


CABLING NETWORK ENGINEERING



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The problem :

THE BODIES OF THE VEHICLES (PLANES, SATELLITES, HELICOPTERS, CARS) ARE MORE AND MORE COMPOSITE AND NOT ANYMORE IN METAL..

- It modifies all the traditional rules in terms of cable network :
- How to fix the cables, where to fix them ?
 - Quid about electromagnetic interferences usually eliminated by the metal frame ? Quid about those received by the cables ? from those emitted by the cables ?
 - How to do the earth return ?

THE VEHICLES INCORPORATE MORE AND MORE ELECTRONIC DEVICES (SENSORS, DISPLAYS, NAVIGATORS,...) INCLUDING WIRELESS EQUIPMENTS (UNDER VARIOUS WIFI, ZIGBEE, BLUETOOTH® PROTOCOLS,...)

- How to face the proliferation of number of cables ?
- How to distribute the increasing needs of energy without losses by Joule effect and without overloading the vehicle ?

THE CLIENTS WANT THEIR VEHICLES TO BE EQUIPPED FOLLOWING THEIR OWN PARTICULAR NEEDS

- How to face the multitude of cable networks versions ?

“FLY BY WIRE”, “DRIVE BY WIRE” : ALL MECHANICAL AND HYDRAULIC CONTROLS TEND TO BE REPLACED BY ELECTRICAL APPLIANCES

- How to ensure that «electrification» of the vehicle vital parts is safe ?

TO ACCELERATE THE LAUNCHING OF NEW VEHICLES ON THE MARKET, THE DEVELOPMENT IS DIVIDED INTO SEVERAL TEAMS SPREAD OUT WORLDWIDE.

- How to elaborate a unified digital mock up between all these teams ?

“AFTER-SALES”: TO AVOID THE USUAL CYCLICAL TYPE OF SALES OF THE PRODUCTS, VEHICLE’S MANUFACTURERS TRY TO OFFER SERVICES TO THEIR CUSTOMERS (MAINTENANCE, VEHICLES’ FLEET MANAGEMENT,...) BECAUSE THESE SERVICES ARE CONTRACT CYCLES.

- How to offer high value-added after-sales services ?

The need

Up to now, the cabling of a vehicle had no interest whatsoever for the Managing Director of any company, nor the Divisions Managers, as the cabling network was really studied last thing and rather quickly during the development of a new vehicle.

But, the appearance of composite materials and their integration in the new vehicles made the cable networks become a real “dreadful” problem when it is treated at the end of the conception of the vehicle. Thus, the recent creation of **cabling network Engineering Team** at the vehicle’s conception stage.

AXON’ has a long and varied experience in the most sophisticated cable network techniques and can offer to optimise their clients cable network Engineering.





How and where to fix the cables ?

SOLUTION TRACKS

Miniaturised cables and connectors, choose flat cables.

Miniature cables

- coaxials, pairs, miniaturisation material : CELLOFLON®.



LOW LOSS COAXIAL INTERCONNECT FOR WIRELESS TRANSMISSION



Miniature connectors

- Micro-D, Nano-D, Bus.

SILFORM® FLAT CABLE

Choose flat cables to fix to the sides and fix them over the floors and ceilings.

- Flat Flexible Cables FFC,
- FFC-LVDS for flat displays,
- FFC AXOLINE® for longer distances,
- SILFORM® flat cable for flexibility and resistance,
- PTFE flat cables for specific performances and special environments.

FFC AXOLINE®



Quid about electromagnetic interferences ?

SOLUTION TRACKS

Shielding and measurement of transfer impedance

To shield cables

AXON' has realized simulation softwares in order to predict the cables shield efficiency (following the construction materials, constructions,...) and has developed tests benches to measure the shield efficiency with transfer impedance Z_T .



STIRRED MODE CHAMBER

MEASURE OF EMC



To ensure the right compatibility between connector, cable and shield termination

The interconnection cable-connector is generally a weak point in EMC. AXON' has tested and measured all interconnect systems (Welding, magneto-forming, memory shape alloy,...) and propose the best technical solutions (AXOCLAMP®, ...).

AXOCLAMP® SHIELD TERMINATION





How to face the proliferation of number of cables ?

axon

SOLUTION TRACKS

Use a network wiring, high data rate.

Cabling network

AXON' has developed a very high expertise concerning cable networks : Bus 1553, Ethernet, ATM, CAN,...



MINIATURISED BUS COUPLER

Scope of our network expertise

AXON' expertise covers the network study and modelling, the production of components (couplers, cables, connectors,...) and even installation as we have also developed a portable test device (1553 test bench,...)

