Custom designed **solutions**

FROM ASSEMBLIES TO MINI SYSTEMS

EXPERTISE IN ASSEMBLIES FOR ADVANCED TECHNOLOGIES

With a wealth of experience in cable, interconnect systems and mechanical components, and employing state-of-the-art CAD models and simulation software, the engineering teams at AXON' can design and develop complete mini-systems starting from the customer's overall requirements specification.

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

When the customer requirements are complex or unique, multi-skilled project teams including Research & Development, Design, Purchasing, Sales, Production and Quality are created to comprehensively control the different phases of the project from initial prototype phase to mass production.

Assemblies and mini-systems can be produced in custom manufacturing cells dedicated either to product families or to specific customer projects. These manufacturing cells can be replicated in a number of sites around the world for optimum effect in terms of proximity to the customer, production capacity or cost of manpower.

▲ COLLABORATIVE ENGINEERING

Custom designed solutions

OUR HARNESSING CAPABILITIES

From around 1985 onwards, Axon' has been assembling micro-D connectors in all their forms: PCB, pigtails, savers, strips, solder cup and complex multi-branched harnesses, designed for the most challenging of environments.
As a result, Axon' has gained a wealth of experience in the termination of single wires and composite cables into a wide range of circular, rectangular and micro-D connectors.

- From 22 AWG to 40 AWG wires, twisted pairs, shielded wires and cables with standard conductors (7 or 19 strands) or ultra flexible conductors (37 to 140 strands).

- From 12 AWG to 20 AWG wires using power contacts

- With different standard coaxial (RG) and microwave coaxial cables.

- Use of
  - Mechanical, thermal and laser strippers, along with manual and semi-automatic crimpers
  - 2D or 3D cabling boards to guarantee the repeatability of harness dimensions and characteristics
  - Comprehensive potting and overmoulding facilities:
    - Large range of moulds
    - Computer controlled ovens to guarantee curing.
    - High pressure injection presses for moulded strain reliefs.
  - Overbraiding machines to provide mechanical or EMI protection of the harnesses
  - Various different marking capabilities:
    - Wet ink marking on connectors
    - Laser marking on connectors
    - Label marking (for connectors, wires and cables)
    - Heatshrink tubing identification on cables and wires.
  - A range of soldering capabilities including specific machines
    - Hot bar soldering machine
    - Phase vapour machine
    - Joule effect soldering
  - Automated test equipment (ATE) for efficient electrical testing with specific test jigs developed by our process engineers.
    - Continuity, net resistance (4 wires), insulation resistance, dielectric strength, capacitance, linear resistance.
    - Filter attenuation according to frequency (up to 1 GHz)
    - Network analyzer to verify insertion loss, return loss, phase matching.
    - Different transfer impedance test benches (EMI characteristics)
  - Class 100,000 (Federal standard 6.5 or ISO14644-8) clean rooms and laminar flow to manufacture in a controlled environment with validated operators.

- Manufacturing sites in different countries for effective local support:
USA, Mexico, France, UK, Latvia, Hungary, China, India

▲ LASER STRIPPING MACHINE

▲ THE INTERCONNECT DEPARTMENT

▲ 2D CABLING BOARD

Custom designed **solutions**

TECHNICAL SOLUTIONS FOR ASSEMBLIES

When designing ruggedised systems for harsh or demanding environments, commonly with severe or extreme operating conditions, the available space is often very limited. This in turn makes for challenging routing for the system interconnect, making very small bend radii a pre-requesite for the wires or cables. Where this is the case, highly flexible wires and cables can greatly ease mechanical installation and resulting interconnect life.
To meet these requirements AXON' can build complete interconnect systems using a proprietary range of highly flexible multi-conductor wires and cables called Flexible Wires (FW).

AXON's in-house conductor design and manufacture makes it possible to produce, as standard, FW conductors with up to 120 strands of either 25 µm (1 thou) or 50 µm (2 thou) diameter, in comparison to typical 7 or 19 strand conductors. Silver plated copper or high strength copper alloy conductors ensure that the AXON' FW cables are able to consistently meet high performance standards in applications where flexibility and flexlife are critical.

FW cables are available in various configurations including singles, twisted pairs and shielded composite versions, all of them made with high quality conductors and insulating materials in compliance with RoHS requirements.

The AXON' FW cables can also be integrated inside larger bundles of different wires and cables including signal, power, RF and optical fibres.

