

INNOVATIVE PARTNER IN DESIGN AND MANUFACTURING



2018, March 13th

Zona Industriale Santa Scolastica

Via Copernico, 2
64013 Corropoli (TE)

Industry 4.0



IoT



Simulation



Augmented Reality

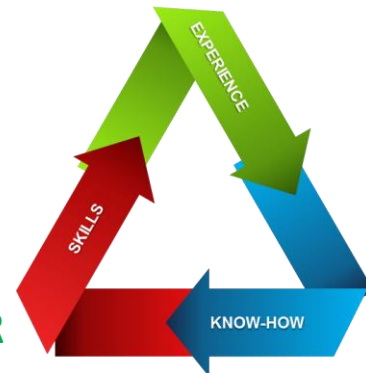
Tecnomatic Industry 4.0 turn-key systems for winding and assembly have the potential of boosting its Customer competitiveness.



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Tecnomatic, thanks to its more than 44 years of experience, aims to be your partner in design and manufacturing of turn-key systems for assembly and testing of automotive components and for **FOR HAIRPIN STATORS** production systems



LEAN AND FULLY AUTOMATIC PROCESS
PROCESS TRACEABILITY
SUPERVISION SYSTEMS
SPECIAL PROCESS INTEGRATION
QUALITY CONTROL INTEGRATION

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PRODUCTION SITE & OFFICES



Headquarters: R & D, Production & Services

Sales (Lonco Ltd./Tecnomatic Asia)

Service

Technical Agreement NAFTA Market

120 Employees

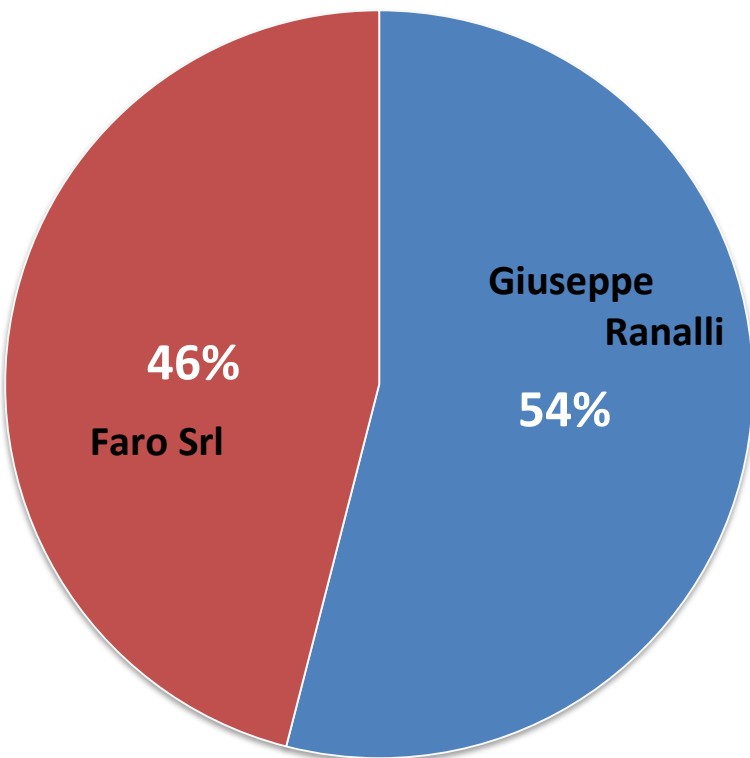
4 Employees

8 Employees

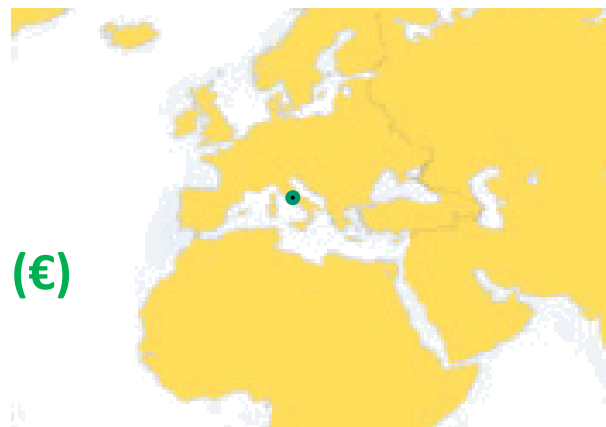
15 Employees

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SHAREHOLDER STRUCTURE



NET SALES (€)



