

## CONTENTS

<b>1</b>	<b>CORPORATE OVERVIEW</b>
<b>2</b>	<b>AREAS OF PRODUCTION</b>
	2.1 OVERHEAD CONTACT LINES
	2.1.1 HIGH SPEED
	2.2 TRACTION SUBSTATIONS
	2.3 POWER TRANSFORMATION AND DISTRIBUTION
<b>3</b>	<b>RESOURCES</b>
	3.1 HUMAN RESOURCES
	3.2 TECHNICAL RESOURCES
<b>4</b>	<b>ORGANIZATION</b>
<b>5</b>	<b>MANAGEMENT SYSTEMS</b>
	5.1 QUALITY
	5.2 OCCUPATIONAL HEALTH AND SAFETY
	5.3 ENVIRONMENT
<b>6</b>	<b>R&amp;D&amp;I: RESEARCH, DEVELOPMENT AND INNOVATION</b>

speciali-  
zation +  
reliability  
= electrén

1.

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CORPORATE  
OVERVIEW

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## CORPORATE OVERVIEW

ELECTRÉN, S.A. is part of the VÍAS GROUP. Our business activity consists of engineering, assembly and maintenance of overhead contact lines, traction substations, and infrastructure for power transformation and distribution for trains.

**THE TWO BASIC PILLARS ON WHICH OUR CORPORATE POLICY IS BASED ARE SPECIALIZATION AND RELIABILITY.**

The two basic pillars on which our corporate policy is based are specialization and reliability. In order to achieve these, it has been necessary to build upon the following goals:

- 1)** To be able to offer complete solutions in terms of both design and resources for any project within the company's sphere of activity.
- 2)** To have the best professionals and staff.
- 3)** To invest in the best technical resources.
- 4)** To structure the organization so that its focus is on the final service provided. In order to do so, each process, each department, is organized in a unique and specific fashion.
- 5)** To develop comprehensive certified procedures which guarantee that quality control is carried out properly, taking the necessary preventive measures to monitor occupational hazards and manage the environmental implications of our work in a proper fashion.
- 6)** To tackle the challenges which arise in terms of research in the area of traction systems for rail and innovative tools and working methods which serve to expand knowledge within the sector.



## CORPORATE SOCIAL RESPONSIBILITY

**THE VALUE OF THE COMPANY IS BASED ON TWO AIMS: RESULTS AND PRESTIGE.**

As we are aware of the responsibility which ELECTREN as a company has to society, each of our decisions is made taking into account not only production quality and financial results, but also those intangible assets which also bring value to the organization. For us these are:

- 1)** Ongoing efforts to improve each one of our work procedures in order to achieve optimum sustainability for our activities.
- 2)** Supplying a key asset for society: a means of transport.
- 3)** Profits for parties outside the organization who hold a stake in it.
- 4)** Professional and personal development for employees.



## 2.

### AREAS OF PRODUCTION

#### 2.1 Overhead contact lines

##### 2.1.1 High speed

#### 2.2 Traction substations

#### 2.3 Power transformation and distribution



OVERHEAD CONTACT LINES

The overhead contact line department undertakes rail electrification projects. This department is able to offer reliable solutions to the most ambitious challenges in terms of quality and adverse conditions for implementation.

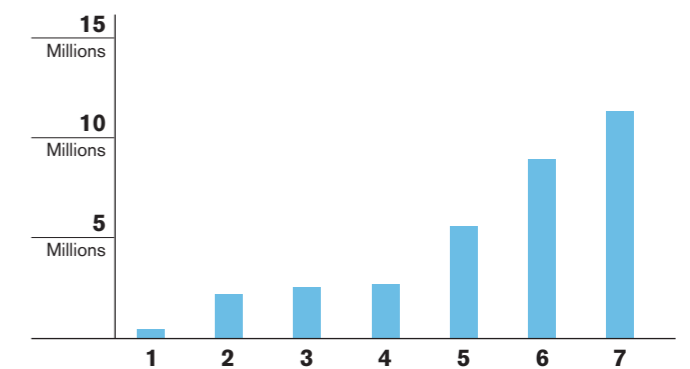
In addition, with the support of the technical office, the principles of any system (high speed, conventional, tramway or rigid) can be adapted to the specific requirements of any given situation, offering comprehensive coverage, which includes both design and resources.

REFERENCES

ELECTREN has been involved in the electrification of the main high-speed, conventional and underground lines in Spain, and has begun expanding into North Africa, France and the rest of Europe.



SALES FIGURES FOR THE MAIN PROJECTS CARRIED OUT BY THE DEPARTMENT.



- 1) Electrification of line 3 for Metro de Valencia. **FGV.**
- 2) Meknes installation. **ONCF.**
- 3) Maintenance of overhead contact lines for the high-speed line between Madrid and Seville. (2006-2010). **ADIF.**
- 4) Modification of the catenary on the high-speed line between Paris and Lyon. Section: Combsa- Ciudad San Luis. **SNCF.**

- 5) Electrification of the Villar de Chinchilla-Almansa section of the Madrid-Alicante line. **ADIF.**
- 6) Electrification of the new Metro de Madrid light rail line: Colonia Jardín-Boadilla del Monte. **MINTRA/METRO DE MADRID.**
- 7) Overhead contact line and associated systems for the Madrid-Segovia and Valdestillas-Valladolid sections of the new rail access to northern and northeastern Spain. **ADIF.**

## HIGH SPEED

ELECTREN has worked with other companies and bodies in the sector on developing rail electrification system technology for AE350 high speed rail. This system is based on 2 x 25 kV 50 Hz type power supply, in which the traction units are powered via the catenary (+25kV), a grounded return line and a negative feeder (-25kV). The main advantages of this system are: Ease of control, pieces which are interchangeable with other installed systems, simplifying maintenance management, reliability, optimum interaction between catenary and pantograph, complies with European interoperability regulations.

