



Cable assemblies & harnesses

TAILORED & OFF-THE-SHELF SOLUTIONS
FOR CHALLENGING MARKETS

axon' 

Cable assemblies & harnesses

TAILORED & OFF-THE-SHELF SOLUTIONS
FOR CHALLENGING MARKETS

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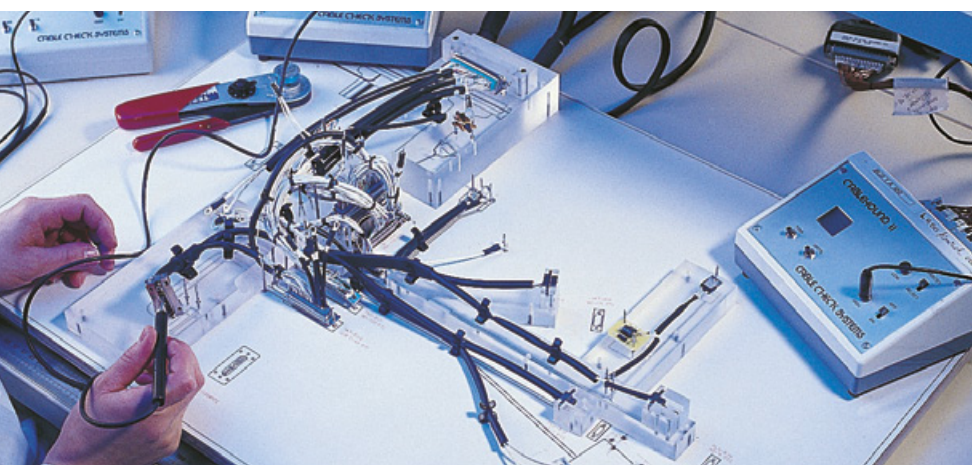
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Cable assemblies & harnesses ... creating connections



Headquartered in France, the Axon' Group has a strong global presence, with major sales and manufacturing operations across North America, Europe and Asia. The Group's in-house expertise in precision conductors, high performance wires and cables, and miniature connectors enables it to deliver advanced cable assemblies for a wide range of demanding applications.

All the companies of the Axon' Group, together with their trusted partners, pride themselves on delivering **a highly professional, yet always friendly and welcoming service.**



**Axon' is a
world leader
in specialist
interconnect**





CABLE ASSEMBLIES designed for challenging markets



- Industrial equipment,
automation systems
and robots, machinery
& equipment, heavy industry •*
- Aerospace flight
command or in-flight
entertainment •*
- Military guidance,
communication
or optronic systems •*
- Automotive electronic
equipment and diverse
sensor systems •*
- Space launchers,
satellites & rovers •*
- Scientific research centres •*
- Oil & gas drilling tools
and pipelines •*
- Nuclear or renewable
power systems •*
- Medical devices - Laboratory
analyzers*

Designed to be tough

Cable assemblies designed by Axon' are engineered for durability and performance, meeting the demands of **the most challenging applications**. With expertise in precision conductors, high-performance wires and cables, and miniature connectors, Axon' designs overmolded cable assemblies and complex multi-branch harnesses.

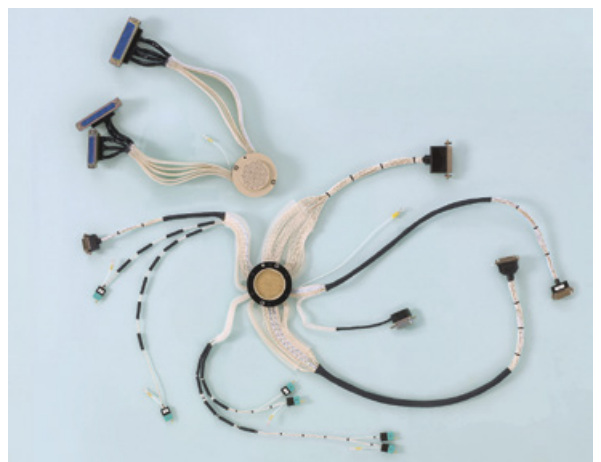
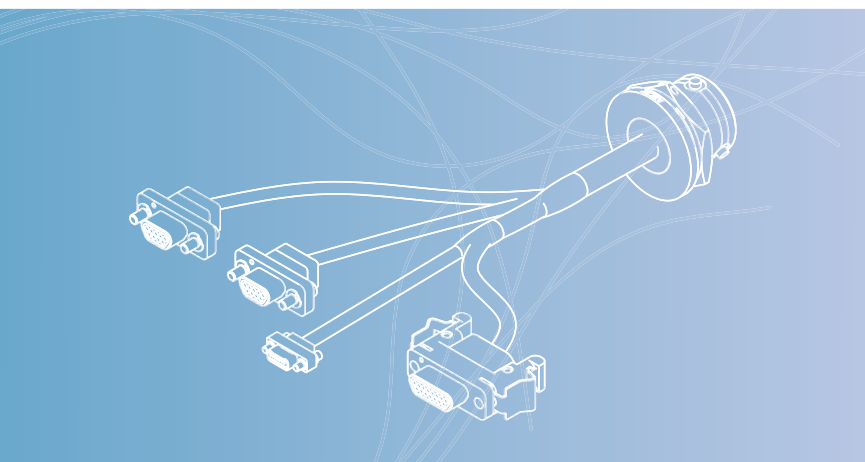
Axon' can also provide ITAR free interconnect solutions.



Tailor-made cable assemblies

CABLE ASSEMBLIES FOR THE MOST CHALLENGING APPLICATIONS

Designed to your needs



Axon's cable assemblies are tailor-made to meet the most demanding applications.

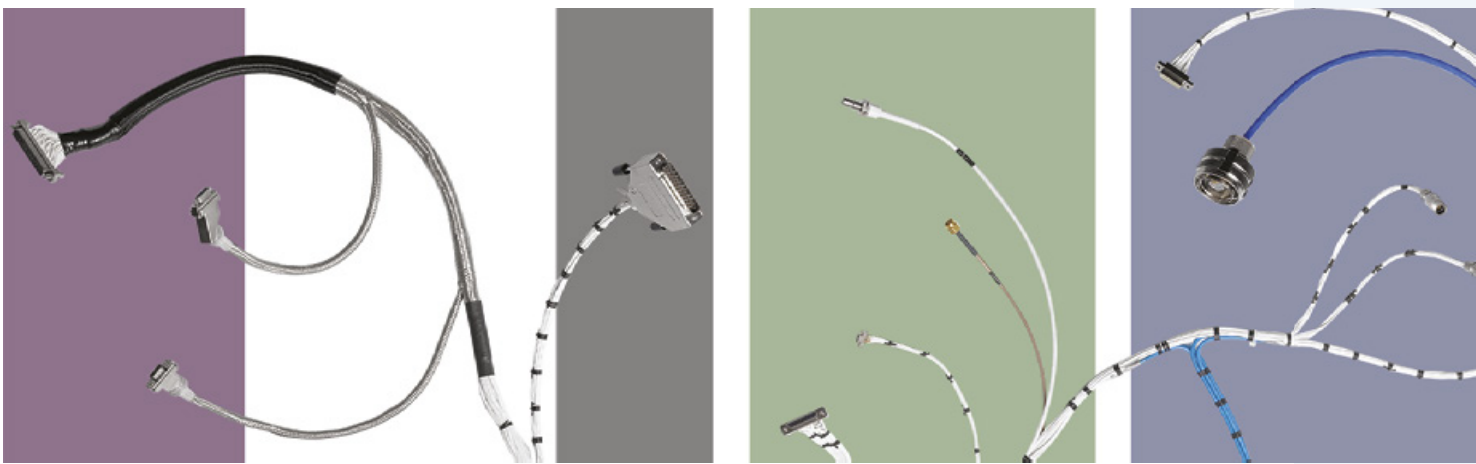
Cable assemblies designed by Axon' Cable can be terminated with a wide range of connectors, including D-Sub, Micro-D or Nano-D, coaxial connectors, MIL-DTL-38999 and others.

Axon' cable assemblies can be made with:

- Hybrid cables.
- Power cables.
- Coaxial cables.
- Fiber optic cables.
- Shielded wires.
- Halogen free cables.
- Radiation resistant cables.



Tailor-made cable assemblies



Axon' cable assemblies and harnesses

They are engineered to meet a wide range of electrical, mechanical and environmental requirements, including :

- Resistance to high temperatures, pressure, shocks, torsion, repeated flexing.
- Resistance to oil, solvents and chemical products.
- Weight saving and miniaturization.
- Electromagnetic protection.
- Sterilization, biocompatibility.
- High flexibility.
- High data rate up to 10 Gb/s.
- High frequency up to 50 GHz and more.
- Reliable data transmission.
- Cosmetic appearance.

