

# Customized Design

## Inductive Components

**dq**



AQ Group is a global manufacturer of components and systems for demanding industrial customers. The consolidated knowledge in the AQ Group, along with a global presence, offer unique benefits to customers around the world.

AQ Group has since its inception in 1994 shown a steady and fast growth. The Group has approximately 3900 employees, whereof 70% in countries outside Sweden.

The annual turnover is € 270 Million. AQ Group is listed on AktieTorget in Sweden and has the highest credit rating AAA.



The AQ Business concept is to develop, manufacture and assemble components and systems for demanding industrial customers and leverage our commitment to Total Quality to ensure our customers become long-term business partners.

We target customers who are world leading in their respective niches, such as road and off-road vehicles, railroads, power transmission, telecommunication, food, etc. To be a world leading company, they have to work with world leading suppliers!

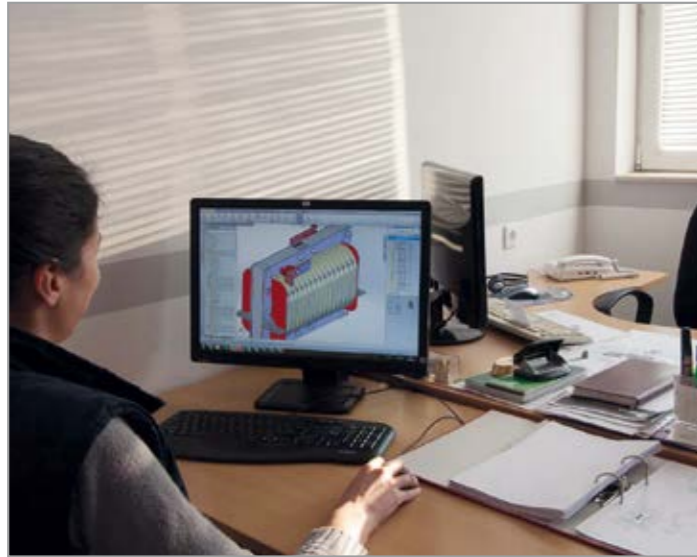
AQ aims to be a world leader in cost effectiveness, quality, on-time-delivery, alertness and service. In one word – reliable.

The AQ Group has grown constantly at a steady pace all from the start 1994 to today's position as a true global actor. Our finances are strong and we will continue our growth, both organically and by acquisitions.



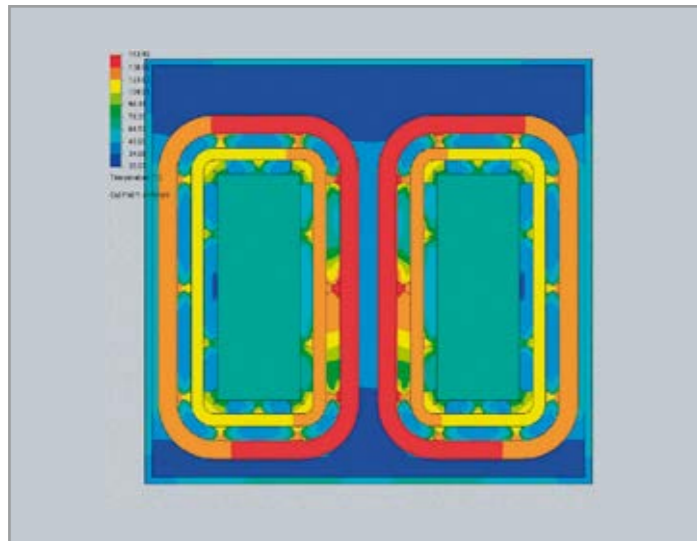
*Claes Mellgren*  
 Claes Mellgren  
 Group CEO

# Design process

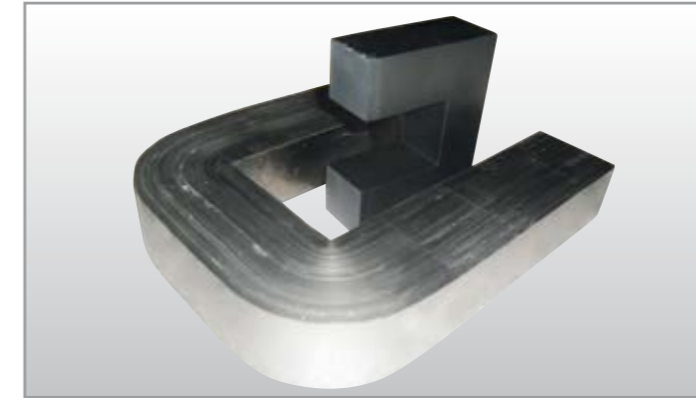


AQ inductive components are used in some of the most demanding applications, such as trains and underground transportation. These can be found in main and auxiliary converters and electrical cabinet assemblies. Units are mounted on the roof, under the train and inside converter enclosures.