**ELECTREN HAS WORKED WITH OTHER COMPANIES AND BODIES IN THE SECTOR ON DEVELOPING RAIL ELECTRIFICATION SYSTEM TECHNOLOGY FOR AE350 HIGH SPEED RAIL.**



## FEATURES OF THE AE350 CATENARY

Simple, polygonal, vertical, and braced catenary with compensator.

Design speed: 350km/h+10%.

Auxiliary messenger cable (Y-shaped catenary hanger).

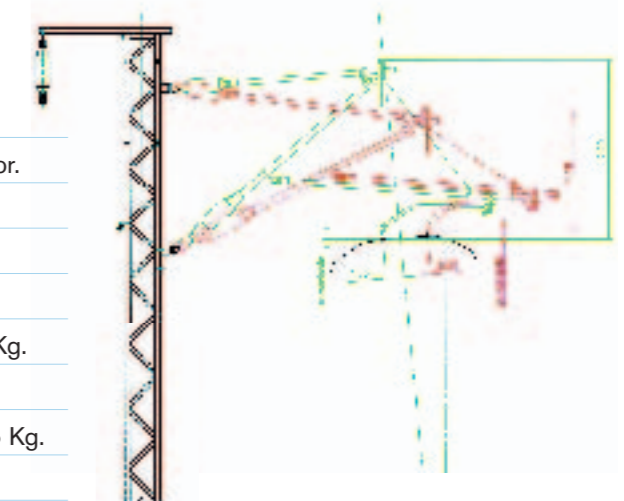
Aluminum tubular cantilevers.

Contact wire: 150 mm<sup>2</sup> (CuMg0.5), mechanical tension: 3,150 Kg.

Messenger cable: Cu 95 mm<sup>2</sup>, mechanical tension: 1.575 Kg.

Auxiliary messenger cable: Cu 35 mm<sup>2</sup>, mechanical tension: 315 Kg.

Equipotential catenary hangers with Cu 25 mm<sup>2</sup> loops.





## TRACTION SUBSTATIONS

The traction substation department studies and executes plans for these structures for high speed and conventional lines, tramways and underground lines.

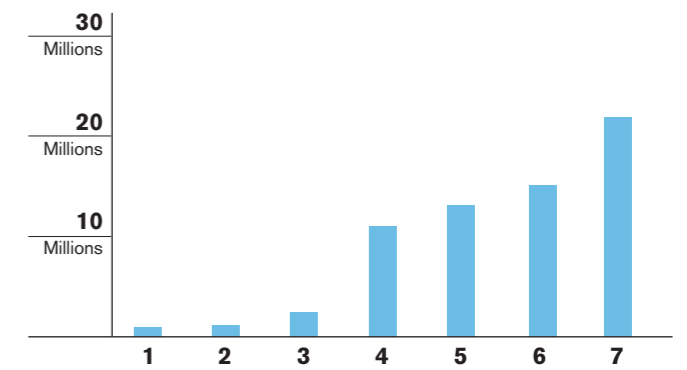
As in the other areas, ELECTREN is able to offer engineering, construction and maintenance solutions for any rail traction project.

## REFERENCES

ELECTREN has been involved in the main high-speed, conventional rail and underground line traction substation projects in Spain, and has begun expanding into the rest of Europe.

