

OPTICAL HARNESS:

Following the Second World War and until the seventies a lot of effort has been devoted in developing commercial and military transport platforms: air-based, ground-based and sea-based. The rate of development was very steep, for example, over one decade more than ten types of new fighter airplanes were developed, with similar rates in helicopters, passenger planes and passenger airplanes.

The main effort was in developing the platform and a lot of knowledge was accumulated in aerodynamics, metallurgy and propulsion. The highest priority challenges were increasing range of flight, the weight of the bombs and their number, increasing the air speed and especially the maneuverability of the airplanes.

In the eighties, the development of fighter airplanes and freight airplanes ceased almost completely. In fact, over the last 25 years only a few aircraft types were developed, including helicopters and attack helicopters.

At the same time, the first signs of computer technology started appearing, the control of information grew to what was later called "The Information Revolution". In fact, most of the effort was devoted to developing avionics systems in the existing platforms. The aircraft were equipped with more and more computer-based systems:

1. Command and control of the platform
2. Display systems for the pilot
3. Display systems for the pilot's helmet
4. Systems for managing weapons
5. Electronic warfare and defense
6. Radar systems
7. Long range observation systems
8. Lasers systems
9. Operation systems for "smart weapons"
10. Navigation systems
11. Audio, video and data communication between platforms and communication with command and control centers

As a result, a shortage of empty spaces for black boxes in the platform was created and communication cables were added in the aircraft. Tens of kilometers of copper cables are scattered all over the aircraft for communication and interconnecting black boxes on airplanes, between power systems and sensors.

The number of black boxes on fighter airplanes and helicopters, for example, in the sixties was 3-10 (depending on the aircraft). Today the number of black boxes on fighter airplanes is about 25 and on helicopters about 30. Currently, the volume these cables occupy is 25-30% of the available volume dedicated for avionics. The average weight of the wiring harnesses on an airplane is about 60-80 kg (150-200 kg in helicopters) and constitutes 25-30% of the total weight of the avionics systems in the airplanes. The average price of the wiring harnesses on a single aircraft is between \$100k and \$300k.

Weight problems on aircraft are even more critical on helicopters and especially small attack helicopters. These are already constrained in the amount of fuel and equipment they can carry and therefore any weight savings are very important. Recently, the UAV market has been developing at a rapid pace. These platforms are very small and it is crucial to have free space and weight available to carry fuel and useful equipment. DPG has the capability to replace the copper wiring harnesses with fiber optics while using unique technologies. The design of these harnesses will be based on new principles, but will utilize available commercial off the shelf components for the optical transmission of data and RF signals. It will also be designed in way that will yield significant weight and volume savings of about 30%-50%.

DPG's revolutionary technology will enable the development of an optical harness with the following characteristics:

1. Reduced harness weight (up to 50%)
2. Increased bandwidth for high data rate transmission
3. Multiple signals and formats (video, RF, data, control, etc.)
4. Immunity to electromagnetic interference
5. Greater flexibility in routing and bending of the cable inside the platform even in densely packed spaces (because of the fibers' greater flexibility relative to copper cables)
6. Simple reconfiguration and upgrade (no need to replace entire harness)
7. Improved reliability and simpler maintenance of the harnesses