



# axon'

CABLE & INTERCONNECT



expertise

harnesses for advanced technologies



In the ever-changing climate of today's electronics industry, AXON' is able to offer complete interconnect solutions for a diverse range of applications. The company has become increasingly involved in the various stages of harness development, from initial design concept to final production.

Over the last ten years AXON' has gained considerable experience in the design and manufacture of harnesses for the most severe of electronic applications. Many companies worldwide have approved AXON' products :

- **Military Electronics (NATO CODE N° F 5688) :**

ALVIS, GIAT, MARCONI ELECTRONIC SYSTEMS, MATRA BAE, MTU, RACAL, THOMSON

- **Aeronautics / Space :**

AEROSPATIALE, ALCATEL, ALENIA, BRITISH AEROSPACE, BOEING, KHI, NEC, NORD MICRO, MATRA MARCONI SPACE, SEXTANT, WESTON

- **Medical Electronics :**

ATL, BIOTRONIK, KRETZ, MED EL, MEDTRONIC, STORZ, ELEKTA, KONTRON

- **Telecommunications :**

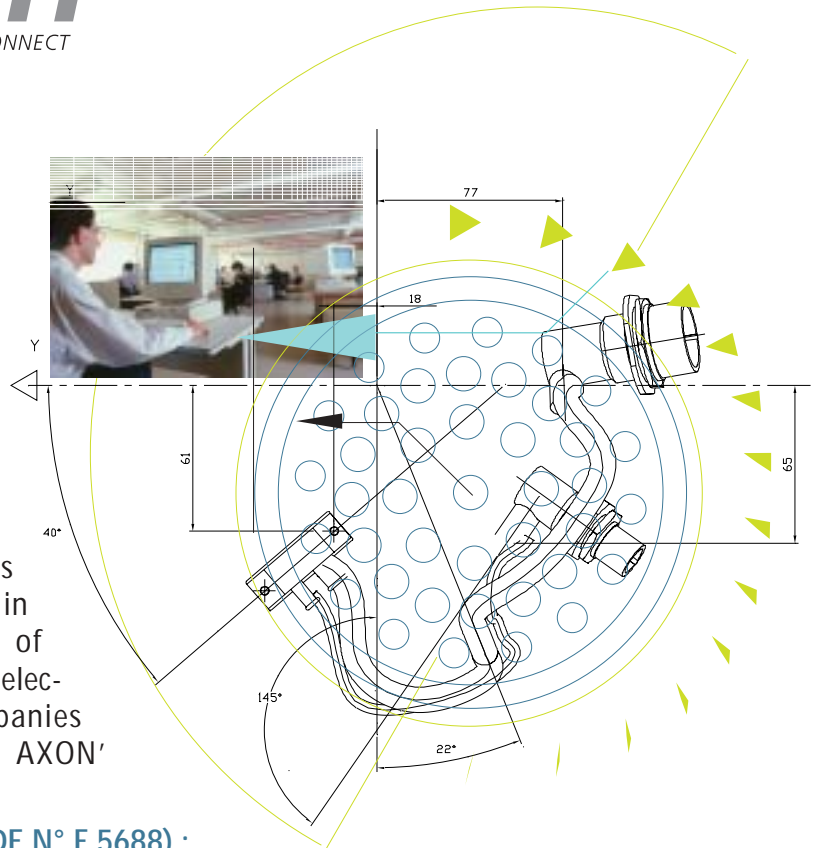
ALCATEL, MITSUBISHI, NORTEL

- **Oil Exploration :**

IFP, SCHLUMBERGER, SPERRY SUN

- **Research Centers :**

CERN, LAL, MPI

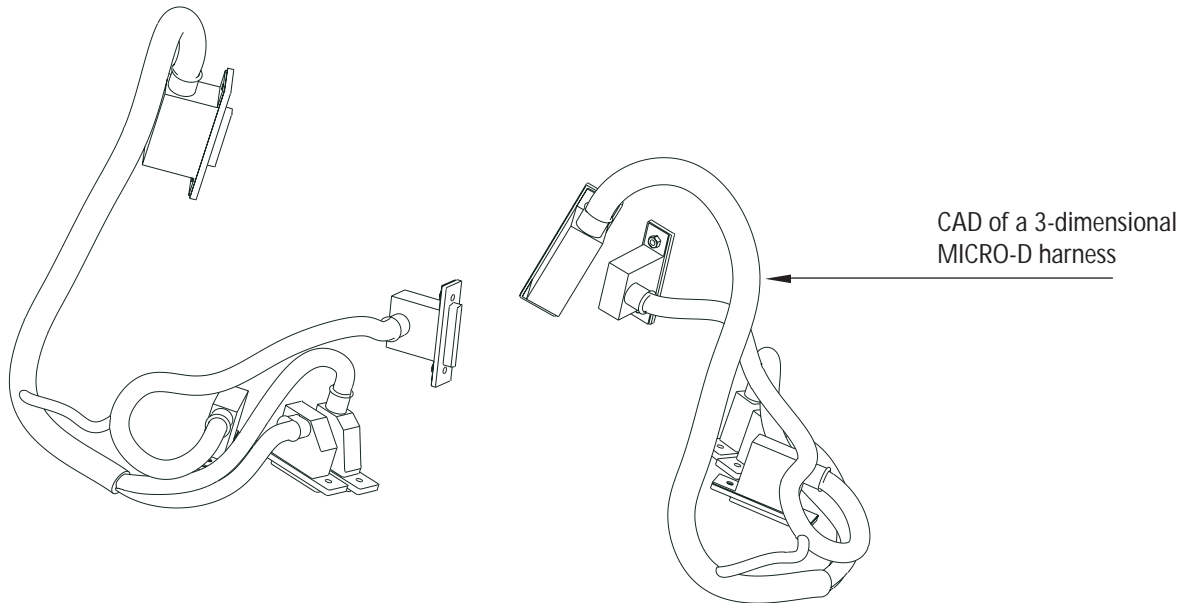


## Design

A team of more than 40 engineers using AUTOCAD® with links to other engineering software are able to construct complex interconnect system designs. In addition internally developed bespoke software assists the engineers in advanced modelling of electrical characteristics, such as the evaluation of the overall shielding efficiency of a set of cables or studying the influence of the lay length on a twisted pairs' impedance.

The Research and Development and Production Engineers support the Design Team with their expertise in various disciplines including metallurgy, plastics, RF and microwave, EMI and electro-mechanical engineering.