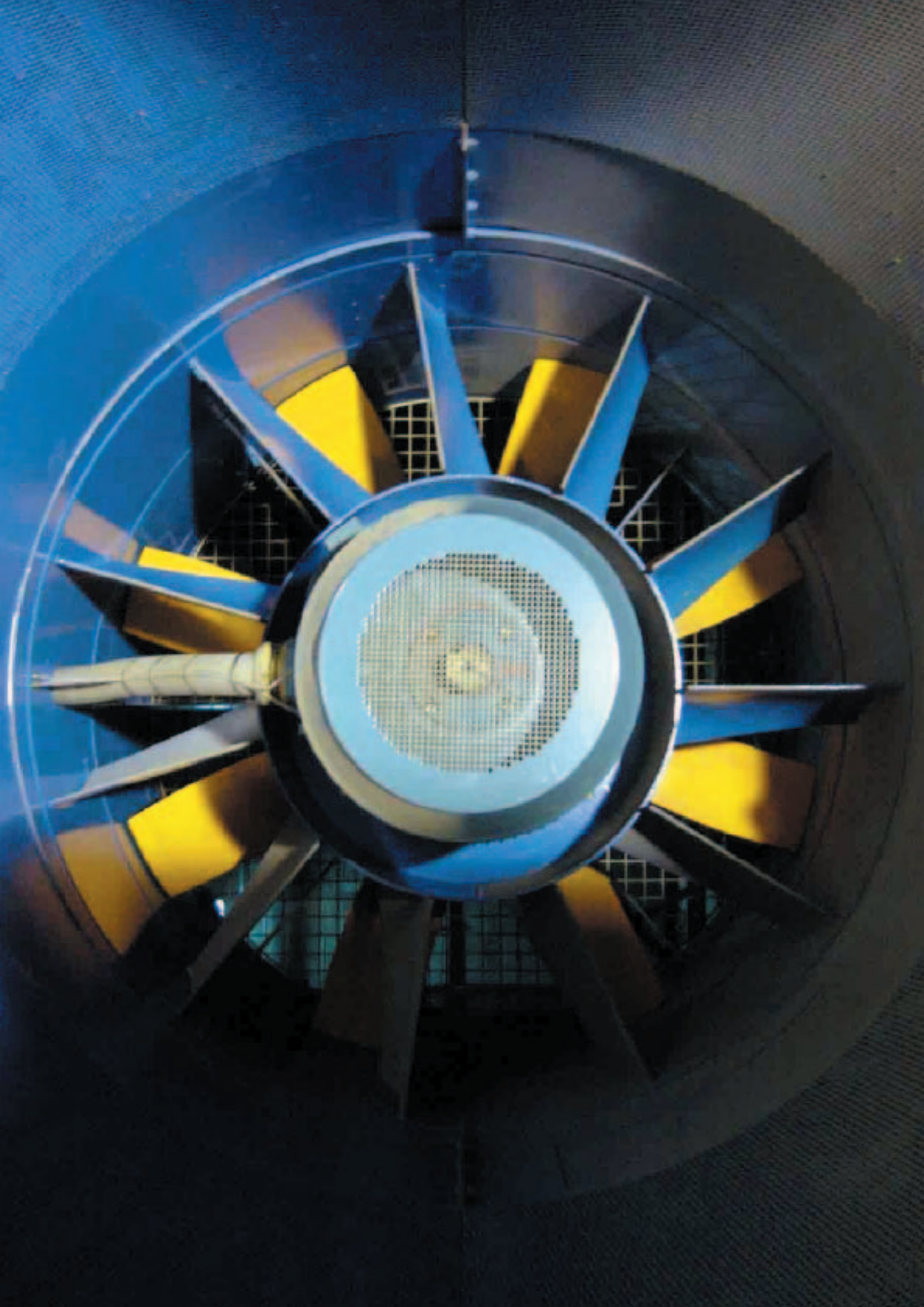
**ELECTREN IS ABLE TO OFFER ENGINEERING, CONSTRUCTION AND MAINTENANCE SOLUTIONS FOR ANY RAIL TRACTION PROJECT.**

**SALES FIGURES FOR THE MAIN PROJECTS CARRIED OUT BY THE DEPARTMENT.**



- 1) Maintenance of substations, associated autotransformer stations and power remote control for the high-speed Madrid-Barcelona-French border line. Section: Madrid-Lleida. **ADIF.**
- 2) Three-phase substations for Madrid-Seville AVE line. **ADIF.**
- 3) Modernization and improvements of mobile traction systems. **ADIF.**
- 4) Track and train signaling on new light rail commuter lines for Metro de Madrid. (2003-2007). **MINTRA/METRO DE MADRID.**
- 5) Electric traction substations and associated autotransformer stations for the high-speed line between Cordoba and Malaga. **ADIF.**
- 6) Electrical substation for Metro de Madrid. **MINTRA/METRO DE MADRID.**
- 7) Electric traction substations and associated autotransformer stations for the high-speed line between Madrid and Barcelona. **ADIF.**





### POWER TRANSFORMATION AND DISTRIBUTION

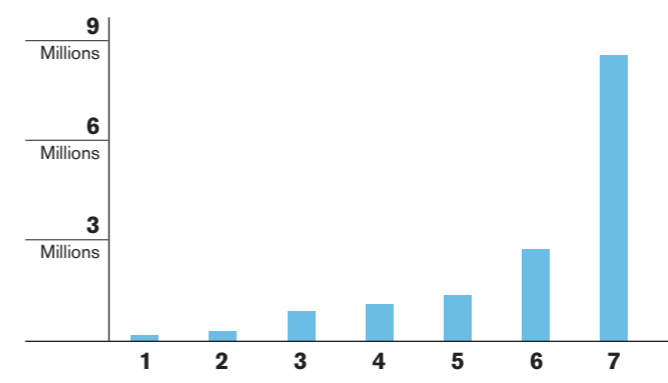
The power transformation and distribution department works in conjunction with the previous two areas in order to offer complete solutions for rail traction system projects.

This department handles engineering, assembly and maintenance of: Transformation centers, power distribution, lighting.

