Full-scale testing of aerospace structures

Testing of full-scale structures and systems supports the design process of these components and is an essential part of the certification process or live-extension programmes. Over the years NLR has built a track record on the certification testing of structures, systems and materials for various types of aircrafts and helicopters.
More realistic component testing

NLR supports customers on finite element modelling and damage tolerance and NLR can assist in the processing, interpretation and correlation of the test results. Working according to certification and conformity regimes is our daily business.

FULL-SCALE TEST FACILITIES
The Full-Scale Test Facility has the following capabilities/experience:
• In-house design of test set-ups and test frames supported with CATIA/CREO and Finite Element Modelling.
• Configuration of load cases (static and fatigue) based on MOOG control systems.
• Large stock with all equipment and sensors needed for full-scale testing.
• Experience in testing full-scale components at elevated and cryogenic temperatures.
• Instrumentation with conventional transducers like strain gauges but also with digital image correlation techniques including stereo pattern recognition.
• Non-destructive in-situ inspections techniques like Ultrasonic Phased Array, A-scan and Eddy Current.
• Wide experience in visual inspection of test articles during fatigue and damage tolerance test campaigns.
• Portable impact systems, including data acquisition, for application of impact damages in full-scale structures.
• Majority of the test equipment is calibrated in-house under the regime of the Dutch Council for Accreditation RvA.

EXPERT IN TESTING AT LOW TEMPERATURES
NLR is an expert in testing full-scale components at low temperature (typical -55 °C or lower) in the frame work of fatigue or endurance test campaigns. Moveable multifunctional large climate chambers with cryogenic infrastructure for vaporizing liquid nitrogen are used for this purpose.

PORTABLE IMPACT SYSTEMS FOR IMPACT DAMAGES IN FULL-SCALE STRUCTURES
Portable impact system with data acquisition system for application of impact damages in full-scale structures:
• Energy range: 12 – 138 Joule (theoretical values)
• Impact damages can be applied in all possible impact directions (vertical downwards, vertical upwards, horizontal impacts etc.) and for locations which are not easily accessible
• Data acquisition systems records impact speed and rebound speed
• Proven high reproducibility and reliability
• NLR in-house developed equipment but commercial available including training.