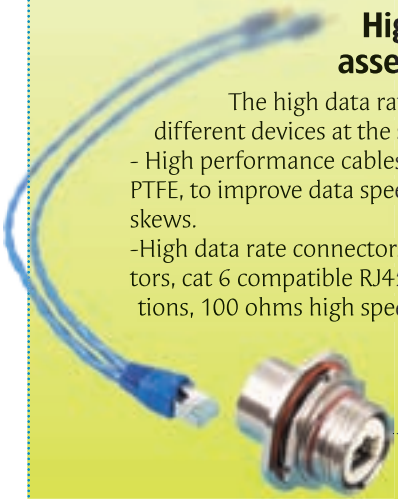


EYE PATTERN MEASUREMENT

High data rate cable assembly

The high data rate allows the control of many different devices at the same time.

- High performance cables, for instance porous PTFE, to improve data speed and reduce the skews.
- High data rate connectors, for example Ethernet connectors, cat 6 compatible RJ45 adapted to multimedia applications, 100 ohms high speed micro-D connectors.



ETHERNET CONNECTOR

How to distribute the increasing needs of energy without loss by Joule effect and without overloading the vehicle ?

axon

SOLUTION TRACKS

Use a bus bar technique designed for space industry, and use aluminium cables.

Space bus bar technique

AXON' has developed a bus bar technique specially designed for satellites, applicable for other types of vehicles storing energy in batteries. This solution decreases the losses induced by Joule effect and reduces the weight of energy distribution

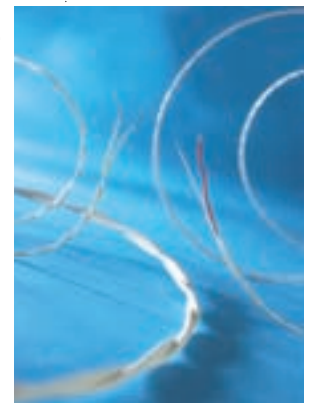


BUS BAR TECHNIQUE

Aluminium cables

AXON' has developed silver plated aluminium conductors for satellites, used by other types of vehicles to reduce weight.

AXALU® ALUMINIUM CABLE





• How to face the multitude of cabling versions?



SOLUTION TRACKS

Create a complete range of connectors

A complete range of cables

AXON' has developed for some of its clients ranges of cables, including a limited number of cables but totally covering the requested needs. For example KZT which became a standard since the first drawings made by AXON'



KZT CABLES



BUS CONNECTOR

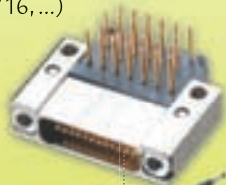
A complete range of connectors

AXON' has developed several range of connectors inter-matching connectors of the market such as :

- Bus 1553 range
- Micro-D and Nano-D range
- FR connectors range (SMA, N, TNC,7/16,...)



RANGE OF RF CONNECTORS



NANO-D CONNECTORS



How to ensure that "electrification" of the vital parts of the vehicle is safe?



SOLUTION TRACKS

Use recognised standards, choose shielded and reliable components.

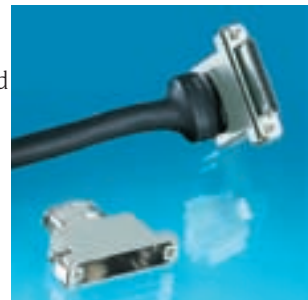
Recognised standards

Amongst approved networks standards, some are more recognised than others : 1553 Bus, ATM Bus, ...



Shielded components

Any AXON' components can be shielded and tested against Electromagnetic Interferences.



EMI BACKSHELL

Reliable components

AXON' advises very reliable "on-board" connectors, ie Micro-D "twist-pin" contacts.



MICRO-D SCREENED TERMINATION

Expertise in plastics technology

- Custom designed solutions for mechanical protection of the cable/connector interface : shaping, airtightness, mechanical strength, chemical resistance, protection of shielding termination, etc ...
- Mould design and overmoulding techniques : low pressure, hot melt, high pressure.
- Potting.



RoHS Components

All AXON' products including pigments (Colouration, laser marking, ...) inside our plastics, conform to RoHS standard.



How to elaborate a unified digital mock up for a collaborative development?

SOLUTION TRACKS

3D drawings, collaborative engineering, professional videoconferencing between engineers.

3D neutral format drawings

AXON' has chosen to use the best-known CAD software on the market (AUTOCAD, INVENTOR,...) and IGES communication interfaces to the CAD of it's clients (CATIA,...).