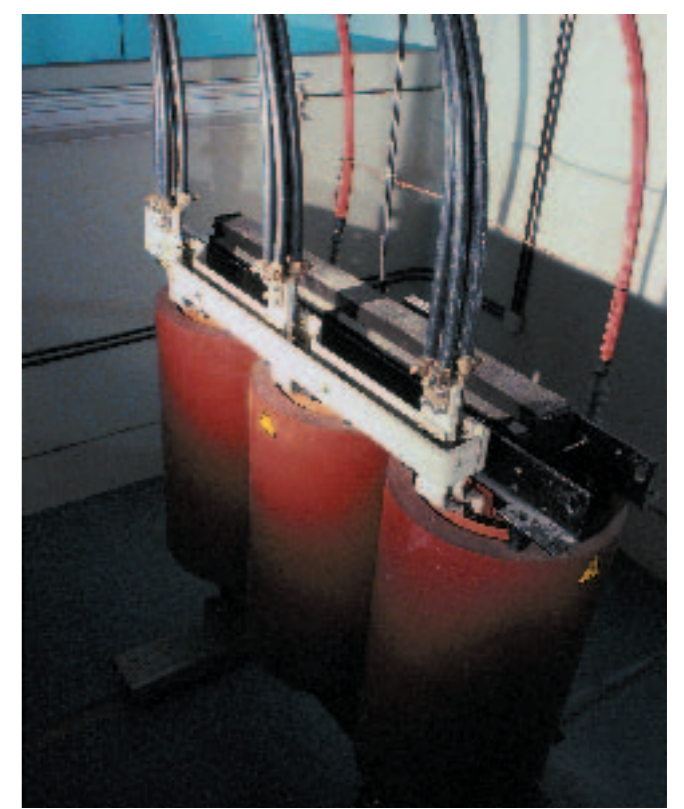
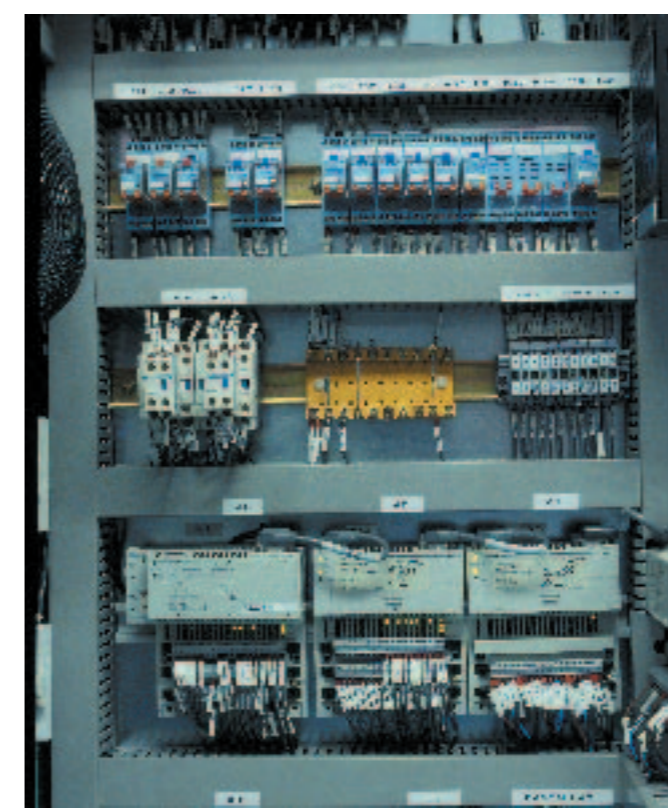
### REFERENCES

ELECTREN has played an active role in the power distribution and ventilation projects involved in the refurbishment and expansion of Metro de Madrid and ADIF stations.

SALES FIGURES FOR THE MAIN PROJECTS CARRIED OUT BY THE DEPARTMENT.



- 1) Lighting for the rail yard at Aboño station. **FEVE.**
- 2) Lighting for La Garena station, Madrid Cercanías commuter rail system. **ADIF.**
- 3) Power distribution at line 1 depot for Metro de Madrid. **MINTRA/METRO de MADRID.**
- 4) Ventilation on the new Metroeste line. **MINTRA/METRO de MADRID.**
- 5) Power distribution for line 10. Section: Casa de Campo-Puerta del Sur. **MINTRA/METRO de MADRID.**
- 6) Power distribution for the remodeling of line 3 of Metro de Madrid. **MINTRA/METRO de MADRID.**
- 7) Cleaning/maintenance of electrical substations, transformer stations and other facilities with electrical systems for Metro de Madrid. **METRO de MADRID.**







# 3.

## RESOURCES

3.1 Human resources

3.2 Technical resources



### HUMAN RESOURCES

Our staff is the company's most important asset. In keeping with the principle of specialization, professionalism is a permanent goal. In order to achieve this, ELECTREN believes it is necessary to reinforce worker involvement and motivation, enabling staff to develop professionally according to their merits and knowledge, and making available to them the training necessary to remain at the forefront of the sector.

These principles have enabled us to achieve a stable staff. There are very few temporary positions, and outsourced work accounts for less than five percent of the total.

**IN KEEPING WITH THE PRINCIPLE OF SPECIALIZATION, PROFESSIONALISM IS A PERMANENT GOAL.**





## TECHNICAL RESOURCES

In order to achieve optimum production yields, and guarantee that projects are completed on time with the level of quality required, it is necessary to have a large stock of specific machinery which is kept in good condition. ELECTREN's ongoing investment in machinery and assembly equipment is undoubtedly the primary basis of our reliability and soundness as a company, and it differentiates us from other companies in the sector.

**ELECTREN'S ONGOING INVESTMENT IN MACHINERY AND ASSEMBLY EQUIPMENT IS UNDOUBTEDLY THE PRIMARY BASIS OF OUR RELIABILITY AND SOUNDNESS AS A COMPANY.**

## MACHINERY STOCK

- 2** hydraulic catenary installation trains.
- 8** track cars equipped with car, hydraulic crane, lift platform and measuring equipment.
- 11** mixed-use trucks (track/roadway), equipped with lift platform and crane.
- 2** rail drills.
- 10** stock cars.
- 2** automatic cement mixers.
- 7** rail units with chain traction system.