▲ MICRO-D MULTIBRANCH HARNESSES

▲ PLASTIC STRIP CONNECTOR MULTIBRANCH HARNESS

▲ FLEXIBLE WIRES INTEGRATED INTO A COMPLEX ASSEMBLY

OVERMOULDING EXPERTISE

DESIGN

AXON's long experience in mould design enables us to offer custom designed moulding and overmoulding, individually tailored to each assembly.

The AXON' Engineering teams use powerful 3D modelling software to rapidly create custom mould designs to fit perfectly within the customer's available space constraints. AXON' can equally work with and process customer's own CAD files in order to optimise the assembly and mould designs through concurrent engineering.

WHY OVERMOULD ?

Overmoulding provides robust and tailor-made mechanical protection for the cable/connector interface which is generally the weakest part of any harness or assembly.

In addition to mechanical protection and strain relief, an overmould can serve many other purposes : shaping, direction change, airtightness, absorption of repeated flexes, provision of fixing points, chemical resistance, protection of shielding termination and improvement of the overall look of the harness.

▲ SILICONE OVERMOULDING

▲ MOULD DESIGN

▲ CUSTOM MOULDED CURVED SHAPE OVER 2 MICRO-D CONNECTORS

OVERMOULDING TECHNIQUES

AXON' can offer several overmoulding techniques to suit customer requirements.

LOW PRESSURE

Low pressure moulding is the technique which consists of injecting a connector cavity with a specific material (e.g. PUR, Epoxy, Silicone) enabling simple potting and the formation of complex shapes. The process involves hot or cold curing to transform a mono or bi-compound material from a viscous to a solid state.
This technique does not entail high pressure in mould cavities and is suitable for small volumes.

HOT MELT

Certain resins become highly viscous when heated and coagulate very quickly as soon as the injected material comes into contact with any components inside the mould, such as wires, cables, metal or plastic parts or connectors.
Manufacturing cycles are therefore very short which make this method suitable for medium and large volumes.
Hot Melt resins can be used alone as a protective part but are often used as pre-protection in conjunction with external high pressure overmoulding.

HIGH PRESSURE

This is the most common overmoulding technique :
Melted material is used to fill a shaped mould which is then cooled, thereby quickly covering and protecting with "required elements". Material temperature, injection speed and pressure in the mould are all high. This method is therefore not appropriate for fragile parts.
This type of moulding method requires specialist machines. AXON' has a large number of vertical injection press machines which allow for easy placement of the different component parts into the mould cavities.
As manufacturing cycles are short, the high pressure technique is suitable for medium and large volumes.

AXON' has expertise in all these overmoulding techniques and can offer a large range of technical solutions to meet customer requirements.

▲ HIGH PRESSURE OVERMOULDING

▲ HOTMELT OVERMOULDING

▲ HIGH PRESSURE OVERMOULDING STRAIN RELIEF ON CIRCULAR 5 WAY MICRO-D CONNECTOR

Custom designed **solutions**

SILFORM®
CABLES & ASSEMBLIES

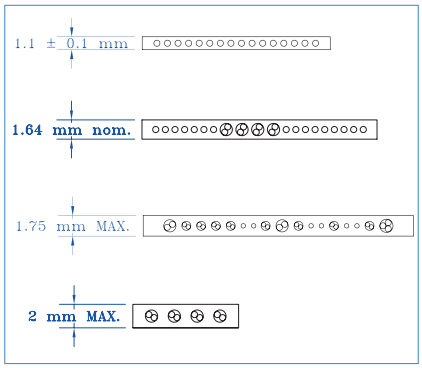
Silicone covered flat cables (SILFORM®) in either straight or shaped form are the result of a combination of a range of AXON' technologies : highly flexible conductors, fine wires and AXON's expertise in the processing of silicone and elastomeric compounds.

SILFORM® cables represent an ideal solution for technically demanding applications requiring high cabling densities along with severe mechanical and environmental restrictions, all within a flat construction.

SILFORM® cables and assemblies can be custom designed to incorporate a wide range of elements including RF cables, mouldings and EMI shielding.

EXTREMELY FLEXIBLE WIRES

- Very high stranded conductors in silver plated copper and copper alloys.
- High flexibility for easy installation (FW product range) and long flexlife (LFW product range).
- Fine braided shields with silver plated copper alloy strands as small as 52 AWG.
- Ultra-thin, high performance fluoropolymer extrusions.
- 26 AWG to 36 AWG.



