



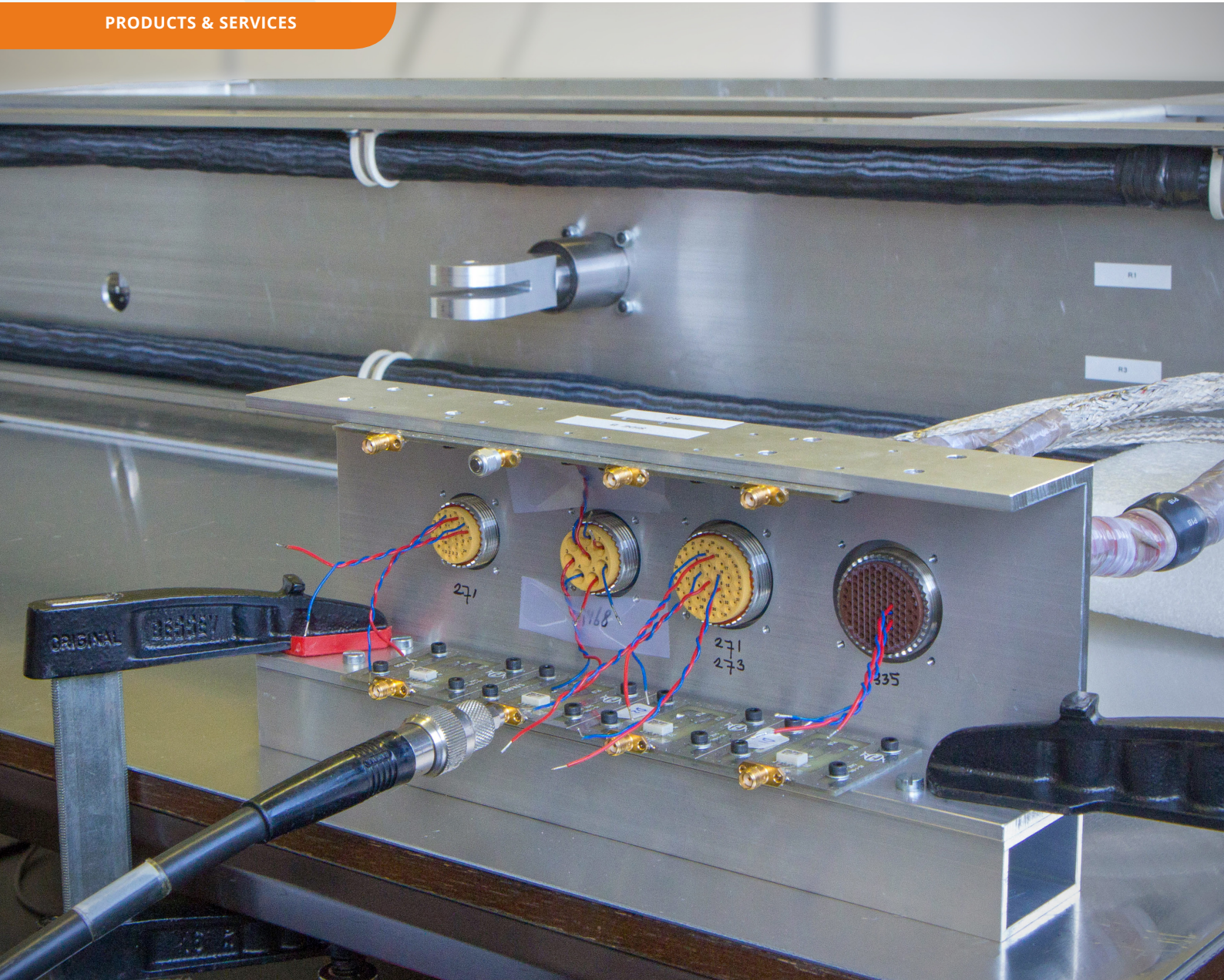
Dedicated to innovation in aerospace

AEROSPACE SYSTEMS DIVISION

ISR AND SPACE UTILISATION

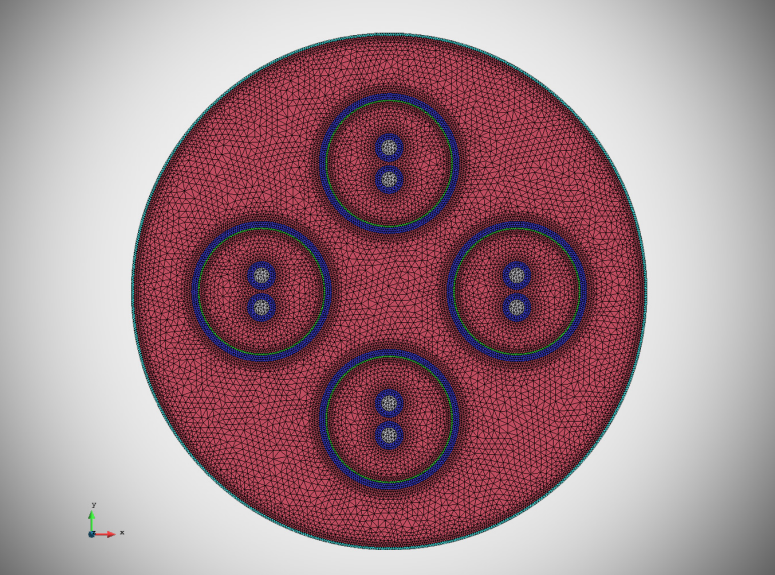
In need of optimised and reliable electric or electronic systems?