# 4.

## ORGANIZATION



## ORGANIZATION

The company's philosophy is based on specific procedures. The general manager's office, with secretarial support, is responsible for managing the company. The production departments execute the projects and are assisted by a technical office which is able to supply immediate engineering solutions and support.

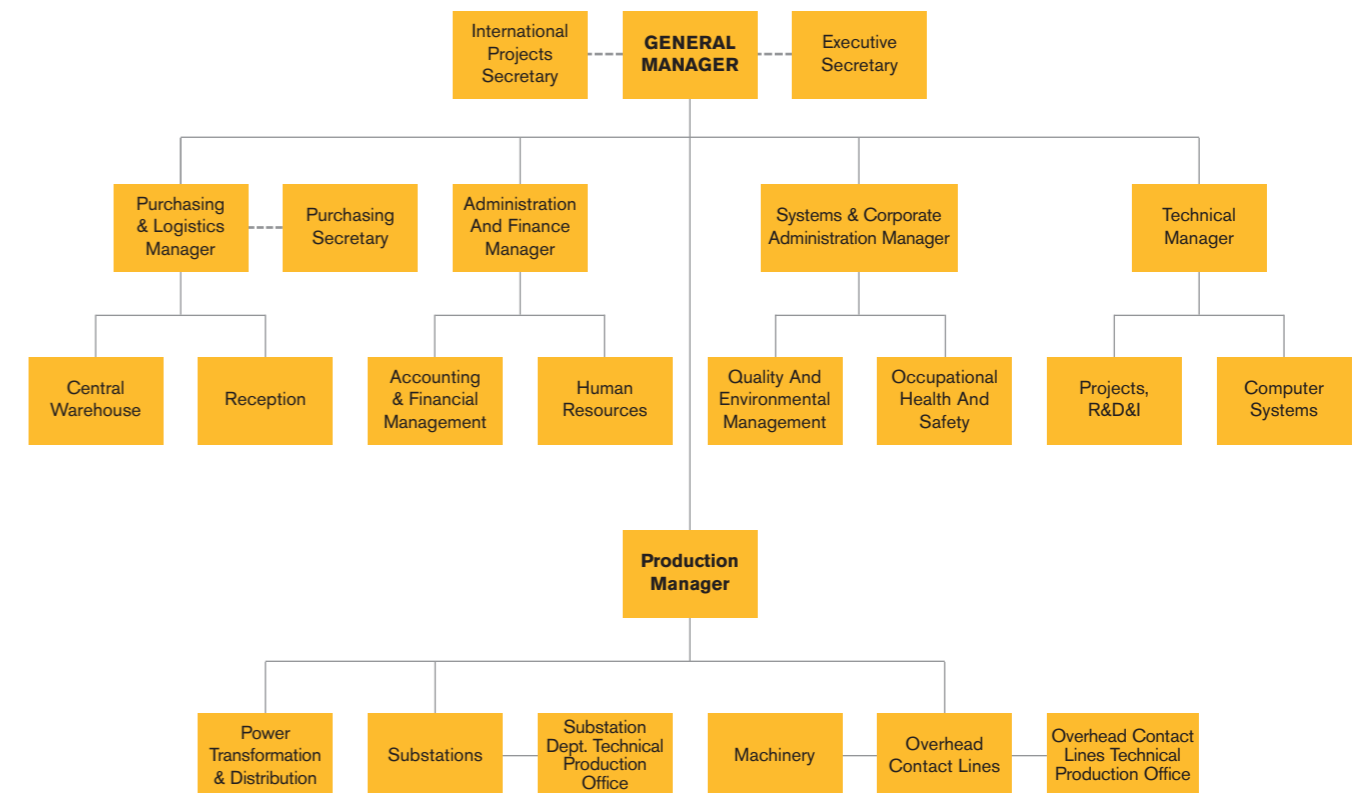
The central warehouse and stock of machinery provide logistical support for assembly work.

The administration department handles purchase cycles, invoicing, finance and human resources.

The systems and corporate administration department is responsible for the company's image and communications, as well as quality management systems, occupational health and safety, and environmental issues. In addition, this department is involved in planning procedural improvements and is responsible for obtaining and maintaining customer certification.

Projects, R&D&I, prepares tenders, maintains a reference database of technical documentation, assists the technical office in performing especially complex calculations, and carries out research into new systems.