BUILT-TO-sPRINT™

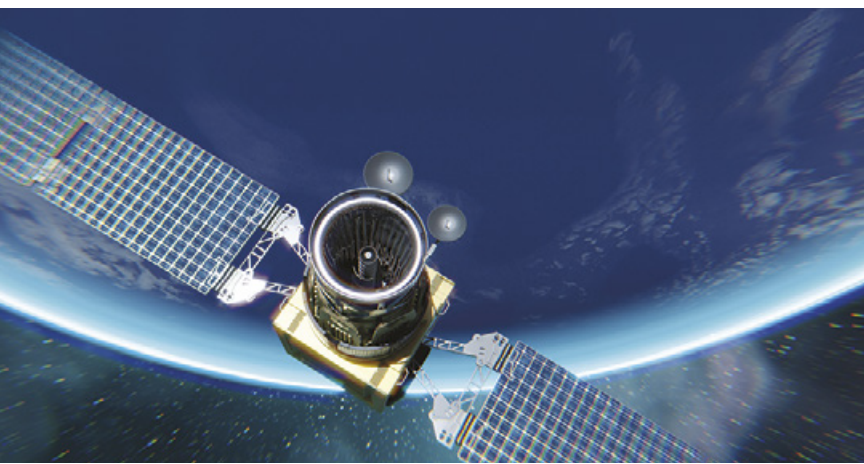
Axon' offers BUILT-TO-sPRINT™ cable assemblies and harnesses **tailored to your application**. Upon receiving a complete technical data package, including drawings, specifications and the prescribed bill of materials, Axon' will review and rapidly process the data to manufacture cable assemblies or harnesses in the shortest time possible.



Tough environments

SPACE HARNESSES

Routing and harnessing of a whole satellite



From the choice of material and components to design, routing, manufacturing, testing and product qualification, Axon' provides a complete service for the cabling of spacecraft, satellite and rover vehicles. 2D or 3D cabling boards can be developed to ensure perfect integration at the customer's facilities, particularly where tolerances on length or routing are very tight.

Axon' can also design the harness working directly on a full-scale mock-up provided by the customer.

Axon' space expertise:

- Data transmission up to 40 Gb/s.
- Resistance to radiation, atomic oxygen (ATOX) & extreme temperatures.
- Fast integration (NewSpace, mega-constellation).
- Aluminum-based power distribution.
- High frequency up to 65 GHz.
- ESCC QPL approved products.

Manufacturing capabilities:

- ISO 7 clean rooms.
- Technicians accredited to ESA (ESCC) & IPC standards.

SPACE PROGRAMMES WITH AXON' ON-BOARD:

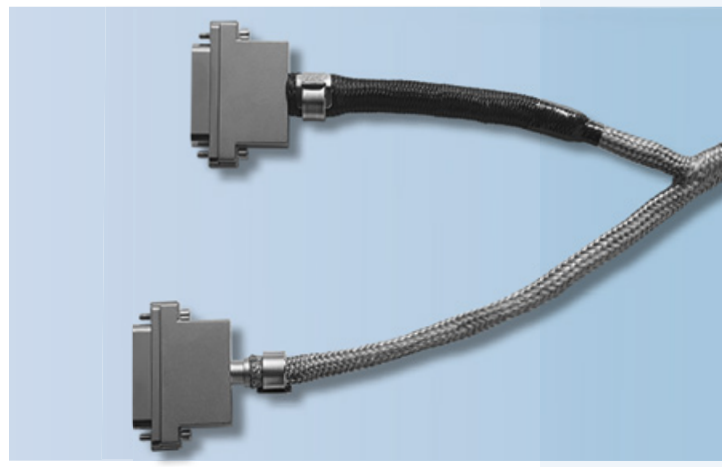
Galileo
Vega Sentinel
Iridium O3B
Exomars Ariane Bepi Colombo
Alphabus Eurostar Mangalyaan
Curiosity Globalstar
CoRoT InSight Maven Spacebus



Tough environments

ELECTROMAGNETIC PROTECTION

Overbraided cable assemblies



Electromagnetic interference (EMI) protection is a critical consideration for defense and avionics applications. In these cases, plastic connectors alone do not provide sufficient protection against EMI. It is not just the cables but the entire interconnect system that must be shielded to ensure communication and navigation systems function reliably.

From the cable to the connector and the complete cable assembly, Axon' delivers the **most appropriate EMC solutions**.

Axon' harnesses are shielded through braiding or overbraiding, with shielded terminations ensuring perfect continuity, and connectors optimized for electromagnetic interference.



Tough environments

ELECTROMAGNETIC PROTECTION

Accessories



EMI CLIP



LARGE FLANGE SHELL



EMI BACKSHELLS

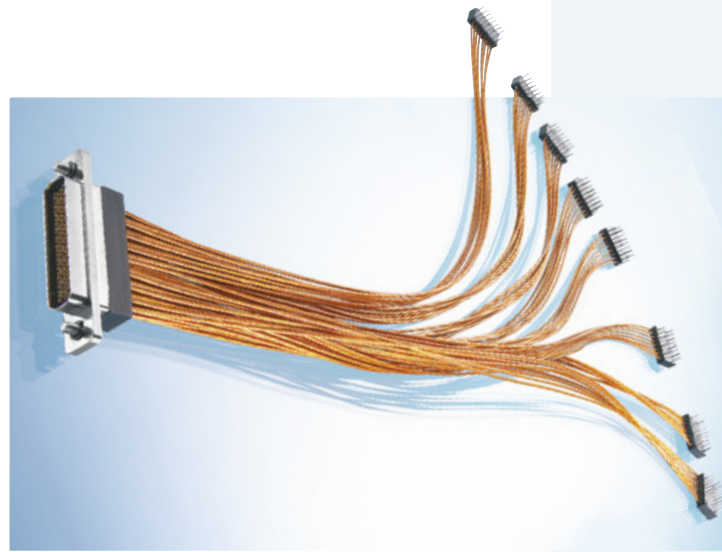
To ensure your interconnect solutions are fully protected against electromagnetic interference, Axon' engineers have developed a range of specialized accessories.

- Overbraiding: tin, silver or nickel (others materials on request), single or double braid, designed to improve EMC performances.
- Axoclamp™: banding adaptors allowing for a 360° shield termination at the rear of connectors.
- Backshells: modular or multi-part versions for easy cabling.
- Halorings: specially designed metallic combs for effective termination of multiple shields within a cable bundle directly to either the connector or backshell body.
- DClip360: a precisely engineered sprung EMI-clip, providing 360° shield continuity between mated pairs of connectors.
- Wide flange connectors. Fitted with EMI o-rings to deliver maximum electrical contact with the equipment bulkhead or panel.



Tough environments

FOR APPLICATIONS WITH MULTIPLE CHALLENGES



OIL & GAS: cable assemblies resistant to vibrations and shock

Whether for onshore or offshore oil and gas exploration, cables and interconnects must be highly resistant to oils, chemicals and hazardous environments. Engineered to withstand these conditions, Axon' multi-element cables are insulated with materials such as polyurethane, FEP and proprietary compounds, such as Poliax, developed by the company's engineers. A wide variety of cable constructions including twisted pairs, shielded, high flex, power and coaxial cables are available for downhole applications and tanker safety systems.

NUCLEAR & RESEARCH: radiation-resistant cable assemblies

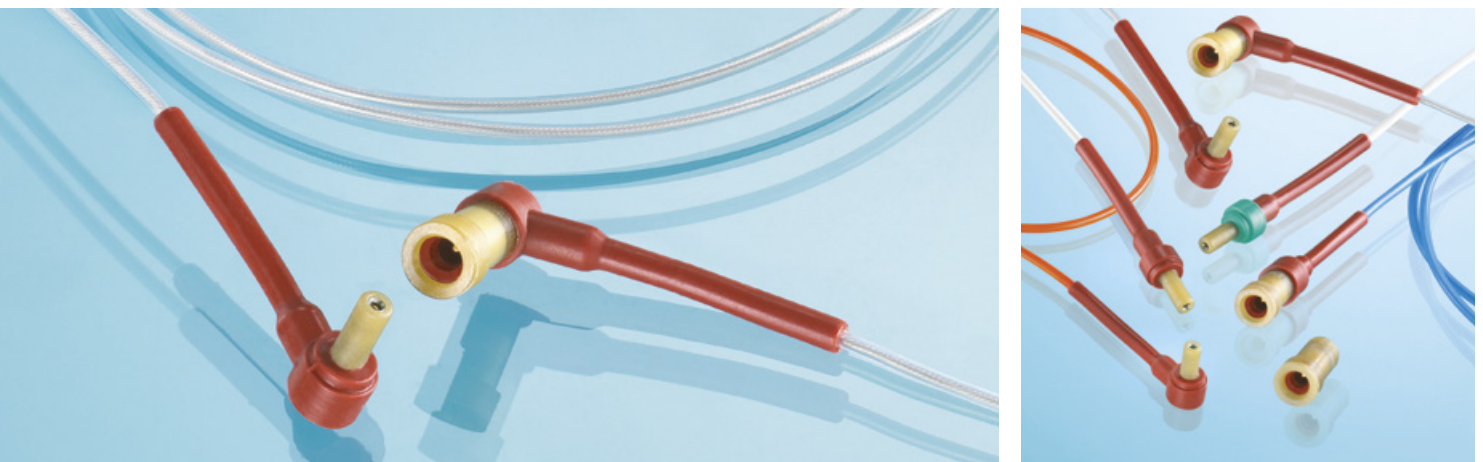
In nuclear environments, cables, connectors and cable assemblies are exposed to extreme operating conditions, including radiation, vacuum and severe temperatures, which can degrade components. To address this, Axon' engineers design insulating materials specifically to withstand these harsh conditions. While traditional radiation-resistant insulating materials are typically very stiff, Axon' can develop dedicated flexible cables. The company has created a wide range of radiation-resistant cables under the **Axorad™** brand.