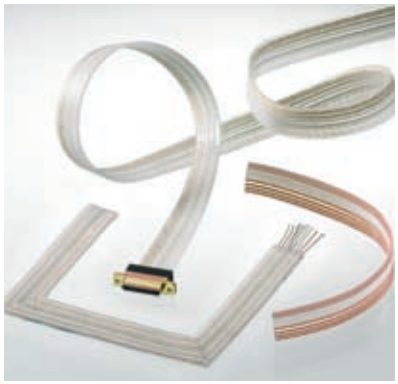
▲ EXAMPLES OF CONSTRUCTION

CONSTRUCTION

- Low shore (20 to 60 shA) silicone in straight or shaped forms.
- Controlled impedance (100 ohms for example).
- Application-specific constructions.
- Integrated wires, shielded bundles, databus, RF, fibre optics, high speed.
- Silicon thickness 0.7 mm.

MINIATURISED ASSEMBLIES

- High quality crimped terminations of wires as small as 36 AWG.
- Automated stripping (rotary blades, laser or mechanical).
- Micro-D and Nano-D connector termination, also other styles of circular and rectangular connectors are possible.
- Low and high pressure moulding/overmoulding at rear of connector.
- EMI termination (backshells, conductive potting, direct shield termination).
- Straight lengths up to 1.5 m max



▲ STRAIGHT OR SHAPED FLAT SILICONE CABLES

▲ OVERMOULDED SILFORM® MICRO-D ASSEMBLY

Custom designed **solutions**

MINI SYSTEMS : COMPLETE SOLUTIONS

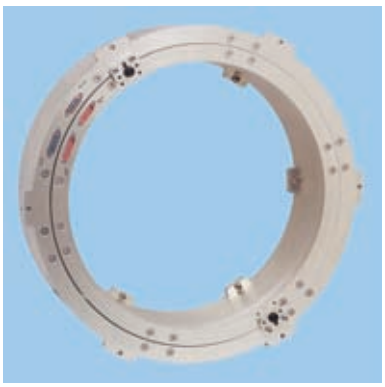
TWIST CAPSULE

AXON' is able to offer custom designed twist capsules (AXOTWIST™) which can rotate freely to defined limits, using our SILFORM® composite cables. Silicone covered flat cables in a "fold-back" configuration are placed between two metal rings which can rotate with respect to one another.
With a huge variety of cable compositions, the AXOTWIST™ system maintains exceptionally low torque and high flexlife within a restricted space.
AXON' has long experience in manufacturing clockspring rotary connectors with flat flexible cables for automotive airbag systems. The company draws on this experience to offer dedicated solutions for the defence and aerospace industries.

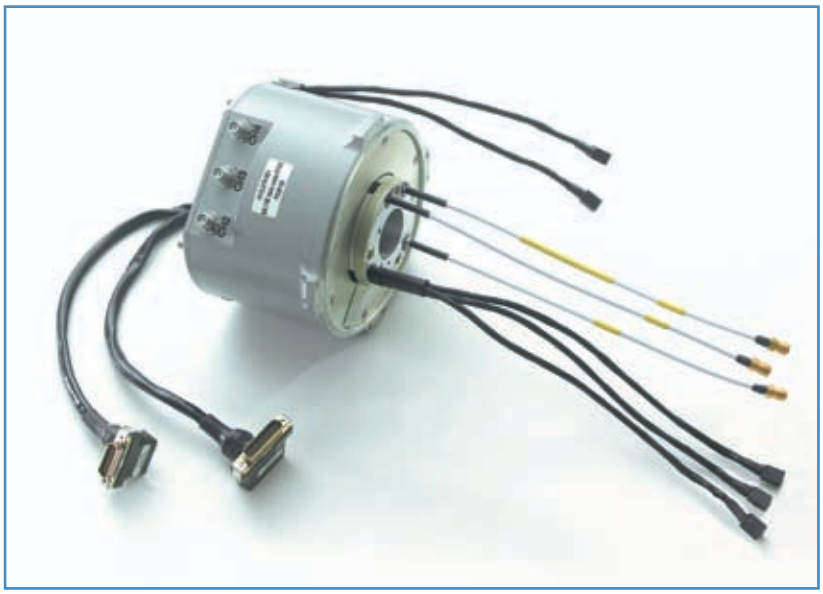
CONNECTORS WITH EXTRA FUNCTIONALITY

Within the micro-D, or indeed any other connector, AXON' can integrate electronic components in order to perform specific functions.
Examples include :
- line-by-line signal filtering to exclude all "noise" outside a given frequency range,
- the inclusion of RFID tags to provide valuable identification data to the manufacturer, the customer or end user,
- or other specific components as required.

Any such components are fully encapsulated in either potting or overmoulding in order to withstand severe operational conditions such as high levels of vibration or shock.



▲ AXOTWIST ™



▲ TWIST CAPSULE