



Dedicated to innovation in aerospace

AEROSPACE OPERATIONS DIVISION

COCKPIT & FLIGHT OPERATIONS

# GRACE NLR Research Flight Simulator

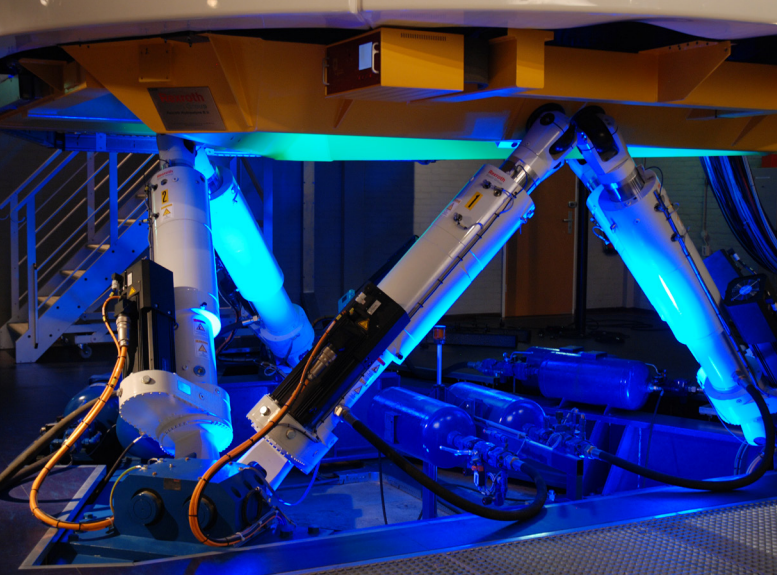
PRODUCTS & SERVICES



## The Most Versatile Full Flight Simulator

You want to fly something that nobody ever flew before? In GRACE you can! With the ability to simulate an aircraft that is still in development, GRACE allows you to feel how the aircraft will fly and how well it handles. The fully programmable electric motion cueing system and electric flight control loading system combined with an immersive wide collimated visual display system generate the completely realistic sensation of real flight.





**When testing a new concept, an avionics system or a completely new aircraft you can save flight test time on the real aircraft and shorten the development cycle by means of flight simulation. Using GRACE in the early stages of the development process can guide this process in the right direction and prevents unnecessary and costly redesign in later stages. GRACE provides a flexible cockpit environment where new systems and procedures can be evaluated under realistic conditions including motion and turbulence. Performing evaluations in GRACE will build you confidence in the implementation of the new system or procedure in the real aircraft. Rehearsing flight test scenarios in GRACE will also build the confidence of the test pilots and helps to optimise the required flight test time on the real aircraft.**

#### APPLICATIONS

- Prototype testing based on wind tunnel measurements
- Handling Qualities evaluation and Flight Control System tuning
- Motion Cueing Algorithm testing and tuning
- Cockpit Display and Avionics Systems evaluation
- Advancing your application to a higher Technology Readiness Level
- Flight operation and ATM concept validation and evaluation
- Evaluation of Training methods and concepts

#### SIMULATION MODELS

The available simulation models range from a small business jet like the Cessna Citation to large transport aircraft including Airbus, Boeing and Fokker aircraft. Also a model of an extended envelope stall demonstrator is available and customer defined or supplied models can be implemented or integrated. All aircraft simulation models used on GRACE are developed using SIMULINK but models coded in C, C++ or Fortran can also be used. All simulation software used on GRACE is developed "in-house" which enables flexible modification to meet all your needs.

#### AVIONICS AND ENVIRONMENT

The simulation environment of GRACE includes simulation models of avionics like for instance:

- FMS - Flight Management System (experimental)
- TCAS - Traffic alerting and Collision Avoidance System
- ADWR - Airborne Doppler Weather Radar
- GPWS - Ground Proximity Warning System

Also generic Autopilot, Autothrust and Fly By Wire systems are available. Cockpit display suites are available for a variety of aircraft including Airbus, Boeing and Fokker. Moreover experimental displays including synthetic vision applications are available. All displays are developed with the NLR Vincent display development tool and can be adapted to include any experimental components or indications. The NLR weather simulation application uses 4D weather grids and feeds the weather radar and the aircraft simulation. The traffic environment can be generated with the stand alone Traffic Manager application (TMX) or by connecting to the NLR ATC simulation facilities, NARSIM Radar and NARSIM Tower.

#### TRACK RECORD

NLR has over 40 years of experience in the field of flight simulation and has always worked on improving flight simulation systems and applications. NLR has supported numerous customers in developing and optimising aircraft flight control systems, cockpit displays and avionics systems but also in validating new flight operation and Air Traffic Management concepts.

#### PRODUCTS & FEATURES

- Electric 6 DOF fully programmable electric motion system
- Wide collimated visual display system – field of view 210° by 50°
- Fidelity comparable with level D training simulators
- Fully configurable cockpit with room for experimental equipment
- Flight controls: Column and Wheel / Side Sticks / Centre Sticks
- Electric Control Loading System for all flight controls
- Throttle levers: 1, 2, 3 or 4 levers – Airbus or Boeing style
- Auto Pilot panel: Airbus FCU or Boeing MCP
- Cockpit displays: 5 large displays with masks for different layouts
- Side displays: 4 Electronic Flight Bag like touch screen units