Tough environments

HIGH-VOLTAGE & MINIATURIZATION

AXOVOLT™ high-voltage cable assemblies



AXOVOLT™ is a range of high-voltage miniature cables and cable assemblies for demanding environments. AXOVOLT™ cables are rated for use up to 20 kV DC, and cable assemblies up to 12 kV DC, from sea level to 21000m (70000ft). They are particularly suited for defense onboard electronics, including helmet-mounted vision systems used by pilots. AXOVOLT™ cable assemblies are constructed with FEP-insulated wires or FEP/silicone-coated wires and terminated with overmolded high-voltage connectors.

- Temperature range: -55°C to +125°C.
- Designed for use in high-voltage applications and reduced atmospheric pressure.
- Flame-retardant.
- AXOVOLT™ connectors are compatible with most existing miniature high-voltage connectors.
- All cables assemblies are 100% tested.



Data transmission

DATABUS CABLE ASSEMBLIES

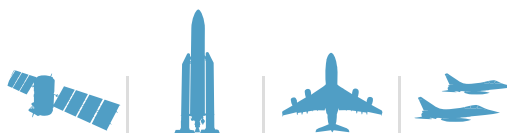
MIL-STD transmission couplers and harnesses



Axon' specializes in the design and manufacture of all components used in data transmission systems in compliance with MIL-STD-1553. They provide high data security, signal integrity, excellent electromagnetic protection, as well as weight and space savings, and fast diagnostics for all equipment connected to the bus. A MIL-STD-1553 data transmission network includes **databus cables, couplers, connectors, triaxial contacts and accessories.**

Axon' range of databus couplers for MIL-STD-1553 networks:

- In-line couplers.
- Removable data bus couplers.
- Crimp couplers.
- Relay couplers.
- Rack couplers.



At the speed of light

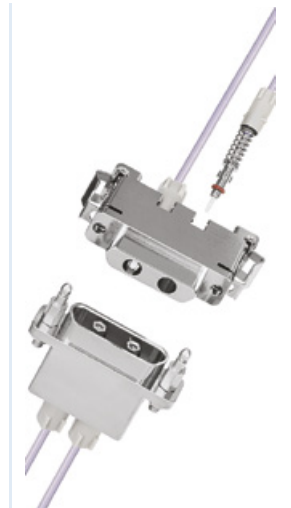
Fiber optic cable assemblies



Axon' has drawn on extensive experience with both Micro-D and high data rate links to develop high-performance optical cable assemblies. Vertically integrated, Axon' Cable can manufacture optimized fiber optic cables fully tailored to high-performance optical Micro-D based connectors. Axon' engineers have designed AXOPT™ interconnects to facilitate the transition from electrical to optical devices intended for harsh environments.

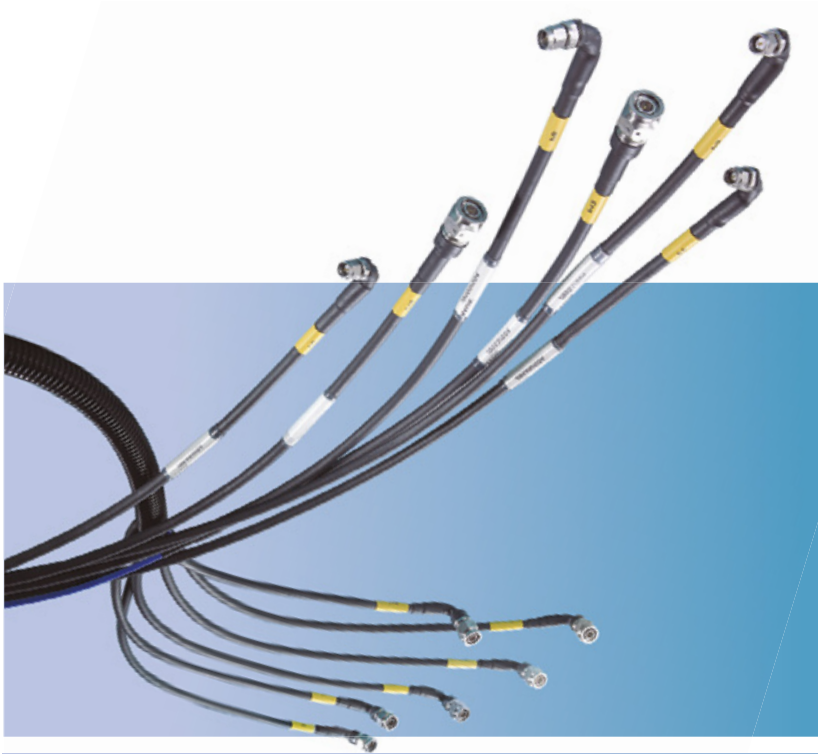
Axon' fiber optic cables are fully compatible with a wide range of standardized contacts and connectors, including ARINC 801, MIL (e.g. MIL-PRF-29504), ST, FC and LC connectors, as well as MT ferrules and Axon' proprietary fiber optic connectors.

- Lightweight & EMI-immune.
- Resistance to harsh environments, high temperatures and to humidity.
- Compatible with industrie standard and Axon' proprietary fiber optic connectors.
- ARINC801 & MIL-PRF29504.
- 500 cycles mating/de-mating.
- D-Click™ fast-locking system for fast integration.
- Multi-fiber links terminated with MT ferrules (12 or 24 fibers).



Signal integrity

Microwave coaxial cable assemblies



Axon' designs and manufactures RF coaxial assemblies and microwave coaxial assemblies with **very low signal loss**. Insulated with a FEP or PU jacket and terminated with coaxial connectors, these assemblies are easy to install. They are primarily used in measurement, radar, antennae and surveillance systems.

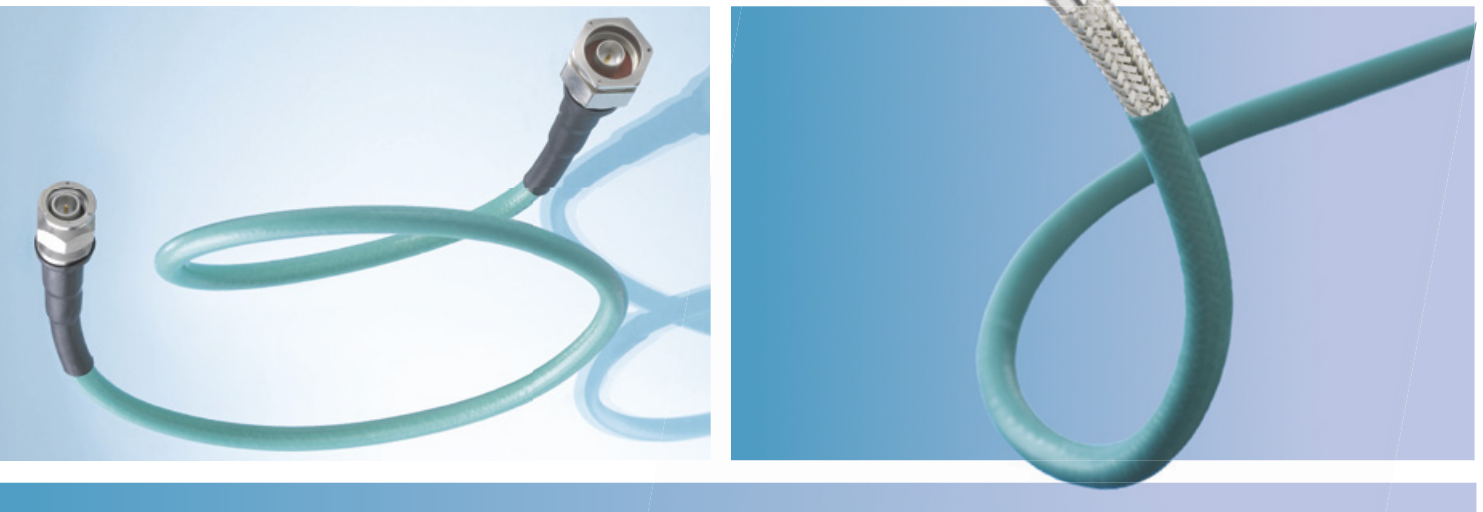
- Frequency of up to 50 GHz for the standard microwave range but can be higher depending on the application.
- Excellent insertion-and return-loss.
- Very flexible microwave cable assemblies for highly repetitive bending in dynamic applications.
- Radiation resistance for space versions.
- Axon' microwave cable assemblies can be easily integrated into hybrid harnesses.
- Hand-formable cables: easy to install, high quality (100% tested) and excellent memory properties.
- PFA, polyimide and PEEK braided versions for Space applications.
- Zero halogen jacket version available.



Signal integrity

30% WEIGHT SAVE

Lightweight coaxial cable assemblies



Designed for the cabling of aircraft and helicopters, Axon's lightweight coaxial cables are **30% lighter than the EN4604-007** aerospace standard and qualified to EN4604-009. Manufactured using materials such as copper-clad aluminum and **Celloflon™** (a porous PTFE patented by Axon) and optimized for weight saving, they deliver excellent mechanical and electrical performance.