2016

24.022.000,00

2017

26.881.000,00

**2018
Forecast**

31.969.000,00

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R&D, UNIVERSITY COOPERATION



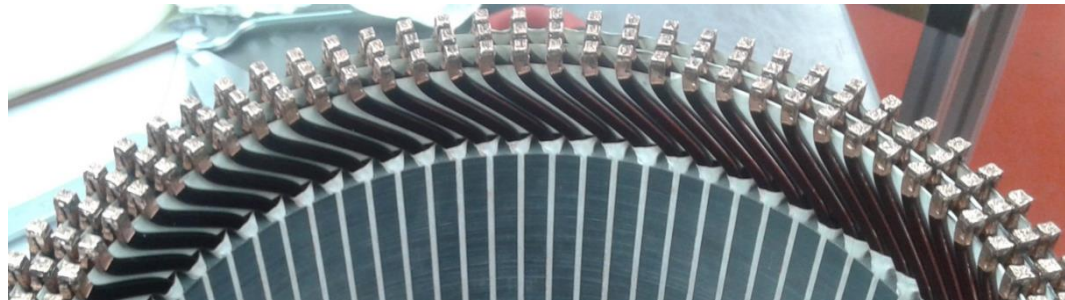
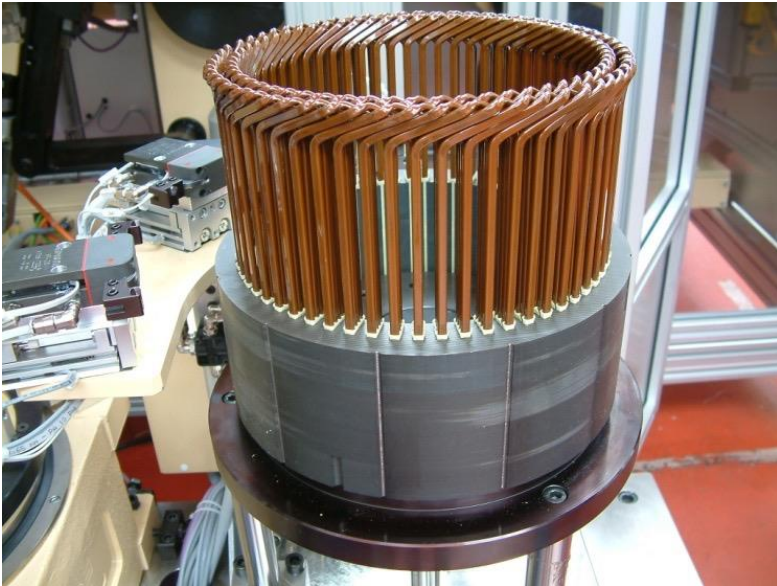
UNIVERSITÀ
DEGLI STUDI
DE L'AQUILA

The company is highly committed to R&D activities for innovation, considering them as a fundamental strategical component of its asset, investing continuously in studying multiple stator applications by using flat conductor winding, with particular emphasis on the automotive sector.

To this purpose, we set up a strong cooperation with the Electrical Engineering and Information Faculty at the University of L'Aquila.

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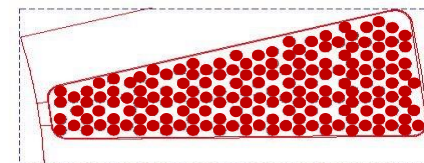
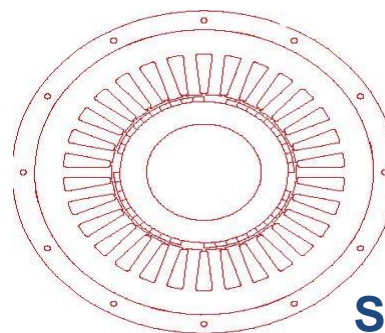
Business Unit: Hairpin Systems



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STATORS FOR MILD, FULL HYBRIDS AND EVS

Traditional round wire Technology

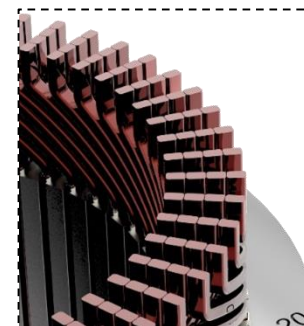


Slot filling 45-60%

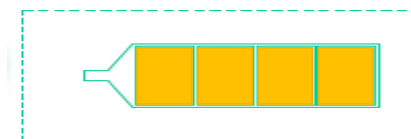
Main Advantages:

- ✓ Higher Slot Filling
- ✓ Best ratio
Power/Weight
- ✓ Better Heat Dissipation
- ✓ Joule Losses Reduction
- ✓ Decrease in Winding
Overhead Height
- ✓ Optimal for High
Voltage Platforms

Tecnomatic's Hairpin Technology



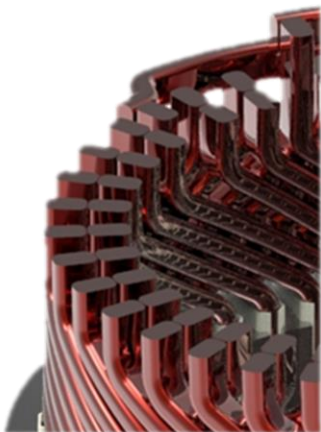
Slot filling 85-92%



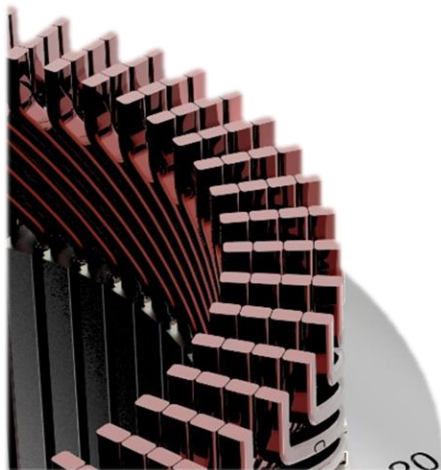
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WINDING SYSTEMS VERSATILITY