Maintaining close relationships with Universities and Research Centers AXON' engineers keep abreast of technical advances and incorporate wherever possible the latest innovative technologies into harness designs.



# Component validation

The Design Departments have at their disposal a wide variety of in-house test equipment to validate different components for use within specific environments.

## Test capability

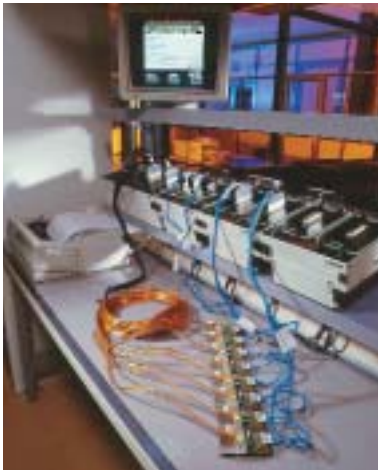
### Physical characteristics

- full material analysis

### Chemical characteristics

Resistance to :

- oils
- decontaminants
- sterilization
- solvents



Automatic continuity and insulation testing

### Electrical characteristics

- automatic continuity and insulation testing
- dielectric strength
- potential difference, current flow
- velocity of propagation
- characteristic impedance
- capacitance, inductance
- attenuation, Return Loss, VSWR
- crosstalk
- intermodulation
- filtering performance
- transfer impedance (screen efficiency)
- mode stirred chamber
- automatic Databus testing

# Component validation

## Test capability



Salt spray chamber

### Climatic characteristics

Resistance to :

- salt spray
- thermal shock
- flame
- sterilization (autoclaving)
- accelerated ageing



Vibration device

### Mechanical characteristics

Resistance to :

- flexion
- torsion
- combined flexion/torsion
- winding
- vibration
- folding
- shock

# Manufacturing

AXON's total manufacturing capability ranges from precision conductors, wires and custom-designed cables through to the fully completed cable harness. All quantities can be catered for, from one-off prototypes manufactured by specialized engineers to volume production carried out by experienced operators.