**THE PRODUCTION DEPARTMENTS EXECUTE THE PROJECTS AND ARE ASSISTED BY A TECHNICAL OFFICE WHICH IS ABLE TO SUPPLY IMMEDIATE ENGINEERING SOLUTIONS AND SUPPORT.**



# 5.

## MANAGEMENT SYSTEMS

5.1 Quality

5.2 Occupational health and safety

5.3 Environment





### QUALITY

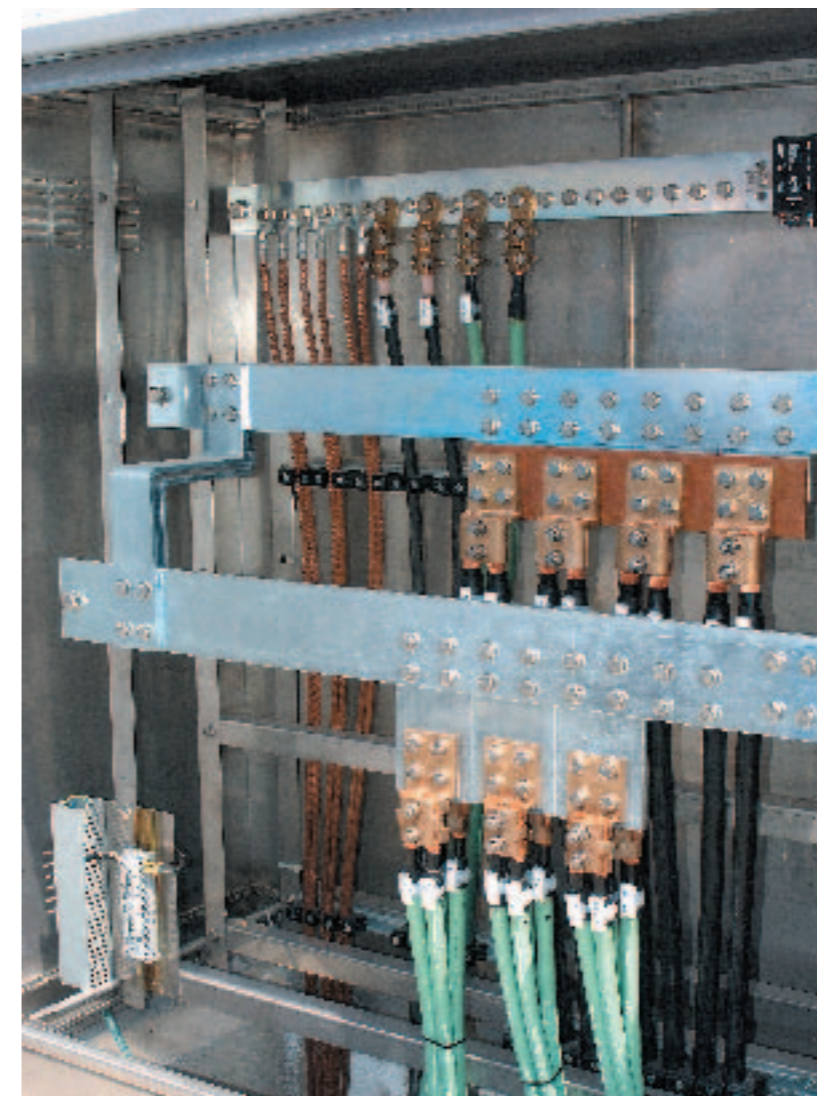
ELECTREN has adopted the requirements contained in the ISO 9001: 2000 standard as basis for the company's operations processes and to guarantee control over customer satisfaction. The system has been certified by AENOR. In addition, the guidelines contained in the ISO 9004: 2000

standard regarding improving performance have also contributed to achieving a dynamic of ongoing progress.

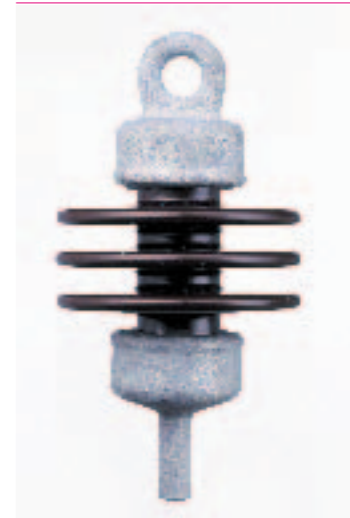
The key to achieving compliance with these requirements is working with specific, well-structured procedures. For this reason ELECTREN is embarking on an

ambitious project: creating procedures in an audio-visual format for each one of the special assembly stages. These will describe each of the activities which make up a work unit in a logical manner, and in chronological order.

This material is one of the company's most valuable knowledge assets.



**ELECTREN HAS ADOPTED THE REQUIREMENTS CONTAINED IN THE ISO 9001: 2000 STANDARD AS BASIS FOR THE COMPANY'S OPERATIONS PROCESSES AND TO GUARANTEE CONTROL OVER CUSTOMER SATISFACTION.**





## OCCUPATIONAL HEALTH AND SAFETY

It is possible to achieve optimum performance in terms of production without compromising employee safety. In order to do so, ELECTREN takes great pains to strengthen its occupational health and safety management system, which is organized in accordance with the requirements contained in the OHSAS 18001:1999 standard. Special attention is paid to seeking out new methods and innovative tools which make it possible to combine results with a lack of incidents and accidents.

**AT ELECTREN SPECIAL ATTENTION IS PAID TO SEEKING OUT NEW METHODS AND INNOVATIVE TOOLS.**

Of course, professionalism and a stable staff give us a very solid starting point. Together with a specific study of each activity, these make it possible to achieve negligible accident rates.

In addition to our own resources, at ELECTREN we have the assistance of an outside occupational hazard prevention service for the specific areas of safety, industrial hygiene, ergonomics, applied psychology and first aid, emergency plans and health monitoring.





