Reliable Power Grids
EUROPOLES SOLUTIONS
FOR T&D NETWORKS
Agenda

1. Introduction Europoles
2. Solutions for Low & Medium Voltage
3. Solutions for High Voltage
4. Solutions for Extra High Voltage
Fact & Figures

- Market Leader in Europe
- More than 125 years experience in the poles business
- 9 Factories in Germany, Poland, Switzerland, Oman
- Sales Offices & Representatives worldwide
- Europe’s leading manufacturer of standard and special solutions made of steel, concrete, and composite materials
- Company headquarters in Neumarkt / Bavaria
- Throughout the world in more than 40 countries
PRODUCTION LOCATIONS
- Branches:
  - Head Office: Czestochowa/ Poland
  - Production: Chrzanów/ Poland
- 320 Employees
- 40 Mio. Turnover
- Capacity up to 25,000 t steel per year
- Production of street lighting, tramway poles and high and extra high voltage poles & pylons
Production Facility

- 3200 t press brake for steel plates from 4,0 mm up to 46,00 mm
- C-controlled welding robot for 2 and 4 shell pole segments
- Automated delivery and aligning system
- Simultaneous welding of inside and outside welding seems possible

State of the art production facility for steel poles in Europe
Research & Development

- Production facilities for concrete, steel and fibreglass poles
- Technical Department for engineering of steel, concrete, fiberglass & hybrid structures
- Production of poles & towers from 3m up to 130m – with the free choice of materials & technologies

Steel Pole Plant in Konin/Polen, Capacity of more than 100,000 Steel Poles per Year
Over 3000 poles for high speed tracks

First Sign Gantry made of spun concrete, A99, Munich
Introduction EUROPOLES

References – Customized Solutions

Floodlight Mirror Pole, Yas Island Abu Dhabi

Floodlight Poles with Lowering System, Munich Airport
1. Einführung & Vorstellung Europoles

References – Renewables

Independent Power Generation & Storage System

Telekommunikation Tower with Wind Turbine
Why Europoles?

- Long Experience in Mast and Towers
- Better Design
- Smaller diameters
- Support during the planning phase
- Inhouse statical calculations and optimizations
- Best pole materials
- Market Leader – more than 1,500,000 poles produced

❖ Best technical and economic solution
❖ Making ideas & innovations come true!
Solutions for Low & Medium Voltage
Steel Poles
Customized for local requirements

- Adapting of existing accessories from existing pole standards

- Calculation of poles and cross-arms according to the conductor requirements

- Low weight – easy to install

- Special duplex coating for maximum corrosion protection

- Small footprint – high load bearing capacity
Forrest Crossing – different isolator arrangements
Solutions for Low & Medium Voltage

Cable termination & circuit breaker pole

Tap-Off / Section Pole
Solutions for Low & Medium Voltage
Spun Concrete Poles
A Spun Concrete Pole is the most Economic Solution for Distribution Networks in harsh environments:

- Spun concrete has a high density and high strength
- Concrete Pole = Industrial Product
- Long term experiences with extreme climate conditions (Australia, USA, New Zealand etc.)

→ No maintenance!
Advantages Spun Concrete Poles:

- No more pole fires
- No deterioration of the poles over their life time
- No damage by termites or corrosion
- High availability of long poles (>17 metres direct from stock)
- Much higher pole strength and consistent quality
- Improved overhead line design

→ Lower overall costs!
Customized for local requirements

- Adapting of existing accessories from the wood pole standards
- Calculation of poles and cross-arms according to the conductor requirements
- Special coating for the pole ends (heat, sand, salt, UV,…)
- Special UV resistant pole caps
- Internal aeration system (chimney effect)
Solutions for Low & Medium Voltage

33kV Section Pole

33kV Terminal Pole
Wadi-/ River-Bed Crosser with 230m Spanlength / Double-Structures
Solutions for Low & Medium Voltage
Special Poles - Innovations
Innovations: Hybrid Design - Steel + FRP

Hybrid Pole - Steel base & FRP top
(fibre glass reinforced plastic)