The AXON' Interconnect Division has more than 300 technicians, engineers and highly trained operators.



## EMC

Depending on the customer's EMC requirements, AXON' can offer braided assemblies and branch braided harnesses. These can be guaranteed to achieve optimum shielding efficiency using transfer impedance ( $zT$ ) measurements. To ensure the shielding efficiency at the cable/connector junction a 360° shield termination to the connector can be effected using AXON's patented banding system AXOCLAMP®.

## Test & inspection

All harnesses are 100% tested on automatic test benches which confirm a variety of parameters including correct wiring schedule and insulation resistance for every circuit. Further specific tests can be carried out on request.

A Certificate of Conformity and Test Report can be issued with every assembly or harness.

## Termination

Cabling boards are produced on a 1:1 scale to improve manufacturability. The products are assembled using composite cables or insulated single wires which are laid up by hand into single or multi-branched harnesses.

The different cable types and sizes can be stripped by mechanical, thermal or laser strippers.

For particularly complex harnesses, AXON' can develop special 3 D cabling boards with integrated test equipment. These tools allow operators to terminate the harnesses whilst in their final form and thus significantly reduce termination time.

The assembly of sub-systems and connectors can be carried out under class 100 000 clean room conditions with controlled temperature and humidity, especially useful for products aimed at space applications.



Harness termination on a 3D cabling board with integrated test

## Protection & Identification

AXON' uses knowledge in high and low pressure and hot melt moulding techniques to develop mould tools and manufacture over-moulded harnesses. These overmouldings are waterproof, resistant to salt spray, and can be sterilized for medical applications.

To meet customers' requirements for identification and tracability on finished products, AXON' can engrave product identification directly onto sleeves or metallic pieces and uses a wide variety of adhesive and heat-shrinkable identification systems.