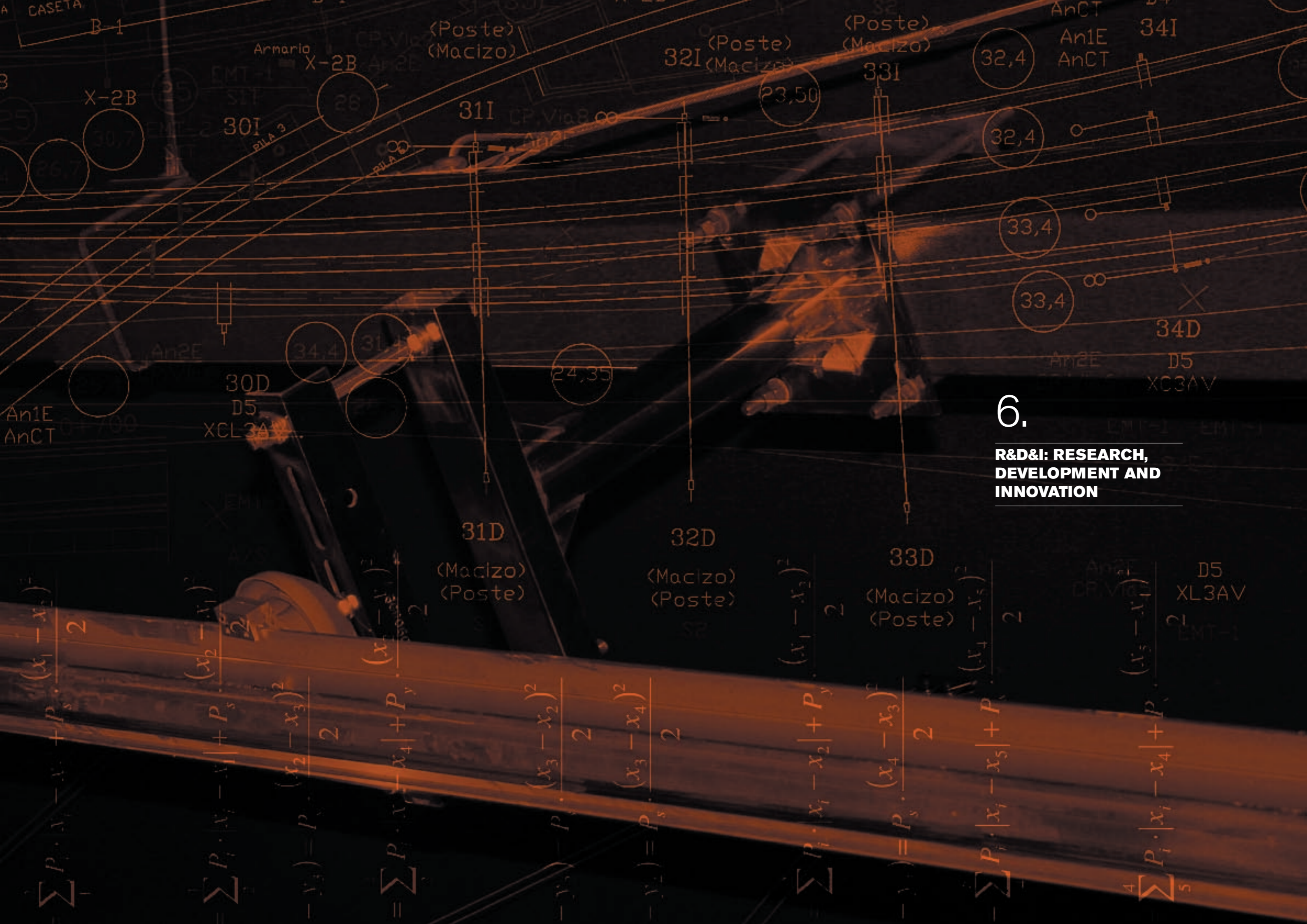


### ENVIRONMENT

To begin with, we should mention that a rail traction system powered by electricity is the cleanest and most sustainable method of powering transport units currently in existence. Furthermore, to maintain the same level of care, the activity must involve minimal environmental invasiveness, as is the case. The environmental management system implemented by ELECTREN has been structured in accordance with the ISO 14001: 2004 standard and certified by AENOR.