Over many years a conscious emphasis on technical development, quality assurance and environmental adaptation has given us a leading position in the field of inductive components. Design is made in close cooperation with our customers. For optimized solutions we use FE-calculations for electrical, mechanical and thermal analyses.



# Design process

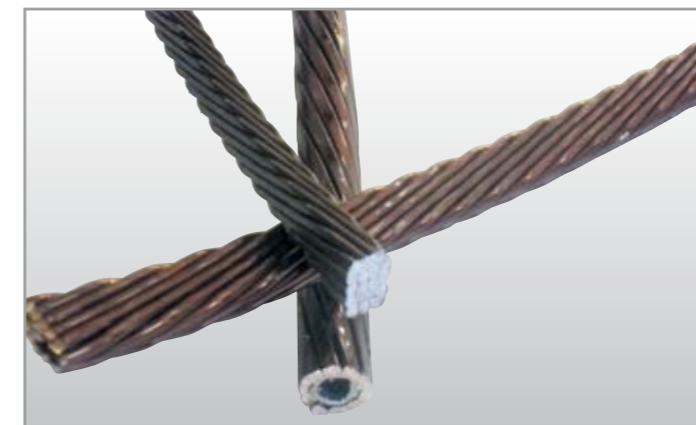


AQ uses both conventional and advanced technology materials in order to develop designs with optimum features in terms of cost, size and weight.

Cores are built from high quality grain-oriented steel lamination. Amorphous and powder cores are used for special applications.



Winding materials include copper and aluminum round and profiled wire, foils, litz and transposed wires.



Depending on system types and application available cooling solutions include: Air Natural, Air Forced, Water Cooled (direct and indirect)



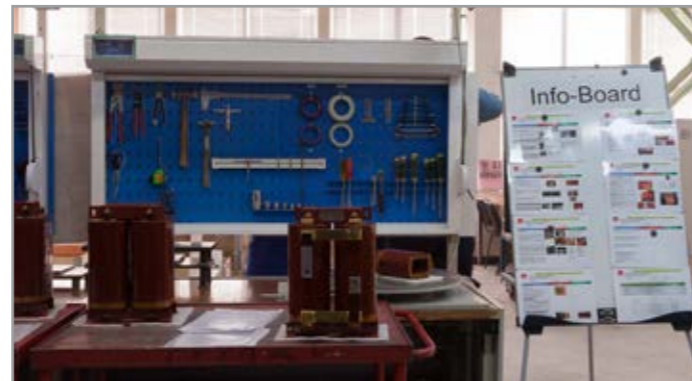
# Manufacturing process

---

Manufacturing techniques for inductive components are constantly developing along with increased customer demands and technology upgrade.

Main processes involved in AQ's production of inductive components are:

- Lamination steel cutting and punching
- Core building
- Horizontal and vertical winding
- Production of transposed wires
- Welding of carbon and stainless steel and aluminum. Brazing of copper
- Assembly
- VPI



# Manufacturing process

---



Coils of various design are produced: Rectangular and Circular construction with layer or disc windings.

Coils are designed to meet three fundamental requirements: mechanical, thermal and electrical stability.

Insulation between layers and turns is selected based on the required electrical and mechanical strength level.

Specialized jigs and fixtures for winding and welding are designed and produced in-house in order to meet the big variety of shapes and constructions used.

# Manufacturing process

---

Manufacturing technology for transposed conductors with different sizes and shapes has been developed. Both aluminum and copper wires are used together with seamless tube for components with direct water cooling.



# Impregnation Process

---

AQ uses complete insulation systems based on polyester varnish or epoxy resin. Vacuum-pressure impregnation ensures reliable protection of the units during entire lifetime and operation in adverse and aggressive environments.