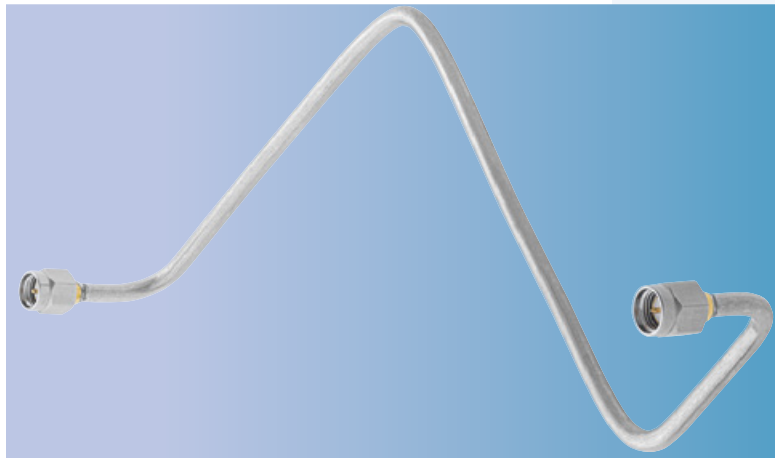
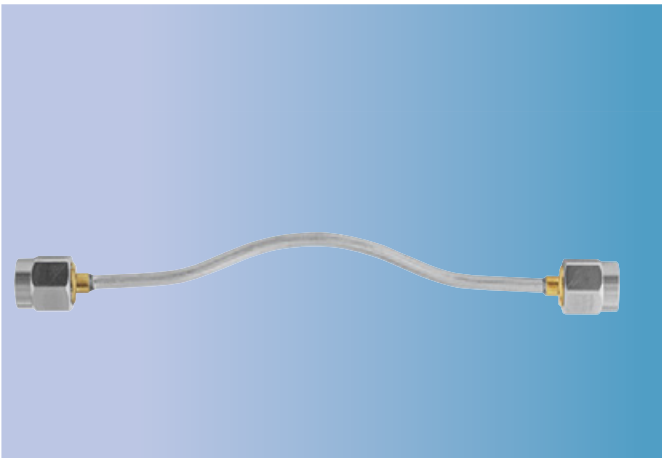
- Frequency up to 18 GHz for the connected versions.
- Excellent attenuation (15 dB for 100 m at 1 GHz).
- Low dielectric constant.
- Temperature rating: -55°C to +180°C.
- Lightweight, yet robust (good crush resistance).
- Can be terminated with standard coaxial connectors (N, TNC, SMA, others).



Signal integrity

FOR SEVERE ENVIRONMENTS

Semi-rigid cable assemblies



Axon' manufactures RF assemblies using semi-rigid cables available in three sizes. Encased in solid metal tubes, these assemblies resemble pipework rather than conventional flexible cables and should be formed into the required shapes only using specialized equipment to avoid stressing the critical dielectric material inside. Axon' can achieve any shape required by the customer and will design a bespoke cable assembly **tailored to your specific needs**.

Axon's semi-rigid cables feature:

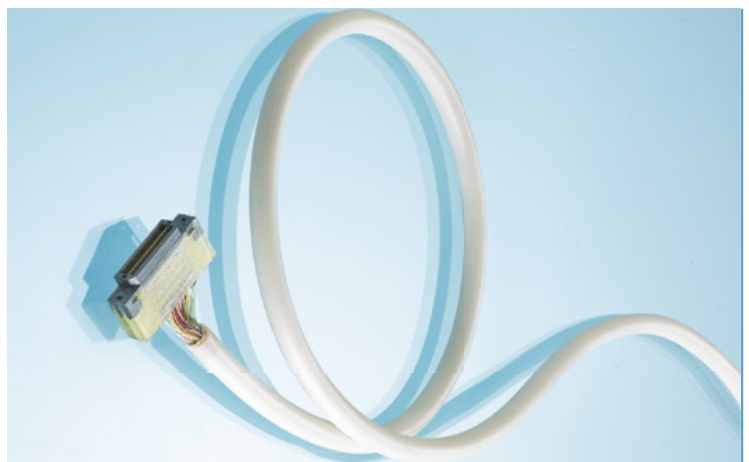
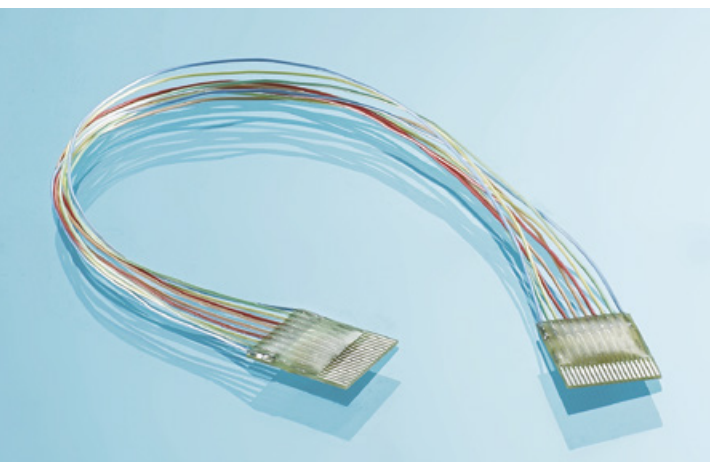
- Solid Conductor: Made with SPC (Silver Plated Copper) or SPCW (Silver Plated Copperweld).
- Dielectric: PTFE or low-density PTFE.
- Shielding: Copper, stainless steel, or aluminum tube
 - Excellent EMI/EMC performance ;
 - Superior electrical performance ;
 - Wide range of connectors (upon request) ;
 - Tight bend radius.



Signal integrity

SPACE SAVING

Multipicocoax™ miniature coaxial cable assemblies



Multipicocoax™ cables are composite cables composed of bundles of 18 to 256 (or more on request) Picocoax™ cables. Axon' can also manufacture hybrid cables combining Picocoax™ wires, twisted pairs, shielded wires, flexible wires, power cables or tubes capable of transmitting power, signals and fluids.

- Many possible configurations: bundles of 18 to 256 (or more) Picocoax™ wires.
- Large range of Picocoax™ wires: 36 AWG to 46 AWG.
- From single-piece orders to large volumes.
- Tailor-made composite cables made with Picocoax™ cables, electrical wires or tubes.
- **All-in-one solution:** cable assemblies delivered with termination.
- High flexibility and tailored environmental resistance.
- Space saving (each AWG46 Picocoax™ has an outer diameter of 0.25mm [10 thou']).



Signal integrity

FLEXIBILITY & RADIATION RESISTANCE

Flexorad™ Flexible RF assemblies



Dedicated to research & nuclear markets:

Our experts have developed a new range of 50 Ω and 75 Ω RF cables called Flexorad™ that combine high flexibility, resistance to extreme temperatures and radiation, and excellent electrical performance. As an added benefit, the cables are halogen-free and flame-retardant.

- New innovative material with low dielectric constant (ϵ 2.20).
- Resistance to temperatures from 4K up to 125°C and 150°C.
- Can be used for cryogenic applications.
- Highly flexible: significantly more flexible than any competing product.
- Tests according to EN3475-704 and EN3475-512.
- Excellent radiation resistant \geq 3500 kGy (350 Mrad).
- Can be delivered as a cable or terminated with standard coaxial connectors including SMA, BNC, TNC or N.

Dielectric system	T°C range	Dielectric performance	Flexibility	Radiation resistance	Halogen Free	Fire retardant
Fluoropolymers	★★★★	★★★★	★★★★	★	NO	YES
Polyolefins	★★	★★★★	★★	★★	YES	NO
Polyimides	★★★★	★★	★	★★★★	YES	YES
Axon® Flexorad™	★★★	★★★	★★★★	★★★	YES	YES



High speed data links

MADE WITH MINIATURE CONNECTORS



High-speed data links for demanding environments are communication systems designed to deliver rapid and reliable data transmission under challenging conditions, such as extreme temperatures, high levels of vibration, electromagnetic interference or hazardous environments. These links are essential in industries such as aerospace, defense, automotive and industrial automation, where **performance and safety are critical**.

These data links often employ advanced technologies such as fiber optics, ruggedized connectors and signal processing techniques to ensure robustness. They are engineered to maintain high bandwidth and low latency while withstanding environmental stresses that would compromise standard communication systems. Key design considerations include signal integrity, electromagnetic shielding and durability against physical shocks or chemical exposure.

Axon' designs high-speed links based on rugged connectors including:

- D-Sub connectors.
- Rectangular or circular Micro-D connectors (MIL-DTL-83513).
- Nano-D connectors.
- Adapted RJ45 connectors.
- Coaxial connectors.