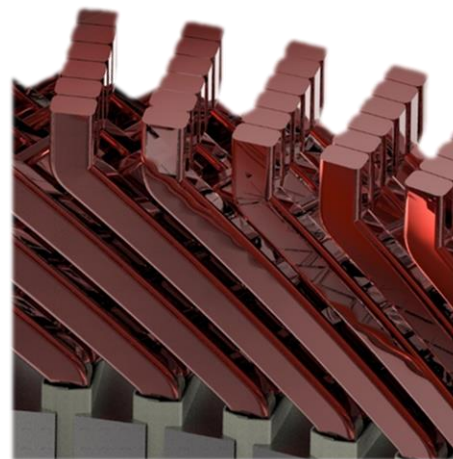
N.2 flat wires per slot



N.4 flat wires per slot



N.6/8 flat wires per slot

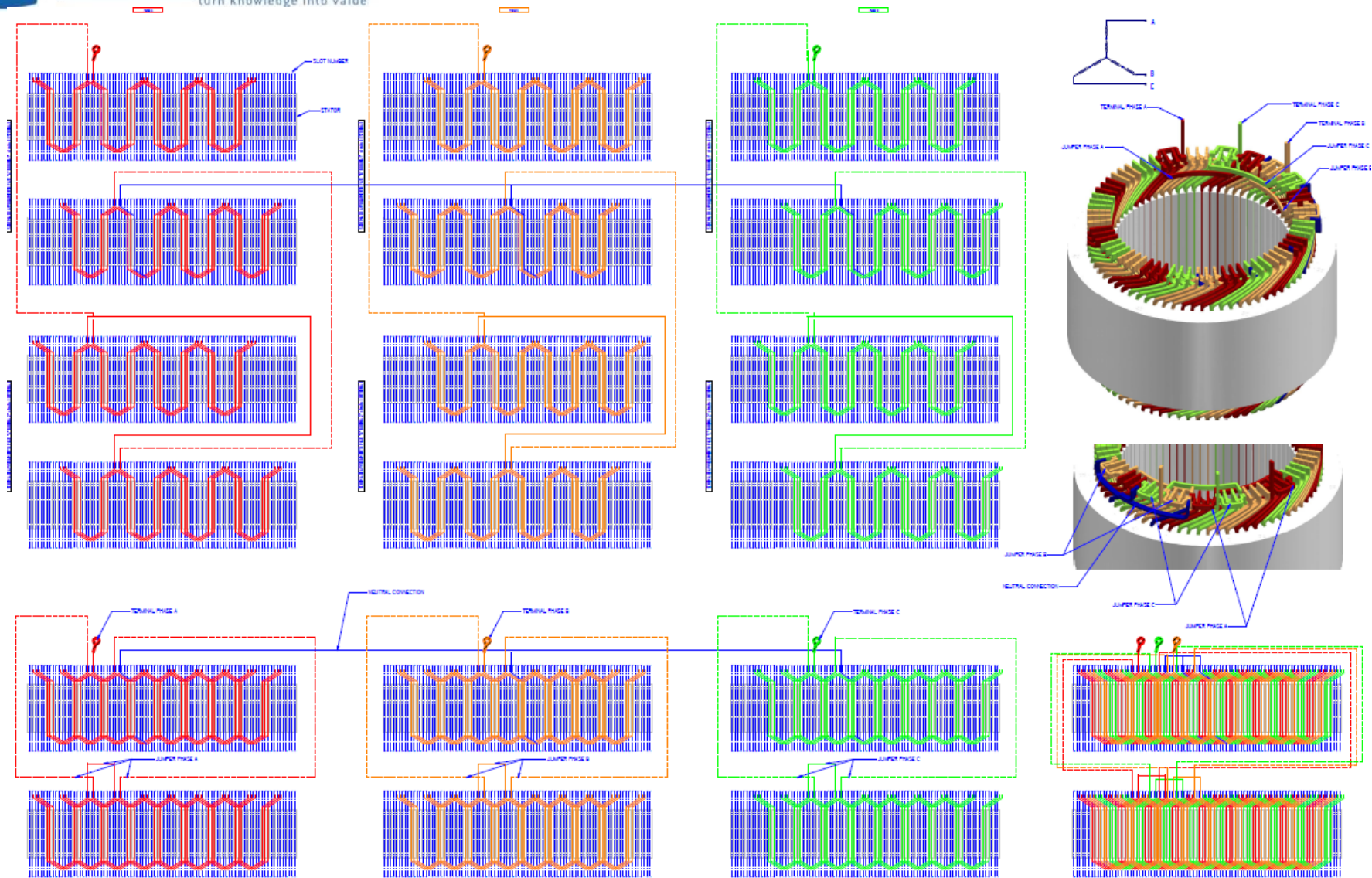


Slot-liner in different shape: 'C', 'B' and 'S' type available

Both full and short pitch distributed winding achievable

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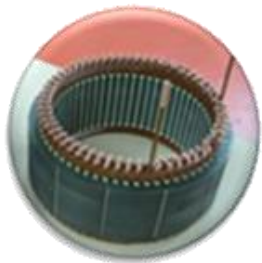
WINDING DESIGN



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MAIN FAMILIES

75 kW



up to 150 kW

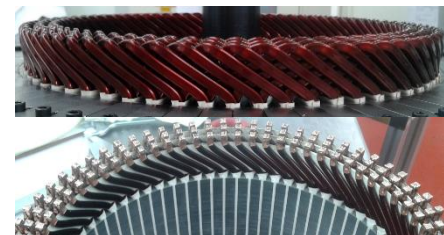
60 kW



60 kW



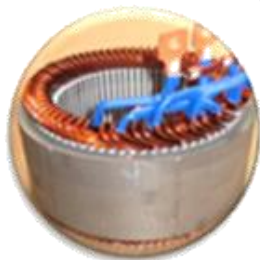
up to 120 kW



30 kW



15 kW



>200 kW
32 kg.