Overmoulding

## Interconnection

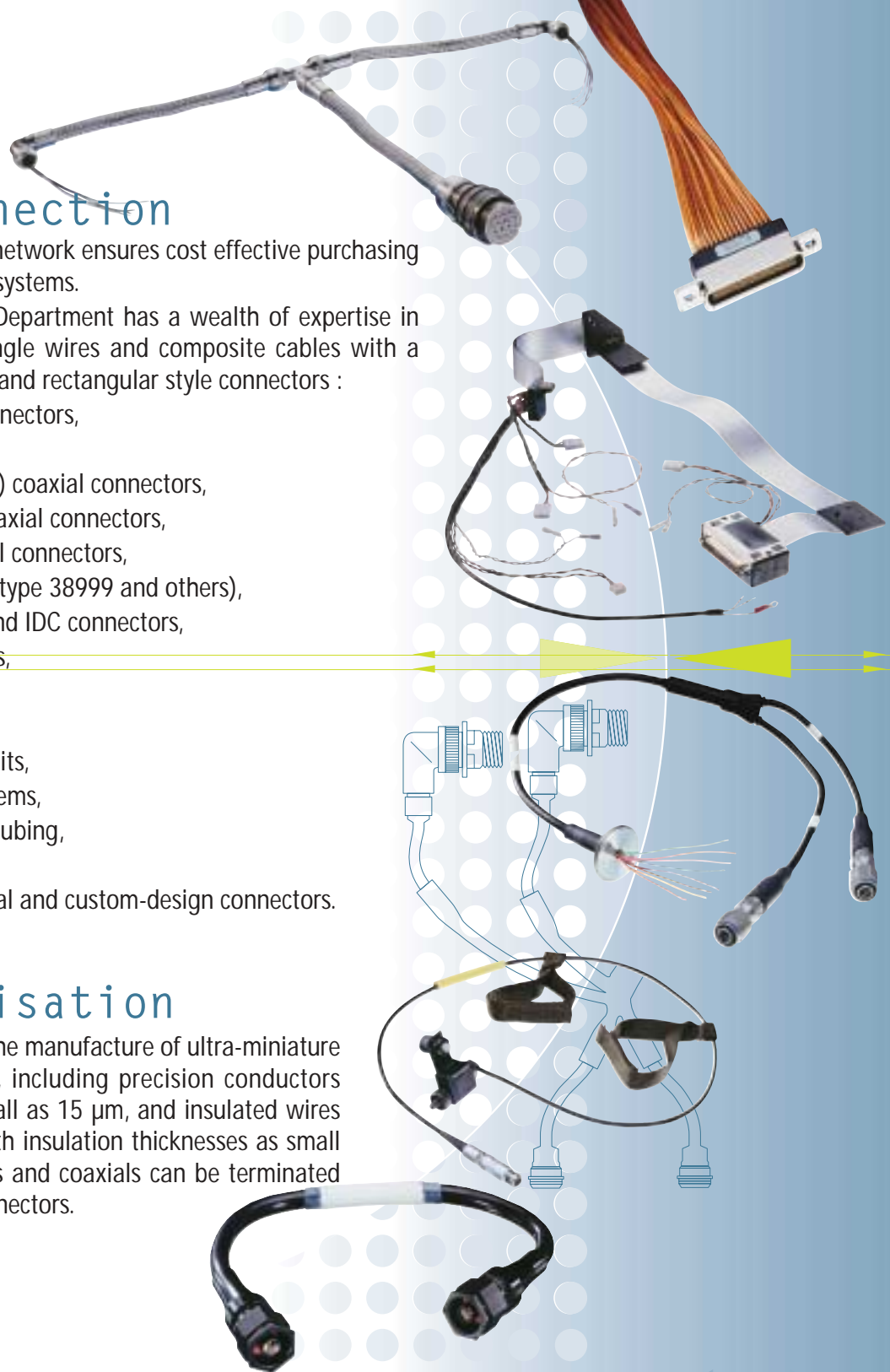
AXON's international network ensures cost effective purchasing of connectors and subsystems.

AXON's Interconnect Department has a wealth of expertise in the termination of single wires and composite cables with a wide range of circular and rectangular style connectors :

- Sub-D, MICRO-D connectors,
- NANO-D connectors,
- Low frequency (MHz) coaxial connectors,
- Microwave (GHz) coaxial connectors,
- Triaxial and twinaxial connectors,
- Circular connectors (type 38999 and others),
- Crimped, soldered and IDC connectors,
- Miniature connectors,
- Filter connectors,
- Special backshells,
- Flexible printed circuits,
- Mechanical sub-systems,
- Flexible convoluted tubing,
- Shielded conduits,
- Large range of special and custom-design connectors.

## Miniaturisation

AXON' specialises in the manufacture of ultra-miniature interconnect systems, including precision conductors with diameters as small as 15  $\mu\text{m}$ , and insulated wires and coaxial cables with insulation thicknesses as small as 30  $\mu\text{m}$ . These wires and coaxials can be terminated into 0.5 mm pitch connectors.



## ORGANISATION

In the case of complex contracts special, multi-skilled project teams are created, comprising people from Design, Purchasing, Sales, Production and Quality Management functions.

These teams supervise the implementation of the different project phases and can track progress with the aid of GANTT charts. They prepare the necessary documents, such as the Design Definition File, the Justification of Choice File, the Control Plan, the Safety Operating Statement with MTBF calculations. Failure Mode Effect Analysis (FMEA) documents can also be generated if required.

This type of organisation allows for improved flexibility and reactivity .

Orders managed by a project team are manufactured in a workshop or cell dedicated to one product family or to one customer project. In this manner AXON' can ensure a quicker service, a more specific operator training and improved customer focus for all personnel.

