



DE  **ANGELI**
PRODOTTI
every wire, everywhere.

INNOVATION THESIS

De Angeli Prodotti is at the forefront of a **GREEN REVOLUTION** to save the Planet.

ENERGY TRANSITION helps **DECARBONIZATION**, requested **WORLDWIDE** to mitigate **CLIMATE CHANGE**, involves substantial investments in **RENEWABLE ENERGY**, and poses the challenge of **ELECTRIC MOBILITY**.

CONNECTION of **MULTIPLE INTERMITTENT ENERGY SOURCES** requires a **MORE INTEGRATED, SECURE** and **FLEXIBLE POWER GRID**.

DIGITALIZATION is an enabling and pervasive technology. All above while in **DEVELOPING COUNTRIES**, a **GROWING SHARE OF POPULATION** has access to **ELECTRICITY!**

De Angeli Prodotti fosters **environmental sustainability** (cogenerator and rooftop photovoltaic system on Italian industrial buildings).



THE INNOVATION PATH




OPGW	1995
ACSS	2000
Invar Core Conductors	2001
Starting CTC production	2002
GAP-Type	2006
ACCM (Aluminium Conductor Composite Multistrand)	2007
Coloured and sandblasted conductors	2010
Low noise conductors	2012
AAAC-HC+ conductors for low losses	2014
ACCS (Aluminium Conductor Composite Single)	2015
Flexible paper covered copper strands Anti-ice conductors	2016
Polymide copper magnet wires	2017
Litz production for High Frequency applications	2018
Enameled flat Cu for hairpin e-Mobility powertrain	2019
Smart conductors for Overhead Lines Monitoring	2020

OUR COMPANY

A dedicated workforce using the latest generation equipment and technology	400
Stock at the service of our clients	3.000 mT _{ons}
Total annual production capacity	50.000 mT _{ons}
Total Covered area	40.000 m ²
Total area	60.000 m ²

OUR GOALS ARE CLEAR

Our team has always worked to achieve certain goals:

-  We aim to be the **most innovative in the world for overhead powerlines!**
-  We develop more and more **high technology** products for **windings!**
-  We boost **efficiency and service** for **mass market products!**

OUR CORE VALUES ARE SOUND

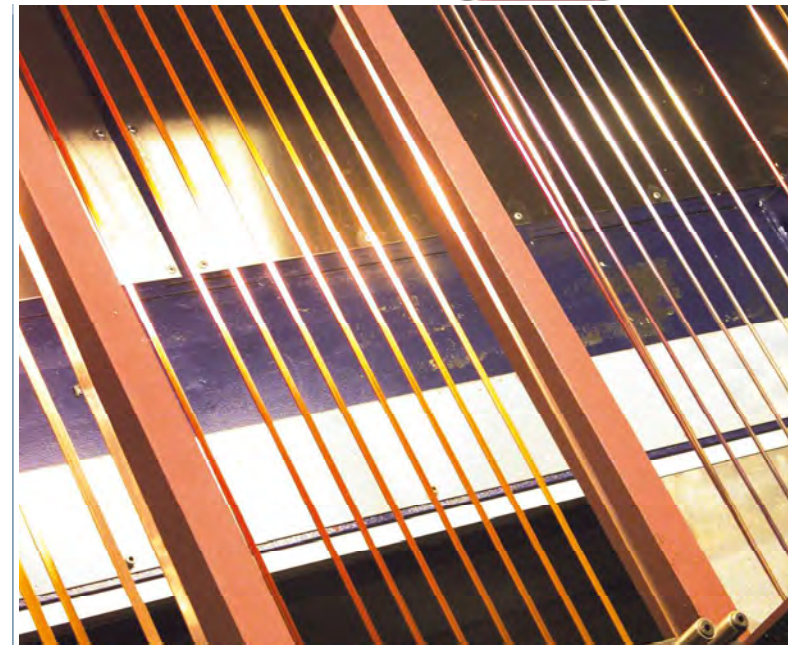
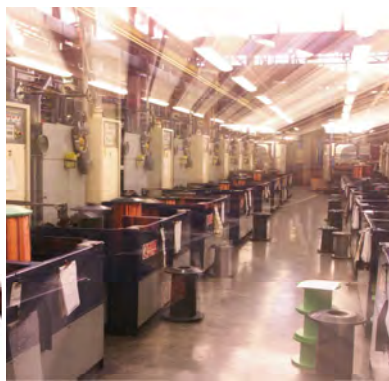
Our corporate culture is based on some **core values**, to which our **people** are faithful, that pervade the entire **organization** and find full accomplishment in our **products**.