2005

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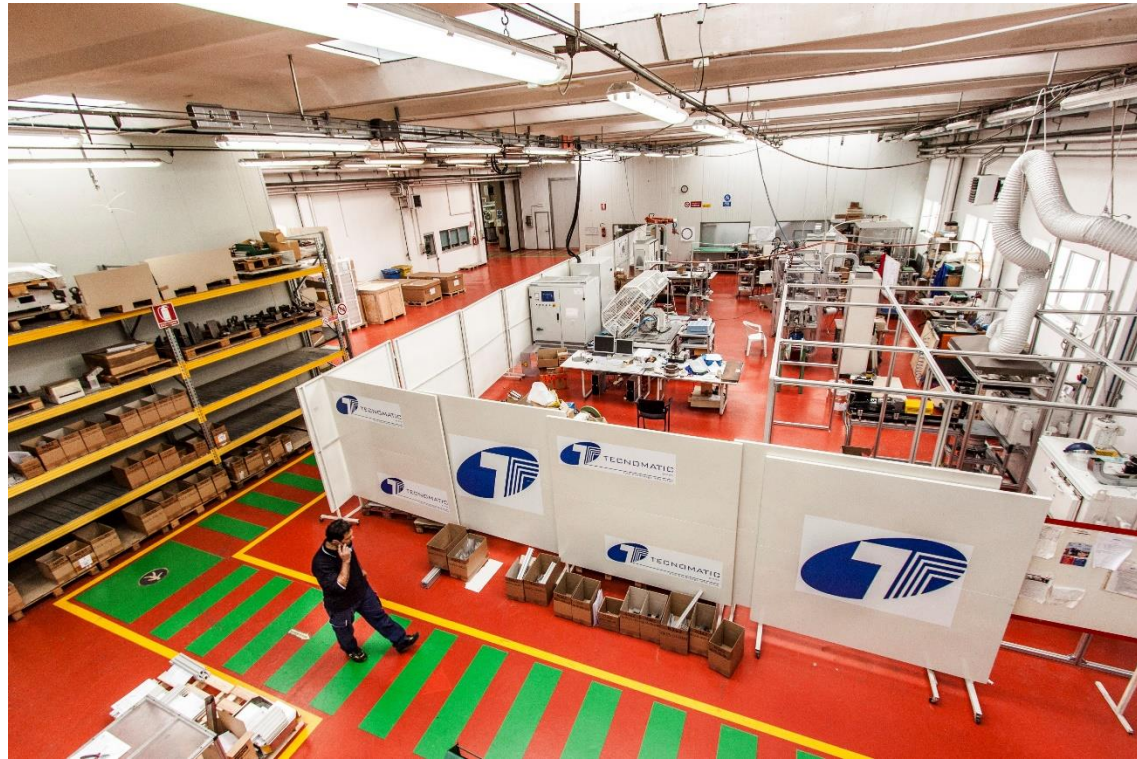
Tecnomatic plant has been provided with a **Prototyping Department**, also equipped with:

- **SMART FLEXIBLE PRODUCTION SYSTEM**, suitable to manufacture:
- **PROTOTYPES**
- **PRE-SERIES**
- **SMALL PRODUCTION BATCHES**

for different motors and Stators by means of dedicated tooling.

- **MOTOR TEST BENCH**, equipped with braking power regeneration system.

PROTO DEPARTMENT



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STATOR WINDING SYSTEM COMPOSITION

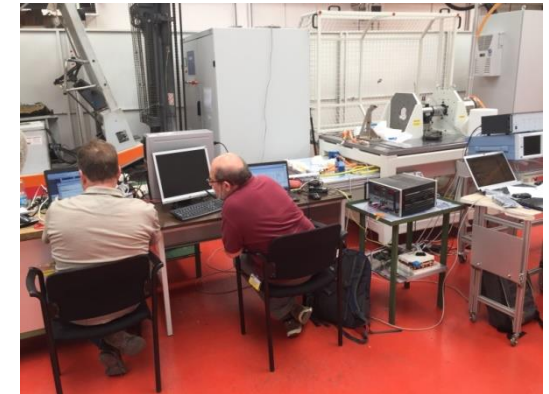
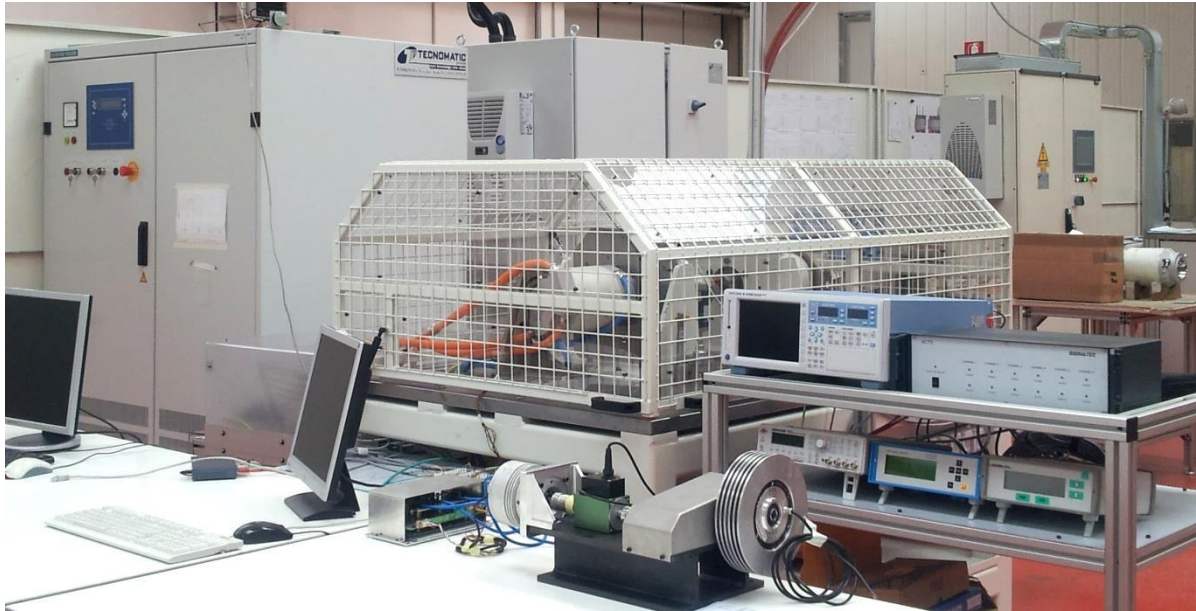
- ✓ SLOT INSULATION MACHINE
- ✓ HAIRPIN FORMING MACHINE
- ✓ HAIRPINS INSERTION BENCH
- ✓ TWISTING MACHINE
- ✓ WELDING MACHINE
- ✓ EPOXY AND VARNISH MACHINE
- ✓ TEST BENCH
- ✓ OD/ID/REGISTER CLEANING TOOLS