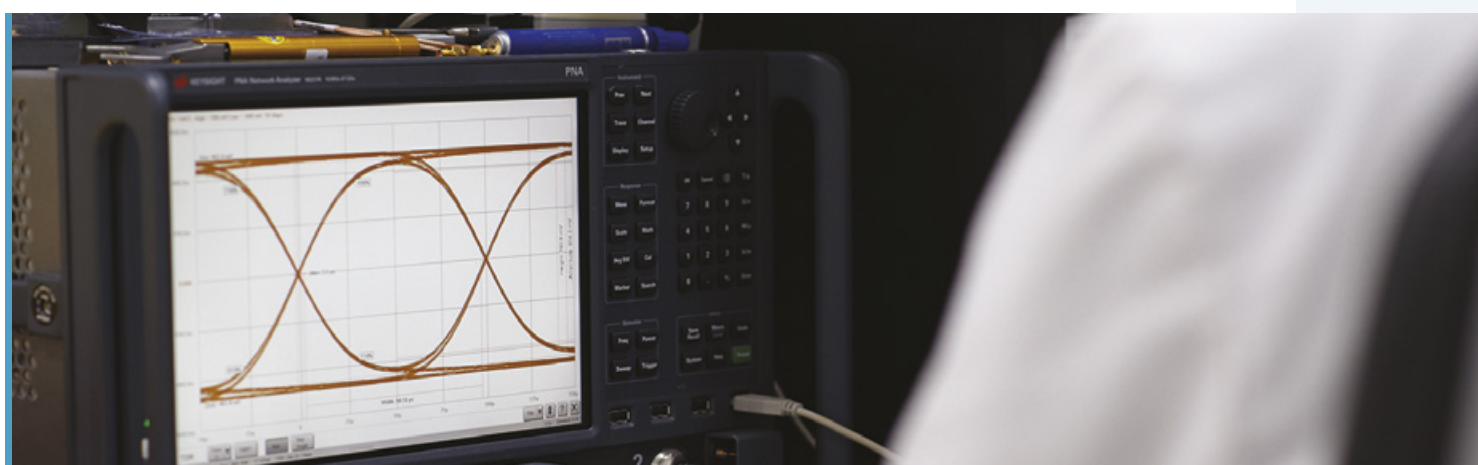
For various protocols including:

- IEEE1394 ● Ethernet/TT-Ethernet
- SpaceWire (ECSS-E-ST-50-12C)
- SpaceFibre (New ESA standard ECSS-E-ST-50-11C)
- HDMI 2
- USB2/3 ● Driver technology compatibility: Low Voltage Differential Signaling (LVDS) & Current Mode Logic (CML).



High speed & signal integrity

HIGH SPEED PROTOCOLS



WHICH AXON' SOLUTIONS FOR WHICH DATA RATE ?

DATA RATE PROTOCOL	UP TO 1MB/S	UP TO 400MB/S	UP TO 3GB/S	UP TO 10GB/S
SPACEWIRE	<ul style="list-style-type: none"> 9-WAY MICRO-D CONNECTOR (STANDARD CABLE: ESCC3902 003 VARIANT 01 & 02) OR LOW MASS CABLE (ESCC3902 004 VARIANT 01) OR MICROMACH™ CONNECTOR FOR HIGHER ELECTRICAL PERFORMANCES (XTALK/EMI/SIGNAL INTEGRITY) • 			
SPACEFIBRE, WIZARDLINK				<ul style="list-style-type: none"> AXOMACH™ & AXOMACH™ SPACEFIBRE •
TT-ETHERNET (ETHERSPACE)	MICROMACH™ (ALSO SUITED TO CAT6A AND BELOW) *			
RS 422/ RS 485 / CAN	<ul style="list-style-type: none"> D-SUB & MICRO-D CONNECTORS • 120 OHM TWISTED SHIELDED PAIRS • ESCC3902.002 VARIANT 21 TO 30 (100 OR 120 OHMS SHIELDED PAIRS) • 			
BUS 1553	<ul style="list-style-type: none"> D-SUB & ACB1 CONNECTORS • BUS COUPLERS • ACB1 TRIAXIAL CONNECTORS • 			

(*) COMPATIBLE WITH THE FOLLOWING STANDARDS: 10BASE-T/ 1000BASE-T/ 10GBASE-T/ 100BASE-TX/ 2.5GBASE-T/ 100BASE-T4/ 5GBASE-T/ ATM-25/ ATM-51/ ATM-155/ 100VG-ANYLAN/ TR-4/ TR-16 ACTIVE/ TR-16 PASSIVE



High speed & signal integrity

SpaceWire high speed data links



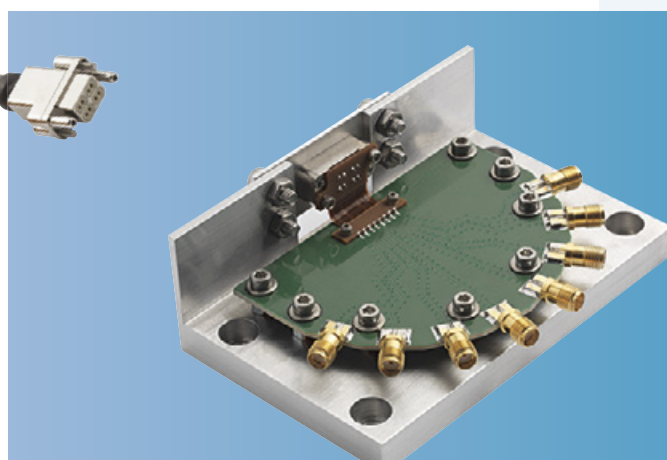
Axon supplies harnesses made from ESA QPL qualified cables and connectors for SpaceWire high-speed data links, supporting bi-directional, full-duplex transfer speeds of up to 200 Mb/s on-board spacecraft (ECSS-E-ST-50-12C Rev 1 standard) with a **proven flight heritage exceeding 20 Years**.

- Data transfer rates up to 200 Mb/s while maintaining a wide working margin.
- Integrity of LVDS (Low Voltage Differential Signalling) signals.
- Low skew, crosstalk and signal attenuation.
- Robust but flexible SpaceWire cable for easy installation.
- ESA qualified Low Mass SpaceWire cable version: 50 % lighter than the standard version.
- Radiation resistance of Low Mass SpaceWire: up to 300 Mrad.



High speed & signal integrity

MicroMach™ high speed data links

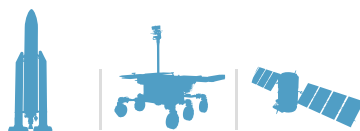


Axon's MicroMach™ high speed data links feature:

- Very close in size to the 9-way micro-D connector.
- Little additional footprint required on equipments.
- Matched 100 Ω impedance pairs: excellent continuity of signal.
- Low crosstalk between ways.
- Enjoys a robust EMC design, providing protection for both the cable and the equipment.
- 400 Mb/s bi-directional, full-duplex SpaceWire performance.
- Up to 3 Gbits/s in base band (depending on cable media type and length).
- EPPL2 listed (ESCC3409-002, ESCC3401-095, ESCC3401-096).

List of ESCC detail specifications published by ESA for MicroMach™

EQUIPMENT CONNECTOR	SAVER & ACCESSORIES	CABLE ASSEMBLY
EDGE PCB SMT WIRED PCB FLEX PCB	SAVER	CABLE MOUNT CONNECTOR + SPACEWIRE OR LOW MASS SPACEWIRE CABLES
ESCC GENERIC SPEC. 3401	ESCC GENERIC SPEC. 3401	ESCC GENERIC SPEC. 3409
ESCC DETAIL SPEC. 3401-095	ESCC DETAIL SPEC. 3401-096	ESCC DETAIL SPEC. 3409-002



High speed & signal integrity

ESA APPROVED

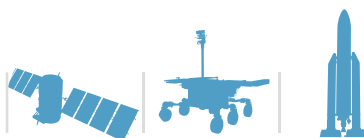
AxoMach™ high speed links



AxoMach™ high-speed links designed by Axon' are primarily used for interconnecting high-definition imagery sensors in satellites. These cable assemblies are made with low-loss microwave coaxial cables and are terminated with a full range of connector variants, including in-line male and female options, with **proven flight heritage exceeding 10 years**.

- Transmission of high data rates: from 10 Gb/s (1way) to 40 Gb/s (4 ways) in base band.
- Signal integrity improved thanks to low skew management.
- Excellent electrical performance in terms of mismatching and crosstalk.
- Excellent EMC performance.
- Space saving: about half the width of a standard SMA connector for the number of contacts.
- Condensed 2 ways AxoMach™ SpaceFibre variant (SpaceFibre protocol -ESCSS-E-ST-50-11C).
- Qualified under ESA detail specification ESCC3409/001.

AxoMach™ is ESA QPL



Power distribution

Bus bars



Bus bars and battery bars are critical components for electrical power distribution in both telecommunication satellites and land-based weapon systems. This technology, based on flat sections of aluminum, enables the transmission of **very high currents**. The flat configuration of the bus bar provides superior heat dissipation compared with circular power cable bundles. Made from aluminum alloy, bus bars allow for significant mass reduction compared with traditional cable solutions. Each bus bar is custom-designed and can be single- or multi-layered to meet the customer's specific requirements.