Medium voltage dry transformers are produced using epoxy cast resin technology





# Transformers



## Custom designed Transformers

### Configuration

Single and three phase

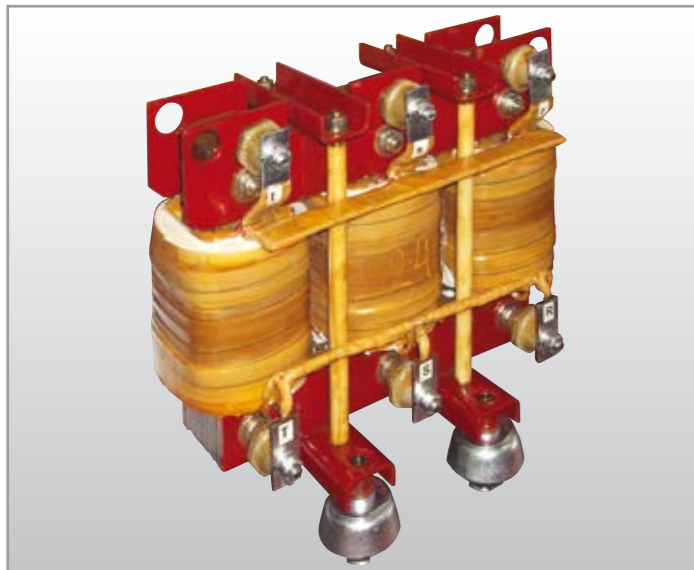
### Ratings

Voltage: up to 3 kV for VPI products  
up to 22 kV for cast resin  
products

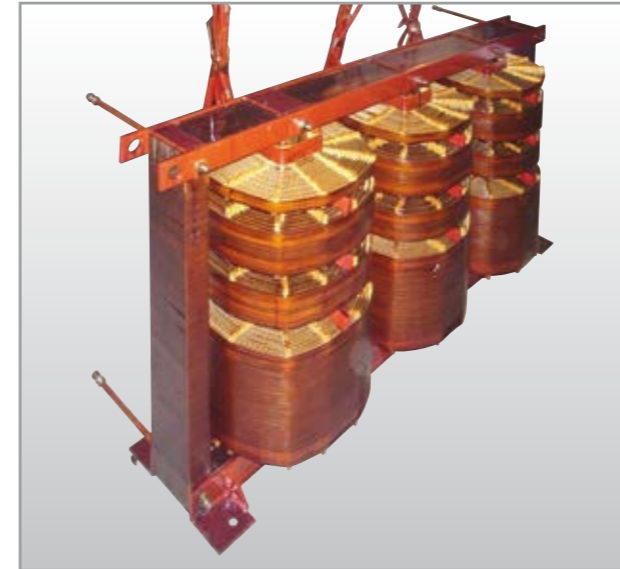
Frequency: up to 25 kHz

Protection: up to IP 66

Power: up to 4 MVA



# Transformers



Special Traction Transformer products  
as per customer requirement  
Transformers with integrated inductor



# Inductors

---



**Configuration**  
Single and three phase inductors for AC and DC application.  
Air core, Iron Core, Shell type solutions

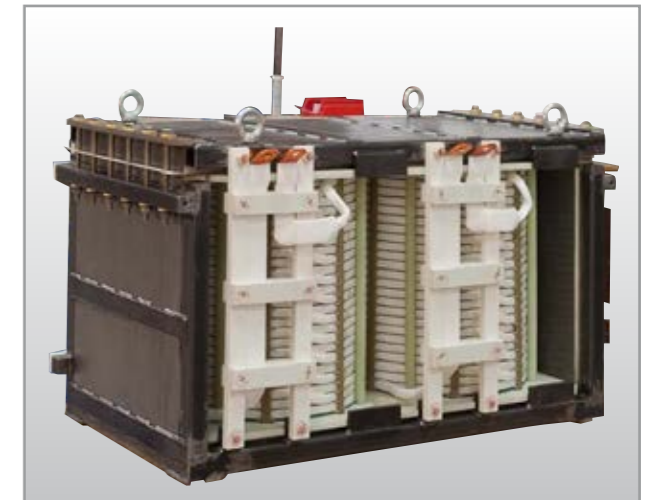


# Customized products

---



**Inductors** for industrial converter applications





# Quality



100% electrical, mechanical and visual control is applied.  
Equipment to carry out tests required by IEC standard is available.  
Special testing is performed in collaboration with accredited external laboratories.

Typical in-house tests:

- No load test
- Short circuit test
- Inductance measurement
- Resistance measurement
- BIL impulse test up to 100 kV
- Heat-run test
- DC measurement up to 3000A with AC superimposed current
- Dielectric test in AC up to 100 kV
- Partial discharge test
- Water leakage test

All design and manufacturing processing are certified according to the following standards:

- EN ISO 9001/2008
- IRIS
- EN 15085-2 CL1
- EN 3834-2
- EN ISO 14001



# Applications



Railway traction and trackside equipment



Power distribution and industrial automation



General industry applications



Renewable energy and power generation



# Contact us

---

## **AQ Trafo AB**

Gesällgatan 2  
74539 Enköping  
Sweden  
Phone: +46 (0) 171-236 00  
Email: info.aqtrafo@aqq.se

## **AQ Italy**

Via G. Sidoli 7  
20129 MILANO  
Italy  
Phone: +39 02 87213359  
Fax: +39 02 87213362

## **AQ Magnit AD**

21, Hristo Smirnenski, str.  
2240 Godech  
Bulgaria  
Phone: +359 (0)729 22398  
Fax: +359(0)729 22393

## **AQ Electric Suzhou Co.,Ltd.**

Suzhou New District Yangshan Science & Technology  
Park  
No.66 Yinyan Road  
215151, Suzhou  
P.R. China  
Phone: +86 512 66163996  
Fax: +86 512 66512292

## **AQ Mechanical & Electrical Manufacturing India Pvt. Ltd.**

Gat No. 343, Plot No. 54/A & 54/B,  
Chakan-Talegaon Rd, Malahunge, Chakan,Taluka:  
Khed, District:  
410501, Pune  
India  
Phone: +91 9845 20 6373



Additional contact information at:

[www.aqq.se](http://www.aqq.se)