ROTOR ASSEMBLY SYSTEM COMPOSITION

- ✓ ASSEMBLY BENCHES
- ✓ BALANCING MACHINE

MOTOR FINAL ASSEMBLY SYSTEM COMPOSITION

- ✓ ASSEMBLY BENCHES
- ✓ TEST MACHINE

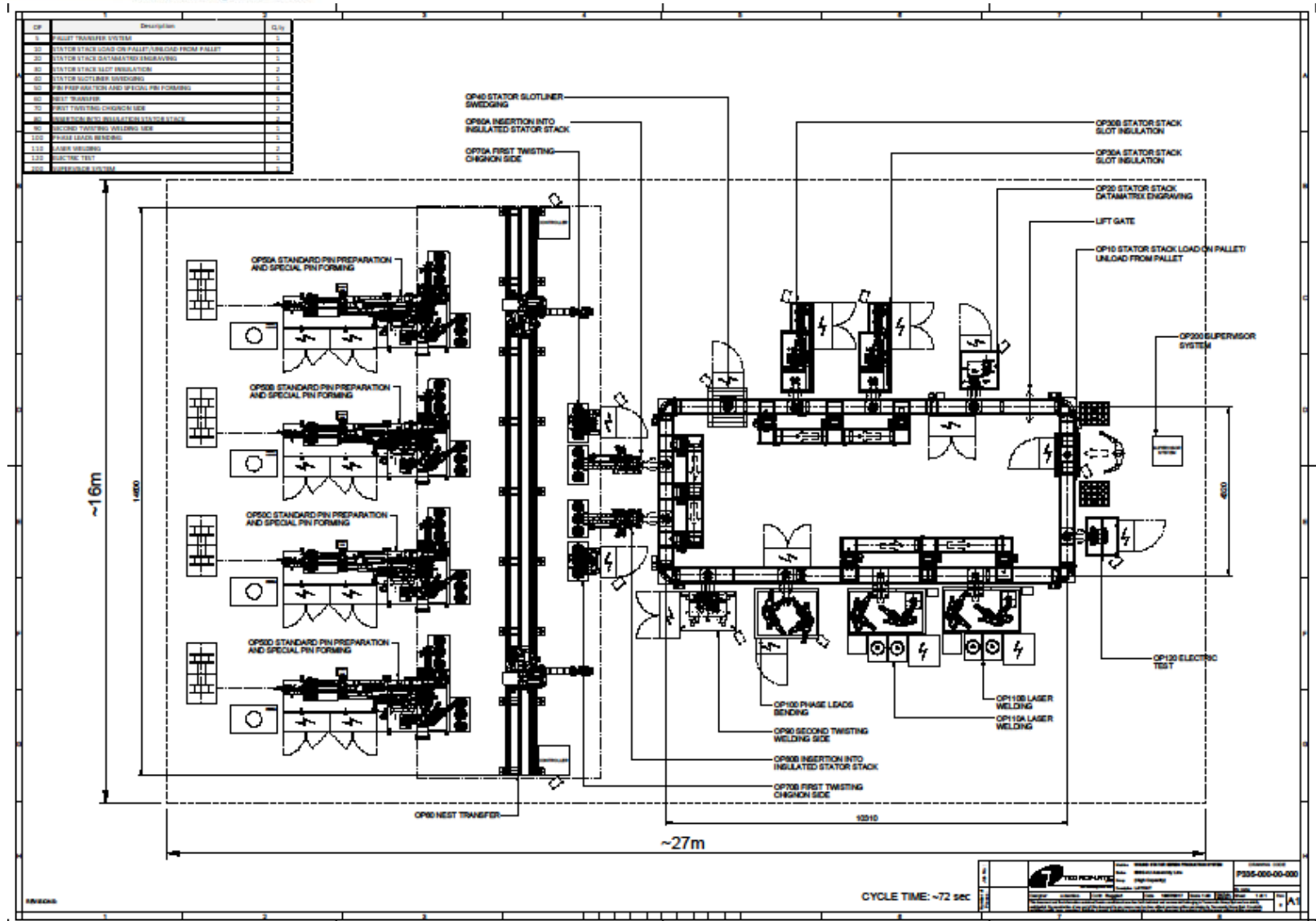


TEST BENCH WITH BRAKING POWER RECOVERING, equipped also with:

- ✓ Battery simulator, max output voltage 1000V
- ✓ WT3000 Watt-meter, with 4 elements 30A 1000V
- ✓ MCTS System, with 4 TA of 700A
- ✓ Torque measurement system CoMo Torque