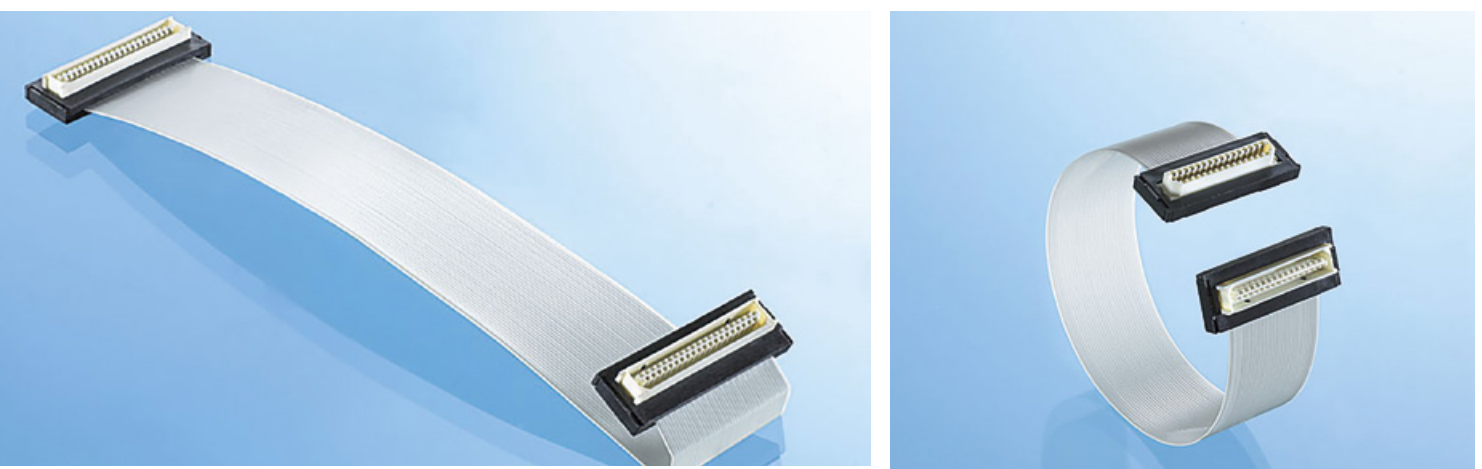
- Mass reduction vs copper solutions.
- Improved heat dissipation versus round power cable bundle.
- Significant improvement in voltage drop.
- Operating temperatures range: -35°C to +150°C.
- Resistance to cosmic radiation.
- Shielded option for specific space missions with enhanced EMI requirements.
- Single or multi-layer bus bars.
- Interconnection of bus bars with dismantlable flexible or rigid links or Versatys™ power connectors.
- Different shapes (U, E, I) and sizes depending on the application.
- Connection interface : D-sub, Versatys™, bolted (terminated lugs, dedicated threaded area).
- Wire interface: ESCC 3901.001, ESCC 3901.002, ESCC 3901.012 wires.
- Could be used with Connector Plate : dedicated power distribution box.



Weight and space saving

BOARD-TO-DISPLAY

FDC-Flat Display Connections



Designed for board-to-display interconnections, FDC-Flat Display Connections consist of Flat Flexible Cables (FFC) and connectors, including industry standard DF-9, DF-19, FI-SE and FI-X styles. Ready to plug in, they are designed for standard or high-definition displays across a wide range of applications, including consumer electronics, industrial equipment, infotainment systems and defense applications:

- Available in 0.50 mm (20 thou'), 1.00 mm (40 thou') and 1.25 mm (49 thou') pitches.
- Ready-to-plug solution.
- Space saving.
- Excellent flexlife and flexibility.
- Foldable for easy integration mounting.
- Shielded versions available.
- FFC cables can be prepared to mate with Zero or Low Insertion Force (ZIF/LIF) connectors.
- PET or polyimide insulation for different temperature requirements.



Weight and space saving

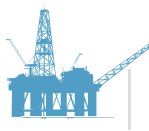
HIGH SPEED PROTOCOLS

High speed Flat Flexible Cables

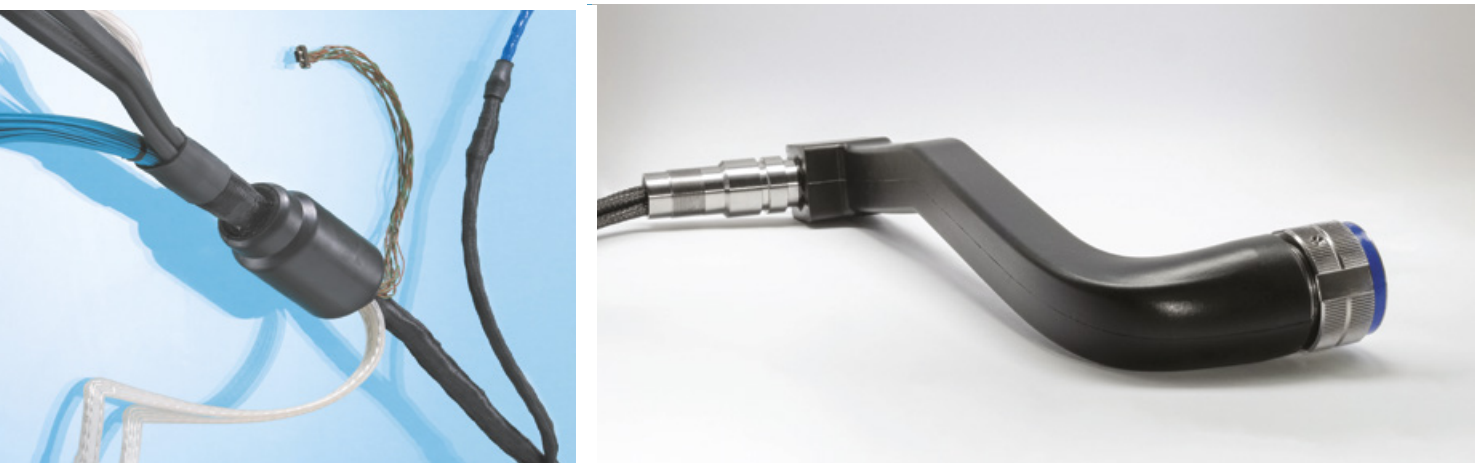


Designed for board-to-board or board-to-display connections, this range of flat flexible cables features 100 Ω cables suitable for high-speed data transmission of signals up to 2 Gbps. These high-speed flat cables are compliant with protocols including LVDS. Foldable and flexible, they are designed to connect PCBs and displays, including full HD displays, larger screens with higher resolutions, LED and 3D displays.

- Fully compliant with the LVDS protocol.
- Space saving.
- Excellent flexlife and flexibility.
- Extra-flexible versions are available for even easier integration.
- Foldable for easy integration mounting.
- Axon' flat flexible cables (FFC) are compatible with most industry-standard ZIF and LIF connectors.



Overmolded cable assemblies



From the ocean depths to outer space, components in high-reliability systems face extreme conditions. They require robust and dependable cable assemblies and harnesses capable of withstanding very harsh environments. Drawing on extensive experience in interconnect solutions, including cables, connectors and harnessing techniques, Axon' engineers optimize overmolded cable assemblies to meet the most demanding applications.

- Expertise in selecting overmolding materials and processes for perfect adhesion to both cable and connector.
- Space saving with customized overmolded cable assemblies.
- Easier integration of assemblies into the customer's system.
- Materials including PVC, thermoplastic elastomers, PU, silicone and more.
- All volumes possible, from one-off prototypes to mass manufacture.



Industrial cable assemblies

AUTOMATION AND ROBOTICS



In today's industrial landscape, robots play a pivotal role across numerous sectors. Robotic devices and cobots (collaborative robots) perform a diverse range of tasks requiring **precision and multi-axis movement**. With the integration of advanced technologies such as artificial intelligence (AI) and machine learning, the cable assemblies and interconnect solutions powering these cobots and automation systems have evolved to meet increasingly demanding requirements.

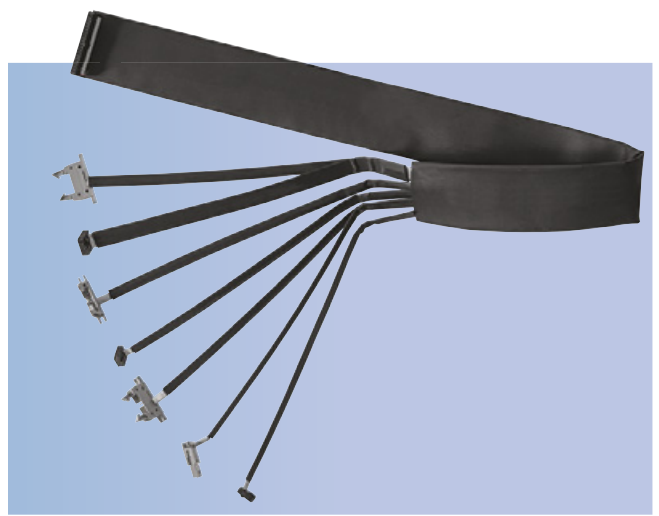
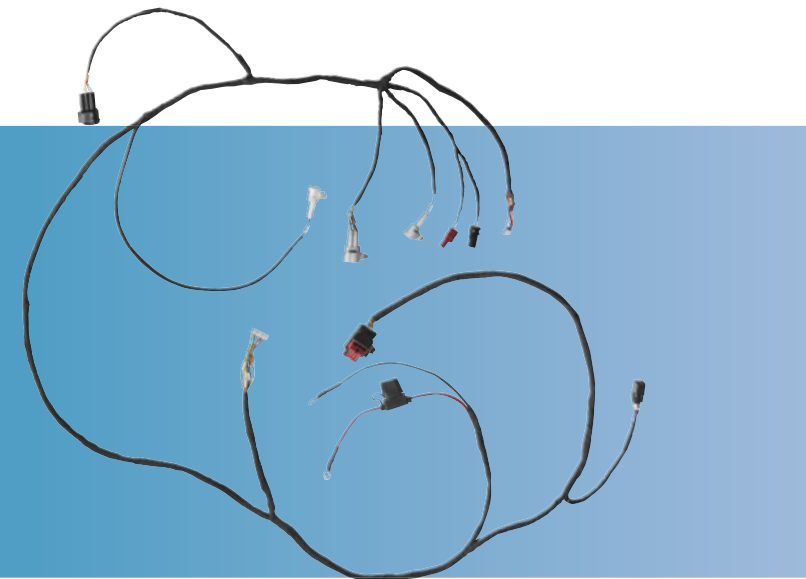
Axon' designs and manufactures custom composite cables and cable assemblies for robotics and automation systems. The design of these cables takes into account the most demanding operational constraints of automation systems:

- Exceptional flex life.
- Small bend radius.
- Flexibility and strain relief.
- **Miniaturization**: small dimensions, allowing for compact robotic arms and grabs.
- Robust and customized mechanical protection.