Our core values are the soul of our company.



PRODUCTION RANGE

- Enamelled round and flat copper conductors
- Enamelled round and flat aluminium conductors
- Litz Wires
- Flexible Insulated Cable
- Copper Continuously Transposed Cables
- Aluminium Continuously Transposed Cables
- Insulated round and flat copper conductors
- Insulated round and flat aluminium conductors
- Bare overhead copper, aluminium and aluminium alloy conductors
- High Thermal Limit bare overhead conductors
- Fibre glass/mica insulated round and flat conductors
- Round, flat and shaped wires for mechanical and electrical applications
- Catenary lines for railway applications



ENAMELLED ROUND WIRES

ALUMINIUM

Adhexal H (180°C) IEC 317 - 15
 Adhexal 200 (200°C) IEC 317 - 25
 diameters (mm): 0,40 min - 6,00 max

COPPER

Thervest H (180°C) IEC 60317- 8
 Thervest 200 (200°C) IEC 60317 -13
 diameters (mm): 0,18 min - 5,00 max
 Bondvest H (180°C) IEC 317 - 37
 diameters (mm): 0,18 min - 2,00 max

ENAMELLED FLAT CONDUCTORS

ALUMINIUM

Adhexal H (180°C) NEMA 1000 MW36 - A
 Adhexal 200 (200°C) NEMA 1000 MW36 - A
 thickness (mm): 1,40 min - 6,00 max
 width (mm): 4,00 min - 25,00 max
 grade: 1 - 2

COPPER

Thervest H (180°C) IEC 317 - 28
 Thervest 200 (200°C) IEC 317 - 29
 thickness (mm): 1,00 min - 6,30 max
 width (mm): 3,00 min - 25,00 max
 grade: 1 - 2

ROUND COPPER

Thervest 200 (200°C) IEC 60317 - 13
 Thervest 220 (220°C) IEC 60317 - 57
 Thervest 200 LL (220°C) IEC 60317 - 13
 diameter(mm): 0,50 min - 3,50 max
 grade: 2 - 3 - 3+

FLAT COPPER

Thervest 200 (200°C) IEC 60317 - 29
 Thervest 220 (220°C) IEC 60317 - 58
 Corona Resistant (To be developed)
 thickness (mm): 0,80 min - 3,00 max
 width (mm): 1,20 min - 5,00 max
 section: 3 ÷ 15 mm²
 grade: 2 - 3 - 3+

ALUMINIUM SOLUTIONS AVAILABLE CASE BY CASE



ENAMELLED WIRES FOR E-MOBILITY



CTC CONTINUOUSLY TRANSPOSED CABLE

FLEXIBLE INSULATED CABLE

ALUMINIUM

width of flat (mm): 4,00 ÷ 12,50
thickness of flat (mm): 1,40 ÷ 3,25

COPPER

width of flat (mm): 3,00 ÷ 12,50
thickness of flat (mm): 0,80 ÷ 3,25

FROM 5 TO 85 INDIVIDUAL ENAMELLED FLATS

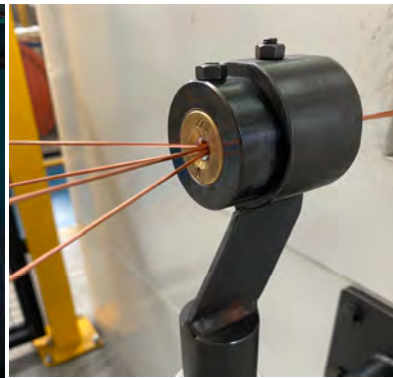
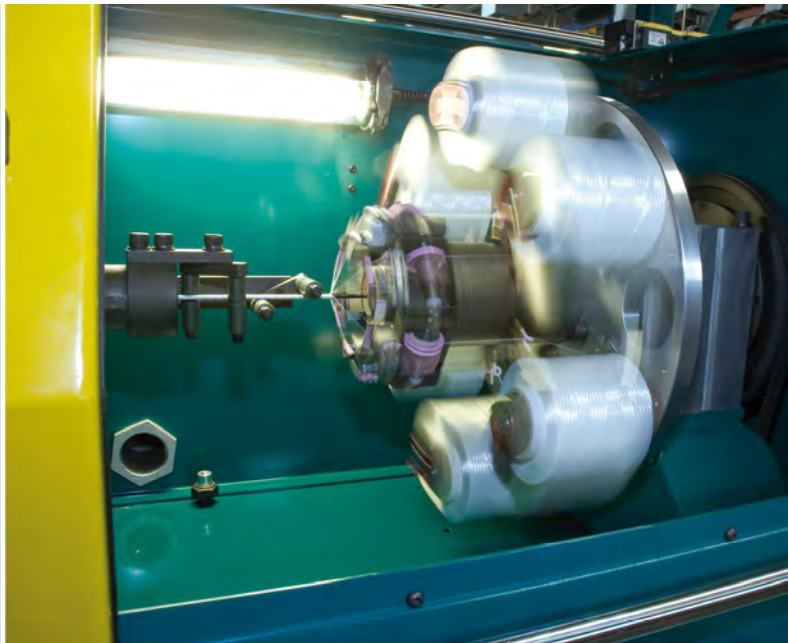
types of enamel: PVF / PEI / PEI + PAI
Optional: Epoxy - Epoxy HT