PRODUCTS & SERVICES



NLR has both knowledge and facilities to assess Electromagnetic Compatibility of electr(on)ic systems

Electr(on)ic systems on board aerospace platforms need to be highly reliable, as well as optimised in terms of weight, cost and maintenance. NLR has knowledge and tools for theoretical assessment of electr(on)ic systems in view of Electromagnetic Compatibility (EMC). Moreover, NLR has measurement facilities for validation of results, and certification of systems. Strongly linking theory and practice, we support in optimising your systems while keeping EMC compliance.



▲ Cross section of a spacewire bundle that is used to numerically estimate the transmission line properties

WHAT YOU NEED

- An electric system that is optimized in terms of performance, weight, cost and maintainability, and still complies to EMC standards.
- Electr(on)ic systems that are certified to operate on board aircraft or in space.
- Design rules for interconnection of onboard systems.
- Optimization of Electrical Wiring Interconnection Systems (EWIS).

WHAT WE DELIVER

- EMC measurements for certification of products or validation of theoretical research.
- Support in the design and optimization of EWIS.
- Support in finding the optimal balance between EMC and weight/cost of electr(on)ic systems.
- Modelling of transfer impedance of braids, crosstalk between cables and effects of High-Intensity Radiated Fields (HIRF).
- Advanced research regarding EMC and new materials, applicable to for instance integrated wiring.

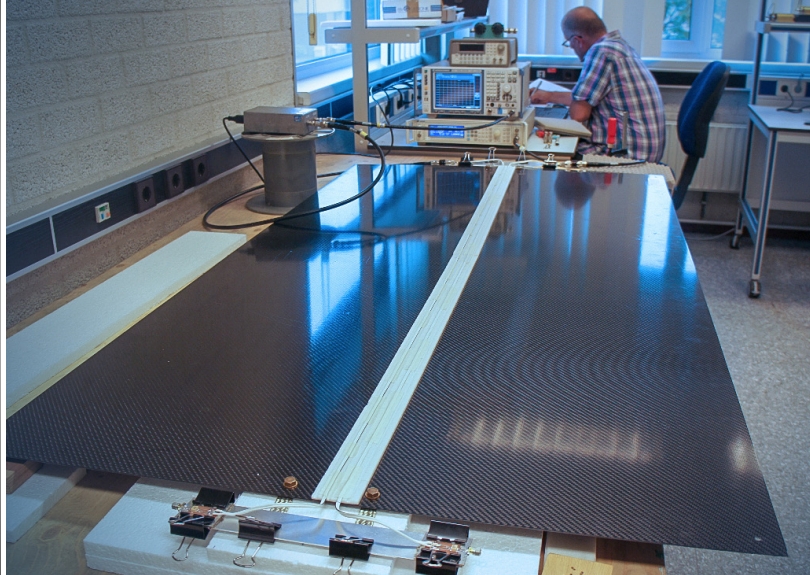
OUR CAPABILITIES

Since aircraft are becoming more and more electric, EMC will remain an important research area. At NLR we can model and measure the three important aspects of EMC: source, victim and coupling path. The strength of our research projects has proven to be the combination of theory and practice. NLR has knowledge and tools to model and simulate EMC problems in theory, and corresponding measurement facilities for validation in practice.

Modeling capabilities

An important coupling path for electromagnetic interference is cabling. Especially in modern aircraft hundreds of kilometres of cables are installed, preferably as compact and light as possible. In several projects we have gained knowledge and tools to model complex cable bundles and predict crosstalk behaviour or pick-up of external fields. Practical cables also contain many uncertainties, which can be incorporated into our simulations by the use of statistical methods. Our in-house tools can be used for the EMC evaluation of EWIS, and to support in optimising cabling and obtaining design guidelines.

Braided shields are an essential part of cable bundles, providing protection against crosstalk and external fields. NLR has developed

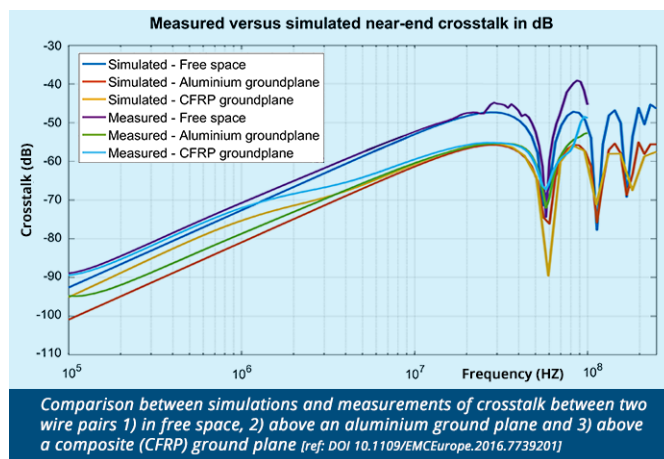


▲ Measurement of crosstalk between wire pairs above a CFRP ground plane

accurate models for the evaluation of cable shield performance. Moreover, HIRF simulations can be performed to estimate effects of external fields to systems on board an aircraft. Finally, we use the commercial simulation software FEKO for full-wave simulations.

Test facilities

NLR operates an EMC measurement facility, in which tests are carried out to check compliance of equipment and wiring with aerospace or military requirements. The purpose of such measurements can be two-fold: 1) Supporting research, or 2) certification of products. Crosstalk measurements are performed to assess the coupling between cables or cable bundles. Transfer impedance measurements determine the quality of braided shields. Also HIRF, susceptibility and radiation tests can be performed.



PRODUCTS & FEATURES

Our expertise and facilities ensure that your optimised, light-weight and compact electric system will not fail in challenging aerospace environments.

- Simulations of various EMC challenges
- EMC validation/certification measurements
- EM models of complex cable bundles
- EM models of braided shields
- Design of optimised, reliable electr(on)ic systems