Industrial cable assemblies

INDUSTRIAL EQUIPMENT



Axon' offers wires, tailor-made cables, cable assemblies and connectors engineered to meet the most challenging industrial applications. Resistance to extreme temperatures, chemicals, flexibility, flex life and space-saving are all requirements that our interconnect solutions are designed to fulfil.

Axon' tailor-made cable assemblies can be specifically designed for industrial robotics and equipment used in the iron and steel industries.

- High temperature equipment wires.
- Hybrid flat or round cables.
- Custom designed composite cables.
- Harnesses connected with different types of contacts and connectors.
- Flat Flexible Cables (FFC) for dynamic applications.
- Flexible power cables.
- Hybrid cables integrating wires & tubes.



Industrial cable assemblies

WELDED CONNECTIONS



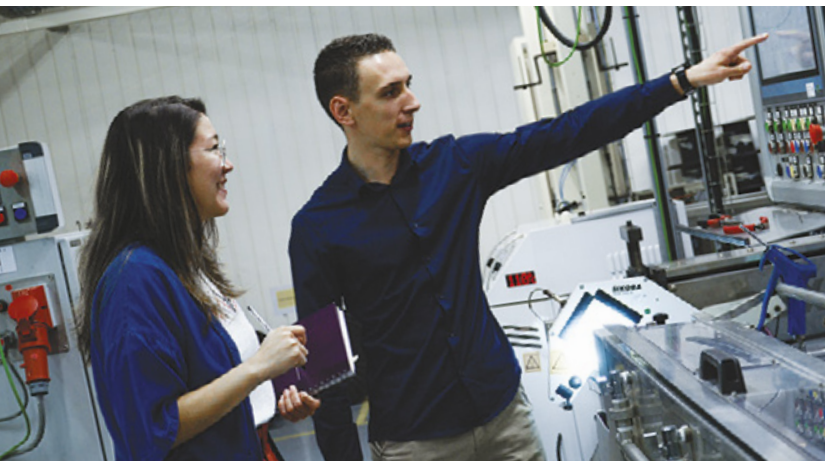
Axon' Mechatronics, part of the Axon' Group, is a renowned specialist in the development and manufacture of **industrial connectors**, offering tailor-made solutions adapted for single- or multi-stranded conductors. The company's products are particularly suited to mass manufacturing, with extensive heritage, particularly in automotive and high-volume industrial applications.

- Resistance welding, suitable for the manufacture of overmolded, watertight connectors or stitched connector terminals.
- Expertise in high volume stamping (terminals), overmolding and assembly.
- Expertise in the manufacture of machines designed to weld and test the cable/connector assembly.
- Manufacture of all-in-one pigtailed.



Custom-designed solution

VERTICAL INTEGRATION



VERTICAL INTEGRATION

- Concept
- Co-design
- 3D modelling
- Simulation
- Rapid prototyping

ENGINEERING



- Contacts
- Insert
- Potting
- Seals
- Connector shells
- Backshells
- Plating

CONNECTOR



- Conductor
- Plating
- Insulation
- Shielding

ROUND OR FLAT CABLE



- Crimping
- Soldering
- Electric, ultrasonic & Laser welding
- Potting
- Molding
- Overmolding

FINISHED HARNESS



- Automation
- Cutting
- Stripping
- Finishing





As a multi-skilled group, Axon' is able to provide custom-designed connectors & interconnect solutions to meet the most challenging requirements



THE DESIGN OF TAILOR-MADE PRODUCTS IS BASED ON:

STANDARD PRODUCTS which have been qualified and adapted to customer's needs.

EXPERTISE

in a number of areas including:

- Metallurgy.
- Plastics technology.
- Electronics.

GREY MATTER

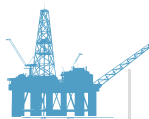
- 10% of turnover re-invested in Research & Development.
- Advanced simulation tools.

CO-ENGINEERING

- Idea and Co-Design: State-of-the-art design tools for collaborative product development.
- Evaluation and Validation of Materials or Components: Rapid prototyping using plastic or metal.
- Product and process studies, including:
 - Design of production toolstube;
 - In-house test equipment for validation of electrical, climatic, dimensional and mechanical characteristics
- Pre-series production.
- Axon' subsidiaries in Europe, the USA and Asia provide significant added value to support customers worldwide.

OPEN INNOVATION

By leveraging our space and aerospace technologies in the automotive and medical sectors, Axon' is able to offer customers innovative solutions and accelerate product development.



AXCES

AXON' COLLABORATIVE ENGINEERING SERVICE



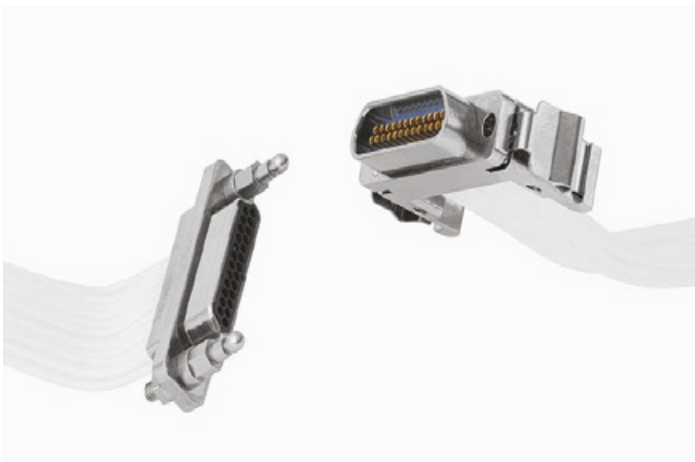
AXCES is a design engineering service offered by Axon' Cable at optimized cost. Drawing on Axon' extensive experience in **designing complex cable harness solutions** for harsh, space-constrained and high-performance environments, we can take your initial concept and assist with the design of the electronic architecture for your entire system. By allowing an interconnect solutions expert to carry out the design work for your application, your resources can be focused on other priority tasks. Leveraging our extensive experience in the design of such complex interconnect solutions, Axon' has developed advanced knowledge and capabilities, including:

- Vertical Integration (page 32).
- Interconnect techniques (page 35).
- EMI protection (page 36).
- Molding and Overmolding (page 37).
- In-house test capabilities (page 38-39).
- Worldwide support (page 40).



Expertise in interconnect techniques

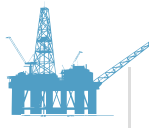
SUB-D, MICRO-D AND MORE



Vertically integrated, the Axon' Group can design and manufacture connectors for the most demanding markets, including defense, aerospace, scientific research, oil and gas exploration, automotive, industrial automation systems and robotics. With expertise in the manufacture of terminals and contacts, as well as in machining, molding, overmolding, assembly and interconnect techniques, the Axon' Group can produce both standard and custom-designed connectors **to meet your specific requirements**. Axon' connectors can be rectangular or circular, tailored to your application and produced in small or large volumes.

Axon' is able to manufacture cable assemblies terminated with:

- D-Sub, D-38999 and many other industry-standard connectors.
- Rectangular or circular Micro-D connectors (MIL-DTL-83513).
- Rectangular or circular Nano-D connectors.
- Mission-critical tailor made connectors.
- Coaxial connectors.
- Fast-locking Micro-D and Nano-D connectors.
- Miniature Versatys™ power connectors.
- Industrial connectors.



EMI protection

SHIELD AGAINST ELECTROMAGNETIC INTERFERENCE



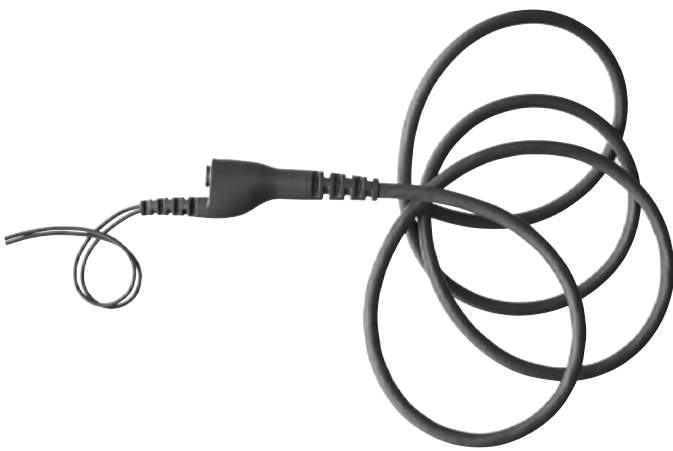
Any electronic system can both generate and be affected by electromagnetic interference (EMI). Effective shielding of wires, cables and harnesses is therefore essential.