types of insulation: normal, upgraded, calendered, Dennison papers, Nomex®, polyester film, glass tapes

section of cable: from 10 mm² up to 600 mm²

type of insulation: normal, creped, upgraded, calendered, Dennison papers
Nomex®

insulation thickness: up to 10 mm on radius



INSULATED ROUND AND FLAT CONDUCTORS, FIBRE GLASS AND MICA WIRES

ALUMINIUM

Round

diameter (mm): 1,60 min - 10,00 max

Flat

thickness (mm): 2,00 min - 8,00 max

width (mm): 4,00 min - 15,00 max

COPPER

Round

diameter (mm): 1,50 min - 8,00 max

Flat

thickness (mm): 1,00 min - 8,00 max

width (mm): 4,00 min - 25,00 max

TYPE OF INSULATION

Kraft natural paper, Calendered kraft, Calendered crepe paper, Upgraded kraft paper, Diamant kraft, Nomex®, Polyester film, Glass tape, Tecwrap, Dacron/Mylar®, Polyester/Mica, Glass/Mica, Kapton

LITZ WIRES

ALUMINIUM

diameter (mm): $\geq 0,4$

spec. resistance ($\Omega\text{mm}^2/\text{m}$): 0,0278

COPPER

diameter (mm): $\geq 0,05$

spec. resistance ($\Omega\text{mm}^2/\text{m}$): 0,0171

UP TO 15.000 INDIVIDUAL WIRES

TYPE OF INSULATION

Individual wire

PU / PEI / PEI + PAI

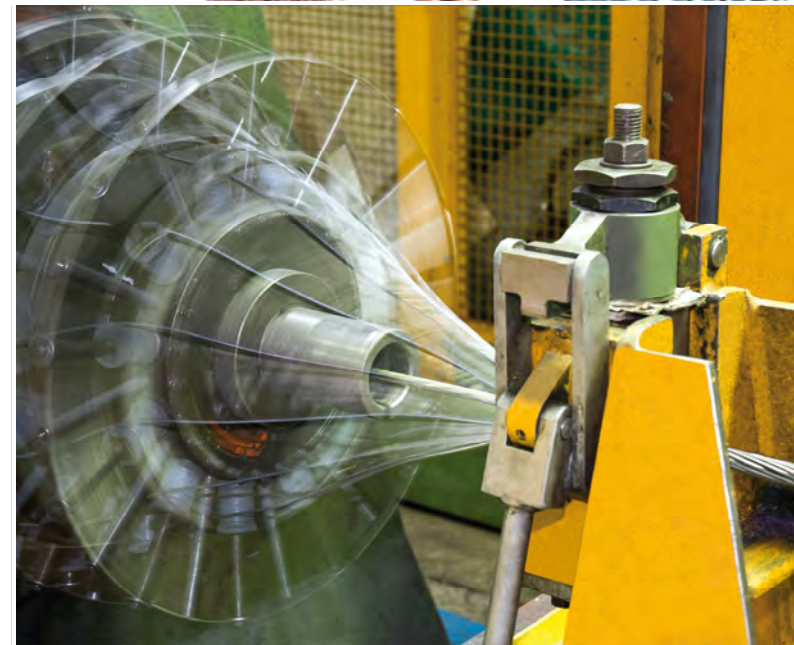
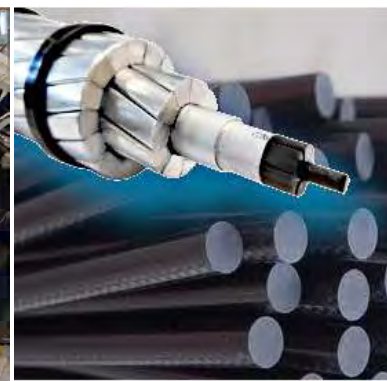
Optional: Self bonding

