

New cable family for power and data connection in HARSH environment

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From September 5th 2008, the wiring connection has been considered as a System with the introduction of the new EWIS regulation ! CS 25 -EWIS

EWIS = Electrical Wiring Interconnection System applied for the first time on A350

With such new regulation, the cables will be considered as a major part of the system they are supplying : power and data. The failure mode of these components will be included in the complete failure mode of the corresponding system .

It defines the reliability of this system :Fuel System for instance .

In addition ,all the new airplanes(A380, B787, A350 ,COMAC C919....) are fully electrically controlled (Fly By Wire) and there is no more any mechanical back up on aircraft like on A320 to recover the complete loss of the electrical system .

To save weight, several major evolutions have been defined like:

- Aluminum cables in small gauge down to gauge # 24 (A380 and A350)
- Double AC voltage (230 VAC) for the generators and equipments (B787 & A350)
- Introduction of High Voltage DC (+/- 270 VDC) (B787)

These new technologies and these high voltages (AC & DC) can produce Partial Discharges in the insulation and CORONA Effect on the surface of this insulation destroying more or less quickly the dielectric of this insulation.

In addition the recent introduction of Power Electronic brings a new control principle named PWM (Pulse Wave Modulation) with very sharp voltage escalation on the cables connecting the Power Electronic module to the equipment supplied by this source .

That means a lot of EMI (Electromagnetic interferences) due to very high Dv/Dt on the connecting line or inside the winding and the necessity to introduce filters taking volume ,adding weight and reducing the reliability of the concerned system .

To reduce the volume and the weight of these filters, a new design of cable is being studied to incorporate all along the cable some ferrites or new capacitive components inside the insulation in order to use the cable not only for transmitting power but also to act as a filter and to avoid very severe interferences with the others cables of other systems

That means to reconsider the new cable construction and new type of insulation to match with these new constraints in addition to the arc tracking resistance which is always a major type of failure with any cable today!!!