**THE ACTIVITY MUST INVOLVE MINIMAL ENVIRONMENTAL INVASIVENESS, AS IS THE CASE.**

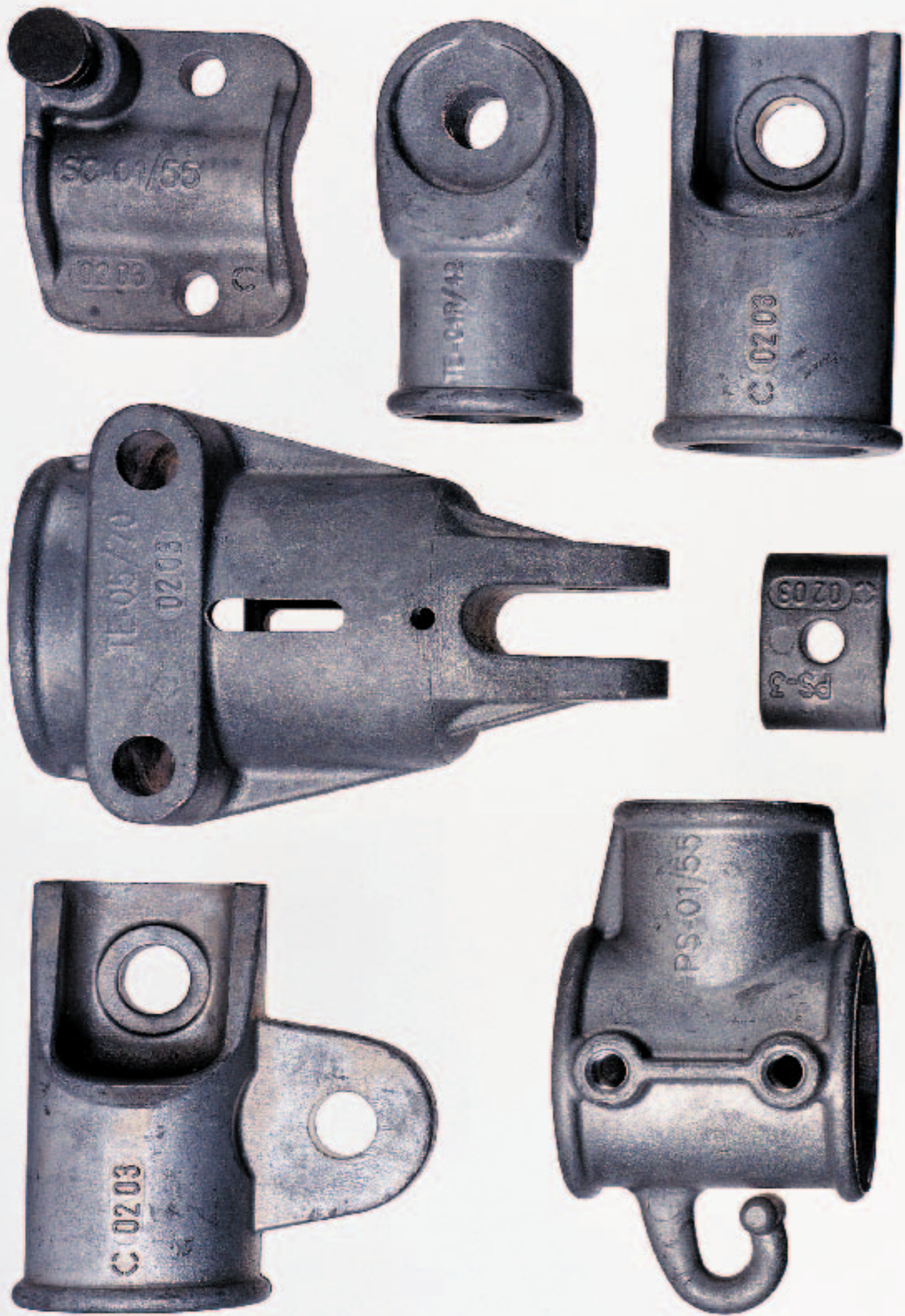




# 6.

**R&D&I: RESEARCH,  
DEVELOPMENT AND  
INNOVATION**

$$\begin{aligned} &= \sum_{i=1}^n P_i \cdot |x_i - y_i| + P_s \cdot \frac{(x_1 - x_2)^2}{2} \\ &= \sum_{i=1}^n P_i \cdot |x_i - y_i| + P_s \cdot \frac{(x_2 - x_1)^2}{2} \\ &= \sum_{i=1}^n P_i \cdot |x_i - y_i| + P_y \cdot \frac{(x_i - y_i)^2}{2} \\ &= \sum_{i=1}^n P_i \cdot |x_i - y_i| + P_s \cdot \frac{(x_3 - x_2)^2}{2} \\ &= \sum_{i=1}^n P_i \cdot |x_i - y_i| + P_s \cdot \frac{(x_3 - x_4)^2}{2} \\ &= \sum_{i=1}^n P_i \cdot |x_i - x_2| + P_y \cdot \frac{(x_1 - x_2)^2}{2} \\ &= \sum_{i=1}^n P_i \cdot |x_i - x_3| + P_s \cdot \frac{(x_4 - x_3)^2}{2} \\ &= \sum_{i=1}^n P_i \cdot |x_i - x_5| + P_s \cdot \frac{(x_4 - x_5)^2}{2} \\ &= \sum_{i=1}^4 P_i \cdot |x_i - x_4| + P_s \cdot \frac{(x_5 - x_4)^2}{2} \end{aligned}$$



**R&D&I: RESEARCH, DEVELOPMENT AND INNOVATION**

For an organization whose entire activity is carried out within a single environment, on a permanent and specific basis, it is simpler to move beyond the bounds of the conventional and approach that point at which the knowledge of the sector as a whole is enhanced.

From this position, ELECTREN is an active participant in technological development forums and associations, discussing its interests and contributing experience and knowledge.

Ongoing project work is a laboratory in which possible errors or modifications for pieces and structures are detected. The projects, R&D&I department gathers these observations, documents them and passes them on to rail operators.

ELECTREN invests in our own management and calculation tools, such as Alotmat software, which provides resolution and agility.

Achieving the goal of innovation revolves around improving processes based on the data provided by indicators and around the search for new work methods.

ELECTREN tackles plans for new railway traction systems with zest, including those for light rail and high-speed lines.

**ELECTREN INVESTS IN OUR OWN MANAGEMENT AND CALCULATION TOOLS, SUCH AS ALOTMAT SOFTWARE, WHICH PROVIDES RESOLUTION AND AGILITY.**



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