- ✓ Temperature DAC Picolog ADC 24
- ✓ Multimeter ROHDE & SCHWARZ HM8118
- ✓ Hipot tester for IR / Hipot AC / Hipot DC test Sentry 30 Plus

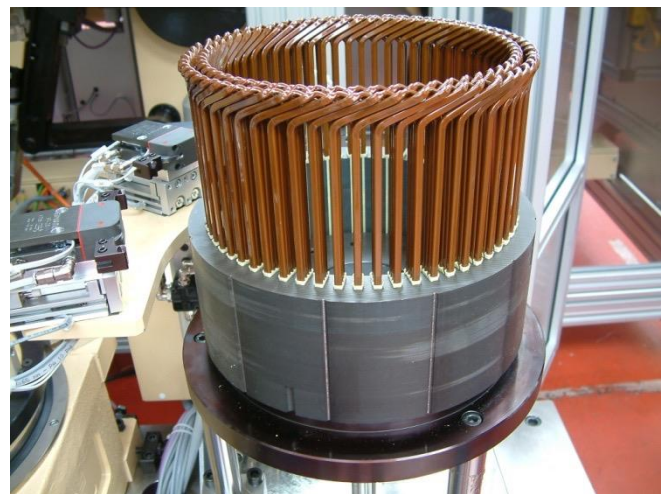
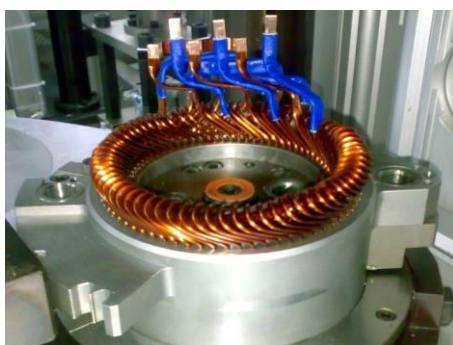
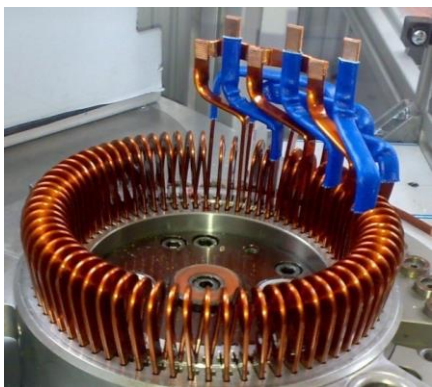
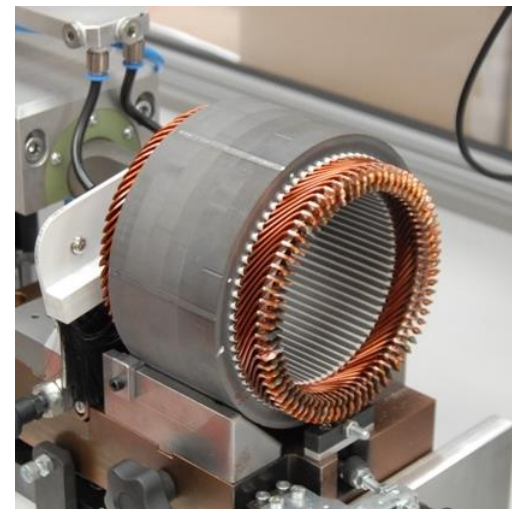
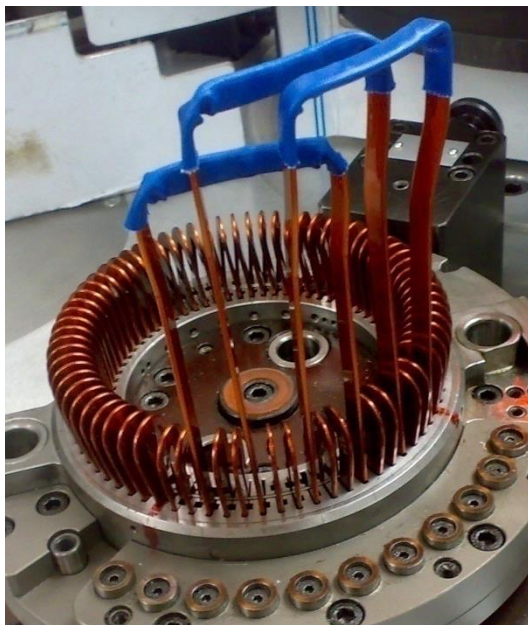
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MANUFACTURING PROCESS: EXAMPLE OF A LAY-OUT



