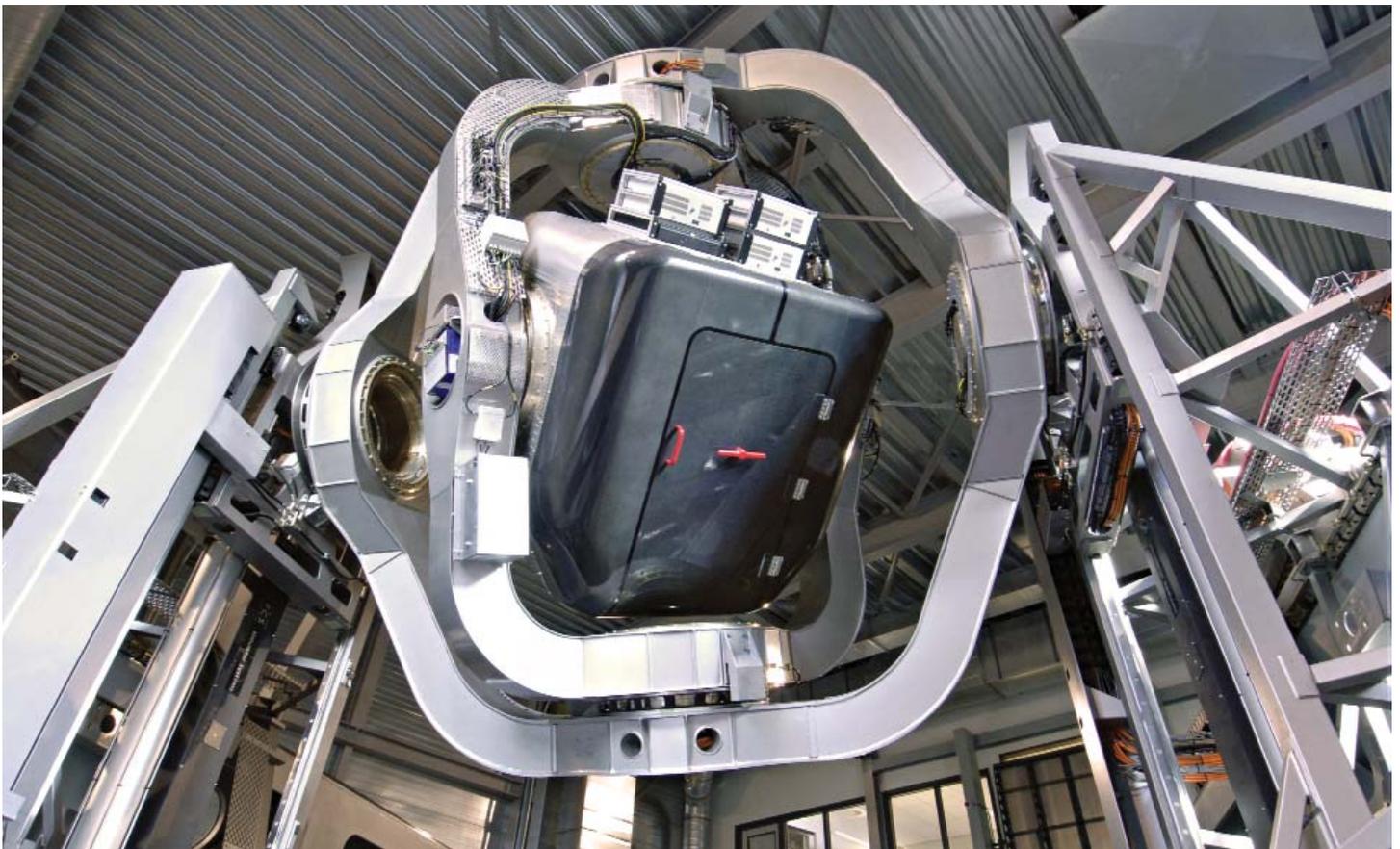


Desdemona

The next generation in movement simulation



The multi-purpose Desdemona simulator recently installed at TNO will definitely push the limits of motion simulation. Desdemona is a flight and driving simulator, disorientation trainer and advanced research lab, all in one. This simulator - unique to the world - can be used for both research and the simulation of complex situations that may occur during (military) flight, driving or even sailing.

Extended motion envelope

Most flight and driving simulations take place in standard hexapod simulators, but these do have a limited motion envelope.

This essentially means that in practice the exact simulation of really complex movements is virtually impossible. Standard simulators will suffice for training most civilian aircraft manoeuvres, but what if the aircraft movements become highly unpredictable, such as in military aircraft? The same applies to extreme ground vehicle movements, such as rollovers, emergency swerves and off-road driving. Standard simulators will not be able to help here. The answer will have to come from a simulator that has an extended motion envelope. That is why TNO developed Desdemona, the next generation in motion simulation.

Multi-purpose

Desdemona is the acronym for DESoriëntatie DEMONstrator Amst. This simulator is the result of a collaboration between TNO and the Austrian company AMST Systemtechnik, which was responsible for the design and built the installation. The diversity in the motion envelope of Desdemona is unique. For instance, a simulator will have to have the capability to support the outside view with exactly the right movements, in order to generate the desired driver or pilot behaviour. This is called motion cueing. The right motion cueing is vital for the required transfer-of-training. It may also help to

prevent simulator sickness. Desdemona combines the possibilities of both the hexapod and the human centrifuge. The cabin has a modular layout that allows it to be used as a F-16 or Eurofighter cockpit, or - and just as easily - as the interior of a car or the bridge of a small ship. It is mounted on a fully gimballed system that is able to rotate around any conceivable axis. The system as a whole allows 2 metres of vertical movement, combined with 8 metres along a horizontal sledge. The sledge itself is able to spin as well. Centrifugation enables Desdemona to generate constant G-forces up to a maximum of 3 G.

Always the right motion cueing solution

A motion cueing algorithm is used to translate the motion envelope of an aircraft into the corresponding motion envelope of the simulator, that will - by definition - be more limited. Desdemona uses algorithms developed in-house by TNO, based on our knowledge of human motion perception. The result: an innovative motion cueing algorithm called Spherical Washout. Desdemona has a motion envelope that is presently the most advanced in the world, allowing application in countless ways.

Application

Desdemona was originally designed for:

- Spatial disorientation: R&D, and training of Royal Netherlands Air Force pilots.

- Advanced military flight simulation, including highly complex jet fighter movements, brown-out landings by helicopters and upset recovery training for transport aircraft pilots.
- Motion cueing R&D.
- Research on human movement perception.
- The human factor in mission simulation and NEC environments (Network Enabled Capabilities).

However, the possibilities offered by Desdemona allow a much wider use, e.g. in civil aviation, general aviation, space travel (e.g. artificial gravity and the training of astronauts), shipping and the automotive industry. Other organisations involved in the human balance system and motion sickness - such as the pharmaceutical industry and manufacturers of roller coasters - will definitely also benefit from the opportunities offered by Desdemona.



TNO Defence, Security and Safety

TNO Defence, Security and Safety provides innovative contributions to the advance of comprehensive security and is a strategic partner of the Dutch Ministry of Defence to build up the defence knowledge-base. We employ our acquired knowledge for and together with contractors.

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