1. Bird protection pole: Approved isolated to part to avoid any kind of bird losses due to electrical shocks
2. Perfect wood replacement pole – FRP top is insulating
3. Very flexible, holes in the FRP top part can be drilled by the customer
4. Very robust against damages because of the steel base
5. For LV and MV
6. Very light design – easy to install
Innovations: Hybrid Design - Steel + FRP

Hybrid pole in action

Hybrid pole - details
Solutions for High Voltage
References – Steel Poles 110kV

110kV Line Luxemburg

110-kV-Tap-off pole
References – Steel Poles 110kV

110kV Oder-Crossing, 477m Spanlength, 100m Steelpoles, Swinemünde
References – Concrete Poles 110kV

110kV Concrete Pole

Concrete Pole with Steel Crossarm
References – Hybrid Lines for 110kV

110kV Concrete Poles, Poland

110kV Concrete Poles, Poland - Details
Innovations 110kV

110-kV suspension pole, rammed pipe foundation, Hemmoor

110-kV tap-off pole (lattice cross arm & drop over foundation) Martinsheim
References - Compact Lines for 110kV

110kV Compact Poles, Austria

110kV Compact Poles - Details, Austria
Compact Lines

110kV Gänserndorf Eisenbrunn, Austria

110kV Gänserndorf Eisenbrunn, Austria - Details
Latest Development – Section Foundation
Erection of a 40m pole in Hohenhewen, Germany
Solutions for High Voltage

Poles mounted with crane

Erection of 145kV poles in Sweden
Solutions for Extra High Voltage
Extra High Voltage - actual situation Compact Poles:

- Reduction of visual impact
- Reduction of electric magnetic fields
- Reduction of “right of way”
- Reduction of pole footprint
- Fast erection due to preassembled delivery

Higher acceptance by the people, smaller trenches, lower impact on landscape
Reduction of the footprint of the line

Background:

- High costs for occupied land – especially in populated areas
- Problems with land owners and “right of ways”
- Limitation of the landscape for big foundations and cross-section dimensions

Conclusions:

- Changing to monopole designs – enables the reduction of the footprint of the pole and under the line
- Usage of new foundation methods
- Very expensive alternative: Usage of underground cables
Reduction of electromagnetic fields and space requirements

**Background:**
- Magnetic field standard of the International Commission for Non Ionising Radiation Protection (ICNIRP) = 100 microTesla
- E.g. TenneT magnetic field standard in the Netherlands = 20 microTesla
- E.g. Dutch Ministry of Housing, Planning and the Environment = 0.4 microTesla for people living close to the OHL

**Conclusions:**
- Compacting the pole by using monopoles
- Using compact insulators
- Specially designed poles with less space requirements
References – 1x 400 kV
References - 2x 110 kV with 1x 400 kV

1x 400 kV with 2x 110 kV – Heavy Angle Poles
References – 2x380 kV - Terna
Solutions for Extra High Voltage

Full Scale Testing of Steel Poles
Solutions for Extra High Voltage
Ultra-High-Strength-Concrete (UHPC)
Ultra-High-Strength-Concrete (UHPC)
Research project: Compact Extra High Voltage Pylons and Cross Arms

Objective:
Environmentally and resource friendly construction, that contributes with a compact arrangement of the conductors to a significant reduction in line width and required area – maintaining the economic requirements and technical safety.

Facts and Figures:
Period: 24 months
Budget: 2.7 Mio. EUR, sponsorship approx. 1.8 Mio. EUR
Universities: TU Braunschweig, TU Dresden, KIT (Karlsruhe)
Partners: Fichtner, Lapp

Focus of development:
- Basic materials:
  High-performance concrete (UHPC), FRP for cross arms & composite isolators, material & EMF-test
- Constructions:
  Hybrid constructions concrete/steel / optimization through the use of multi edged cross section steel poles / optimization of foundations (e.g. compact piles, drop over) / optimization of pole joints

Validated and accompanied by:
- Acceptance studies and surveys
- PR work
- Environmental assessment

Pole Bending Test with the equivalent of 80t tractive force
R & D Projects

Advertisement Tower (UHPC)

Height: 62m
Top-Diameter: 912mm
Base-Diameter: 2.400mm
Moment at the base: Md: 29.800kNm
Material: Ultra High Performance Concrete (UHPC)
Concrete Strength: > C140