Collaborative platform

AXON' uses a collaborative and secure PTC platform which can be used for free by all clients and suppliers, upon simple request from an AXON' engineer.

Professional videoconferencing

All AXON' companies and engineers are equipped with a videoconferencing software. Available for all clients and suppliers on AXON' website for free. Moreover, our sister company Sofim has developed WiFi access points, connected to RJ45 socket allowing all participants on a meeting to connect to internet.



WIFI ACCESS POINT

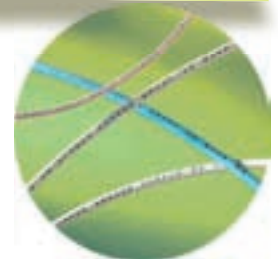
How to offer high value-added after-sales services ?

SOLUTION TRACKS

Easy products maintenance and follow up with products marking, harnesses RFID tattoos, test reports and tracking digital files.

Cabling and connector marking

AXON' has many means of marking cables and connectors. For example, cables jackets contain pigments marked with excimere UV laser allowing the writing of even very small characters and symbols by changing the colour of the jacket without burning, thus without damaging the jacket



CABLE AND CONNECTOR MARKING

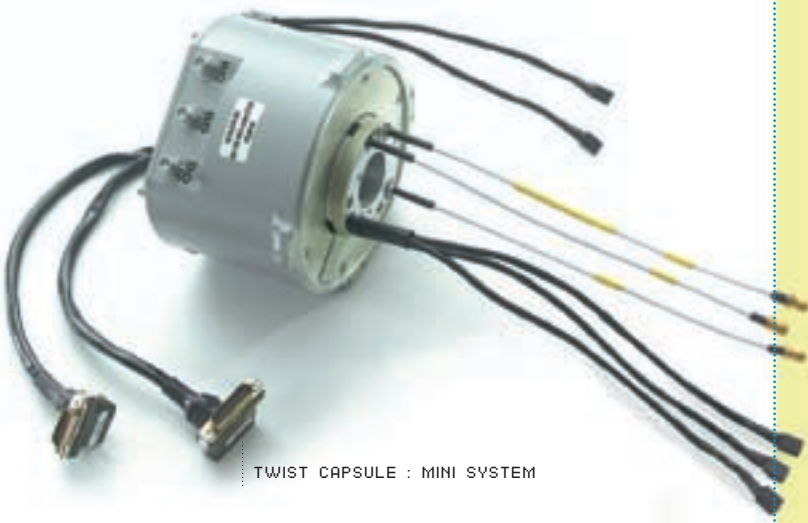
Harnesses RFID tattoos

RFID tattoos of harnesses has the main advantage of rewriting information at every stage of maintenance which can be consulted during several decennials, at any place of maintenance, in Mexico for instance, or even in India.



Test reports digital files

AXON' can provide a digital file gathering all tests results of a harness and can supply or keep to your disposal a digital tracking file.



TWIST CAPSULE : MINI SYSTEM

Examples of cabling network engineering

AXON' has been part of many projects in cabling network engineering, from which we present a few examples below :

The twist capsule

Aeromil version of a switch rotary connector of the airbag situated under the steering wheel of a car.

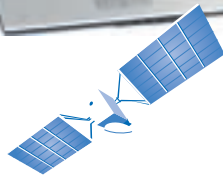
Wireless cabling of a laptop

allowing High Data WiFi in keeping Flexibility of the display screen.



Modelling of a satellite

the optimisation of the best cable network tracks.



Miniature cable networks

MICRO-D ASSEMBLY



3D HARNESSES MEASUREMENT TEST



Expertise in interconnect solutions

AXON' CABLE, the manufacturer of wires, cables and harnesses for advanced technologies, offers complete interconnect solutions for a wide range of applications.

AXON' CABLE has brought its expertise in the manufacture of precision conductors, wires and cables together with its knowledge of overmoulding techniques and EMI protection to be able to offer solutions suited to customer requirements.

AXON' Interconnect Department offers specialised skills in the termination of single, hybrid, round or flat cables with different types of connectors irrespective of the application.

With 10% of its turnover invested in Research, Innovation & Development and its patents, AXON' can offer complete solutions for high tech applications.

Quality Assurance

- ISO 9001 / 2000
- ISO 14001
- EN 9100 / AS 9100
- ISO/ TS 16949
- ISO 18000 in process

Axon' in brief

- Headquarters : Montmirail (France)
- 1965 : established
- 2 000 employees
- 3 000 customers
- 30 000 products
- 15 factories





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AXON' AGENT

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