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MANUFACTURING PROCESS OF THE COMPLETE STATOR

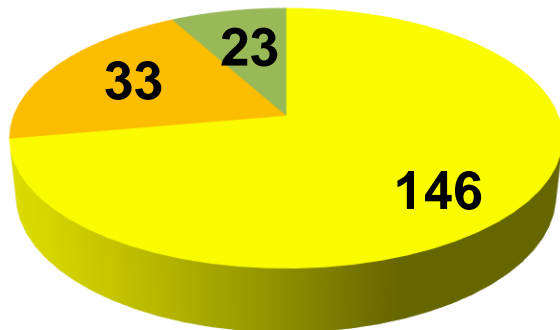


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Research and Development projects financed with public funds (grant or concessional funding)

Public Entity	Project ref & Partner	Subject
Italian Government	CHRA 4.0	New Assembly system IoT 4.0 for CHRA of Turbochargers
Abruzzo Region	Abruzzo E-Motion	New Architecture E-Motor + Inverter for virtual gear box or direct drive - Product & Process
UE – HORIZON 2020	ReFreeDrive	New Architecture E-Motor



- **146 Issued Invention Patents in Hairpin Tech;**
- **33 Pending Patent Applications in Hairpin Tech;**
- **23 2018 – new 23 patents family (potentially new 345 innovation patents in Hairpin Tech)**

- **Territories: International PCT, EPO, Brazil, Canada, People's Republic of China, France, Germany, India, Italy, Japan, People's Republic of Korea, Mexico, Spain, Turkey, United Kingdom, and United States**

- ✓ Patented technology related to electric motors:
 1. methods and apparatuses for: insertion of insulation paper, stripping conductors, preforming conductors, forming conductors, insertion of conductors, twisting conductors, and clamping manufacturing a stator;
 2. products such as stators, rotors, and electric motors
- ✓ Trade secrets related to the manufacture of stators, rotors, and electric motors and the products themselves
- ✓ Copyrighted works related to the manufacture of stators, rotors, and electric motors and the products themselves

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More detail about Tecnomatic are available online:

<http://www.tecnomatic.it/harpin-technology/>



“Coming together is a beginning, staying together is progress, working together is success”

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