Axon' has a **long and proven expertise in EMI** simulation and protection of cables, connectors and complete cable assemblies.

- Simulation and test tools:
 - Definition of required EMC value during the design phase,
 - Definition of cable shielding configuration,
 - Shield efficiency testing including micro-strip, and stirred mode chamber.
- Expertise in shielding techniques: helicoidal shielding, braiding, tapes for round or flat cables.
- Optimization of bundles, diameters of shielding strands, braiding angles.
- Synthetic or glass fibre for mechanical protection.
- Overbraiding of branches with a continuous shielding.



Molding and overmolding

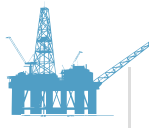


Experts in plastic injection, molding & overmolding:

- Elastomer parts (for example seals for connectors)
- Compression molding
 - transfer molding,
 - injection molding.
- Plastic injections include micro-miniature parts in a wide range of materials: ABS/PC, PA, PBT, PPS, LCP, PPS, PEEK, PSU, POM.
- Expertise in different technologies: hot melt, low pressure, high pressure.
- Molding & overmolding of metal, plastic & composite parts including micro-miniature parts.

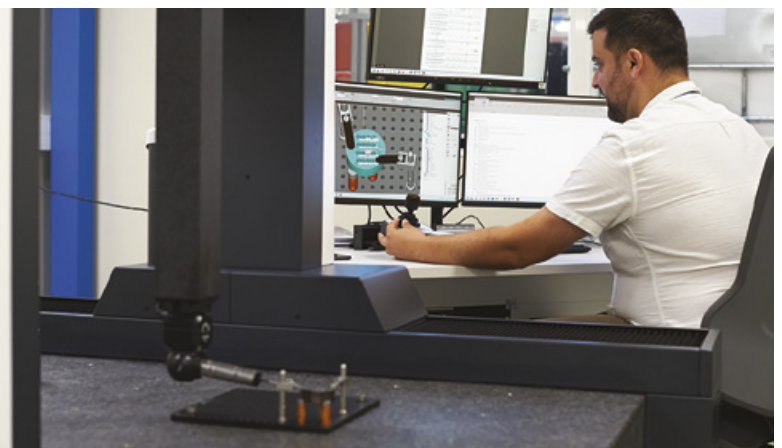
OVERMOLDING: for an optimal protection

One of the primary purposes of the overmolding process is **to bond and seal together** a set of components. This operation should preserve, and even enhance, the initial properties of the assembly, such as resistance to abrasion, shock, radiation, chemicals, temperature and moisture ingress. To ensure strong adhesion, it is critical to select compatible materials: the more compatible the molecular chains, the stronger the resulting bond.



Proving and Validation Labs

"THE PROOF IS IN THE PUDDING"



Because connectors and interconnect solutions often face demanding conditions, Axon' uses a wide range of in-house equipment to ensure its products perform reliably in the most challenging environments.

For specific requirements, our Process Development teams can also **design bespoke equipment and test benches** in partnership with our customers.

PHYSICAL CHARACTERISTICS

- Meniscograph (IEC 38-2-69) to check solderability of cables and components.
- Scanning Electron Microscope (SEM).
- Differential Scanning Calorimeter (DSC): measurement of heat flux under temperature variations.
- X-Ray Radiography, with optional Computed Tomography if needed.
- Magneticity test.
- Fourier Transform Infra-Red Spectrometry (FTIR).
- Dynamic Mechanical Analysis (DMA).

MECHANICAL CHARACTERISTICS

- Resistance to shock, combined flex/torsion, folding, winding, unwinding.
- Resistance to flexlife.
- Vibration chamber and combined vibration & environmental "shake and bake" tests.
- Tensile strength.



Proving and Validation Labs



CHEMICAL CHARACTERISTICS

- Resistance to oils, decontaminants, sterilization, solvents.

ELECTRICAL CHARACTERISTICS

- Test benches to check continuity, insulation resistance, dielectric strength linear resistance, capacitance, inductance, attenuation, VSWR, crosstalk, intermodulation, filtering performance.
- Test benches for MIL-STD-1553 data bus products.
- Transfer impedance test benches
- Network analyzer to check insertion loss, return loss, phase matching up to 110 GHz.
- High-voltage tests including Faraday chamber.

- Mode stirred chamber.
- Eye pattern test bench.
- Bit error rate (BER) tester.
- Time Domain Reflectometer (TDR).
- High power supply up to 1000A.
- Partial Discharge tester for high-voltage testing.

ENVIRONMENTAL CHARACTERISTICS

- Resistance to salt spray, thermal shock, autoclaving, accelerated ageing, humidity.
- Resistance to flame.
- Hermeticity test for hermetic connectors and seals.
- 500 bars high pressure water test bench.
- Thermal infrared cameras.



A worldwide presence



**The Axon' Group
has developed and
manufactured cables
& interconnect
solutions for high
tech electronics
since 1965**

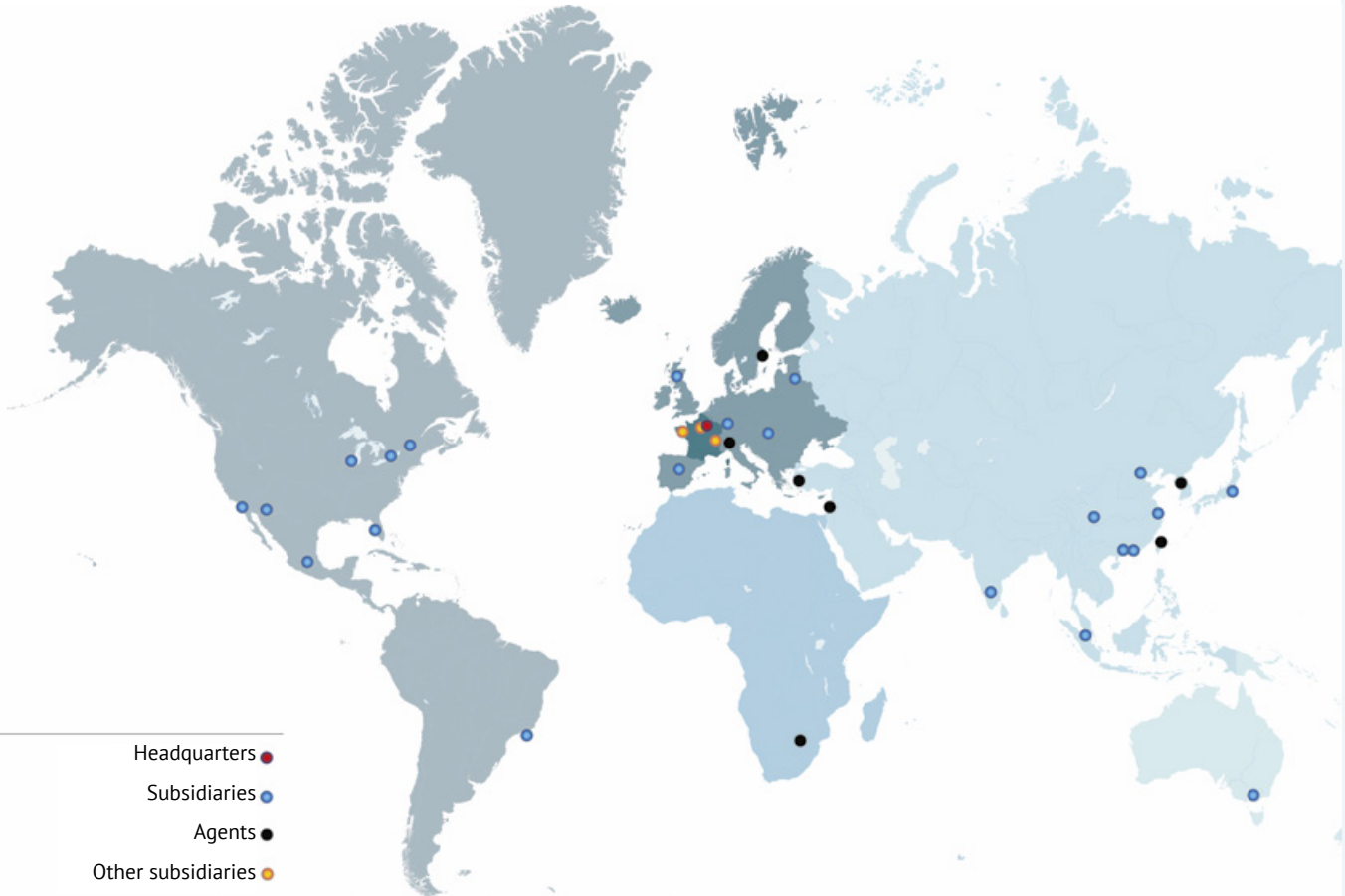
From its early origins in the '60s manufacturing high-temperature insulated wires, Axon' Cable, over the years, has significantly expanded its expertise to provide comprehensive solutions to customers.

- Design and manufacture of wires, cable assemblies, custom-designed connectors with **Axon' Cable**.
- Design and manufacture of metal-plastic parts and components with **Axon' Mechatronics** and **Axon' Nanotec**.
- Design and manufacture of elastomeric components with **Addix**.





AXON' IS CLOSER THAN YOU THINK !



Axon' has significant
global reach, with

25+

subsidiaries and
trusted partner locations
worldwide



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