Metro Rail Corp.

Year of commissioning: June 2017



Electrification of metro

Delhi Metro Rail Corp, phase 1 and 2

Location: Delhi, India

Customer: Delhi Metro Rail Corp

Year of commissioning: 2013

The challenge:

→ Reliable partner for the electrification of metro line 1, 3, 4, 5 and 6 (phase I and phase II of DMRC)

Scope:

Turnkey delivery of the complete electrification system, comprising design, supply, installation, testing and commissioning

- 370 track km of 25 kV overhead contact line and related 25 kV switching posts
- Three traction substations feeding the lines with one AC 25 kV and 150 auxiliary substations for the railway infrastructure
- SCADA system including asset and building management systems

Benefits:

→ Reliable system completed ahead of schedule



Urban metro

Kochi Metro urban mass transit system

The challenge:

- Working on operating lines for extension for existing power supply network for new stations
- Integration of existing system by third party and new system supplied by Linxon

Scope:

- Design, engineering, project management, supply, erection, testing and commissioning of complete power supply scope for the extension
- Traction substations and auxiliary substations.
- Power rings for the new systems
- A 750 V DC third rail system, basically a conductor rail providing electric traction power to railway trains and is placed outside of running rails

Benefits:

- Single supplier which takes overall responsibility of complete traction power supply system for extension package.

Location: Kochi, India

Customer: Kochi Metro Rail Limited (KMRL)

Year of commissioning: 2022 and 2023



Transportation

Kolkata Mass Rapid Transit System

The challenge:

- For an old metropolis like Kolkata with lingering issues of over population, congestion as well as environmental pollution, ideal transportation solution is MRTS along with supplementary feeder bus service and adequate first and last mile connectivity

Scope:

- Linxon turnkey scope involves project management, engineering, supply, erection, testing and commissioning of complete power supply scope for the two corridors. The project consists 13 traction substations and auxiliary substations and a 750 V third rail system, basically a conductor rail providing electric traction power to railway trains and is placed outside of running rails.

Benefits:

- Once operational, the system will nourish this public-transport oriented transit feature of the city and will cater the expectation and demand of the people by providing fast, reliable, safe and modern mass transportation mode.

Location: Kolkata, India

Customer: Rail Vikas Nigam Ltd. (RVNL)

Year of commissioning: 2022



Urban metro

BMRCL urban mass transit system

The challenge:

- Supply of the complete power supply package (including third rail) for the new lines of the Phase II corridor Urban Mass Rapid Transit System in the city of Bangalore, India

Scope:

- Engineering, project management, supply, erection, testing and commissioning for the complete power supply scope
- Traction substations, auxiliary substations, a 750 V DC third rail system and a supervisory control & data acquisition system for the electric traction power
- Maintenance planning system installed at BMRCL's operation control centre and integrated with the supervisory control and data acquisition system

Benefits:

- Improved efficiency of power supply by almost + 10% compared with competitors
- Reduced carbon footprint and greenhouse gas emissions by around 17 million metric tons over 25 years

Location: Bangalore, India

Customer: The Bangalore Metro Rail Corporation (BMRCL)

Year of commissioning: 2022 and 2024



Conclusion

Genuine partnerships for real success

- End to end complete range of solutions
- Strong operational and safety standards
- Diverse and global know how of grid solutions and power supply packages for rail
- Customer focused approach with higher agility
- Integrated sub contractor approach
- Securing multiple interfaces
- Value creation through joint engagement with end customer
- Unique proposition for end customers
- Fully integrated system offering

“

As one of the leading engineering companies, we help our customers with turnkey solutions in the field of substations for power transmission, renewable energy and transportation. As a single point of contact we combine the accumulated knowhow of key-suppliers and contractors in a sustainable way so that customers benefit from efficient solutions, increased industrial productivity and a lower environmental impact

”



Our global presence

600 employees

5 hubs

- North America
- UK, Ireland & Central Europe
- Nordics
- Middle East & Africa
- Asia Pacific



linxon