## COMMUNICATION

AXON' is fully equipped with e-mail and videoconferencing capabilities, to ensure efficient communication with customers.

To be able to respond rapidly to international projects, AXON' has hired multilingual engineers who work in the main plant and also in the various international technical sales subsidiaries.

AXON' can offer technical files in English, German or Japanese.

## QUALITY MANAGEMENT

With a carefully structured Quality Management system AXON' has obtained

- ISO 9001 approval (AFAQ - EQ-NET member),
- QUALIFAS certification,
- Numerous product approvals according to international standards : UL, CSA, NF, MIL
- Quality agreements for the space industry : ESA, NASA
- Customer approvals for both products and processes : BOEING, MATRA BAE, AERO-SPATIALE, ALCATEL, DASA

## COMPETITIVE GLOBAL COST

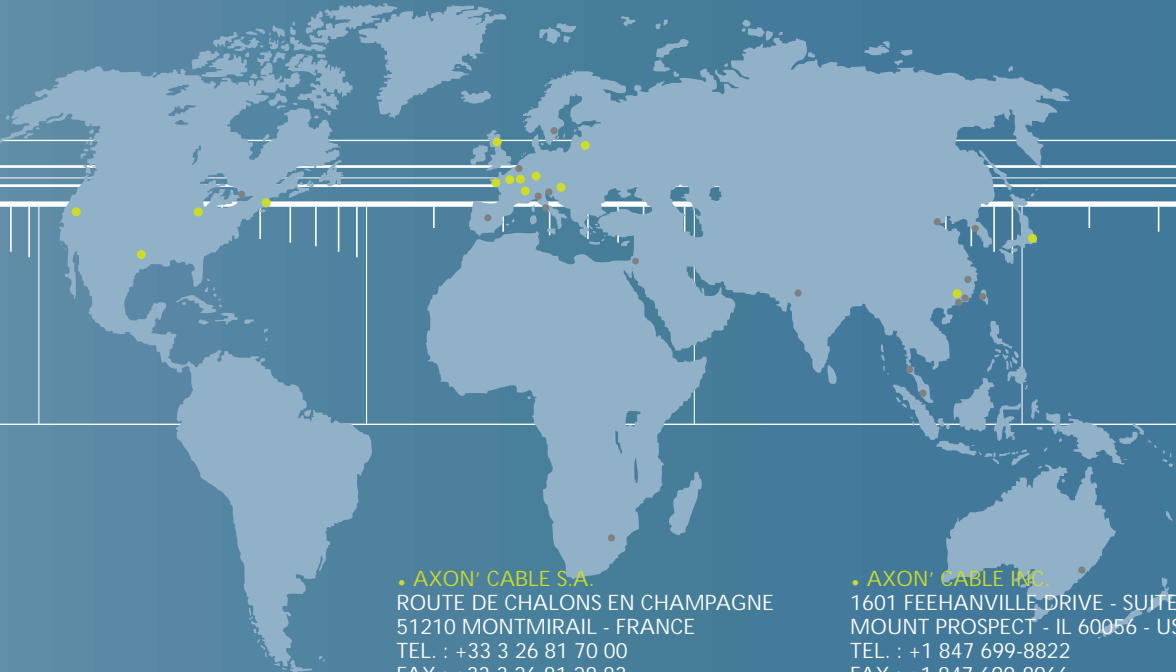
AXON' has developed skills in cost reduction methods employing a range of techniques from value analysis to Taguchi experiment planning. Cost down pilot teams place emphasis on continuous processes, prioritising and tracking progress with the aid of Pareto diagrams.

In addition, several customers delegate their quality control to AXON', recognizing that the additional cost of Goods-in Inspection is not required when the supplier can demonstrate a consistently high level of quality.



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▶ EQUIPMENT WIRES

▶ COAXIAL CABLES

▶ FLAT CABLES

▶ COMPOSITE CABLES

▽ HARNESSES

▶ SPECIAL PRODUCTS

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