External tape

Nomex T410, Polyester, Polyimide,

Conductofol, Mica-Glass

ROUND OR FLAT SHAPED



BARE OVERHEAD CONDUCTORS

Since the 80^s, De Angeli Prodotti designs and supplies **conductors for overhead power lines**, following all the national and international standards. The mutations of **regulations**, that avoid and hinder the possibility to build new lines in the most developed countries, the **climate changes** and the unstoppable **growth of the energy demand**, brought to the need of re-powering the existing grids. For this reason, starting from 2000, De Angeli Prodotti successfully revised, designed and supplied countless **technological solutions** for any conductor for the Overhead Power Lines.

RAILWAYS APPLICATIONS

The **contact line** for electric traction in the railway infrastructure consists of various types of copper and copper alloys conductors: **Cu-Etp, Cu-Ag, Cu-Mg and Cu-Sn**.

The sector requires products of the highest **quality** and the large investments of electrification of railway lines impose on the suppliers a **high production capacity**. The advent of **high-speed railway lines (High Speed Trains)** modernizes the mobility and allows the reduction of CO₂ emissions thanks to **more resistant products** (Cu-Mg) that guarantee **safety and reliability**.

De Angeli Prodotti has served for decades the major European railway infrastructures with a full range of products.

TYPE OF CONDUCTORS

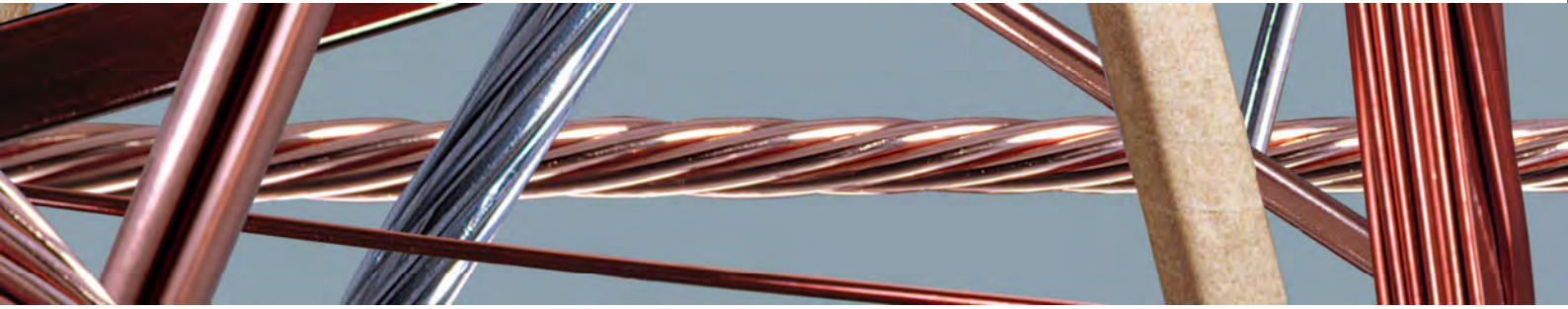
- ACCM Conductors (Multistrand Carbon Core)
- ACCS Conductors (Single Carbon Core)
- ACCS-Sens Conductors (Monitoring System)
- SMART CONDUCTOR (Real Time Monitoring of Overhead Lines)
- INVAR CORE Conductors
- ACSS Conductors
- GAP-TYPE Conductors
- AAAC HC⁺ (Super High Conductivity, Low Losses)
- AAAC Conductors
- AAAC-AW Conductors
- ACSR-AW Conductors
- ACSR Conductors
- CU Conductors
- OPPC Conductors
- ACS and OPGW
- Surface Treatments (Colored, Sandblasted, Anti-Ice)

BARE OVERHEAD CONDUCTORS

Are you looking for a **customized solutions** that suits your needs?

DISCOVER OUR CONFIGURATOR!





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