

Replicating the Aerodynamic Phenomena of Takeoff and Landing

MTS delivers world's largest rolling road system to facilitate highly accurate ground simulations and power testing.

CUSTOMER CHALLENGE

DNW (German-Dutch Wind Tunnels) is one of the world's most advanced specialized wind tunnel test facilities. It hosts eleven wind tunnels for subsonic, transonic and supersonic testing, making it an ideal destination for manufacturers seeking deep insight into aerodynamic phenomena. The facilities are distributed over 5 locations in the Netherlands and Germany. The facilities are especially attractive to aircraft manufacturers, who can access a wide range of test capabilities and leverage the expertise of in-house experts who understand both the nuances of wind tunnel testing and related measurement techniques.

Manufacturers chose DNW due to its array of key simulation technologies, high-quality facilities and skilled personnel with years of experience in wind tunnel testing – manufacturers need all three.

Two of the most challenging tests DNW performs are ground simulation and powered testing, which integrates simulated jet engines. These tests characterize the complex interactions between the aircraft and the ground. Because the model is stationary, a completely flat moving ground plane below the model must be running at the same speed as the wind tunnel in order to achieve an accurate, meaningful simulation.

DNW had been using the same rolling road system since the 1980s. But more stringent requirements on belt flatness and the need to simulate the higher landing speeds of larger aircraft necessitated a new moving belt. Unfortunately, few providers were capable of meeting DNW's exacting specifications.

MTS SOLUTION

When DNW engaged MTS, they discovered a company fully capable of delivering a rolling road system that aircraft manufacturers would be unable to find anywhere else in the world.

DNW's prior moving belt operated at speeds up to 43 meters per second (m/s). The new rolling road system developed by MTS nearly doubles this rate, operating at speeds up to 80 m/s – equal to that of rolling road systems used for testing Formula 1 race cars. In addition, the MTS rolling road system is the largest of its kind. Measuring six meters wide, it is almost twice as wide as the next largest system.



DNW's wind tunnel rolling road provides the most realistic simulations possible for manufacturers who seek to perform complete aerodynamic optimization of new aircraft, as well as upgrades for existing aircraft.

Faster speed and greater width enable the rolling road to facilitate much more realistic ground simulations and power testing. During each test, a scale model aircraft is lowered toward the rolling road in phases. At each phase, flap configurations and power ratings are adjusted to simulate the aircraft's actual operating conditions. Eventually the model is positioned very close from the surface of the rolling road. No contact takes place to avoid unpredictable interactions that could damage the wind tunnel, the rolling road and the test specimen.

These tests generate important information about how aircraft interact with the ground during takeoff and landing. Specifically, the tests help manufacturers evaluate how engines are integrated with wing designs and how new wing and flap configurations behave differently depending on the location of the engine. The tests also shed light on the drag effects of landing gear and high lift devices.

CUSTOMER BENEFITS

The immediate advantage of the MTS rolling road system is that it adds to the truly exclusive array of wind tunnel testing capabilities that DNW can offer. The system provides the most realistic simulations possible for manufacturers who seek to perform complete aerodynamic optimization of new aircraft, as well as upgrades for existing aircraft.



The speed, flatness and reliability of DNW's MTS wind tunnel rolling road system enables manufacturers to accurately and efficiently replicate the unique dynamics surrounding aircraft takeoffs and landings

In addition to high-speeds, exceptional flatness and reliability, the rolling road system also makes the entire process more efficient. One downside of the prior system was the relatively frequent need for belt replacement. Belts in the new MTS rolling road system last much longer, so overall productivity is higher and test programs can be completed more cost-efficiently.

The MTS rolling road system is also more integrated into the wind tunnel's infrastructure than the previous moving ground plane. The old system had to be controlled manually using a mechanism separate from that used to position the

model. Now, test engineers at DNW can manage the speed of the rolling road automatically, without utilizing a different control interface.

Creating a rolling road system to accommodate DNW's exacting specifications presented considerable challenges; success was only possible through the collaborative efforts of DNW and MTS engineers' willingness to learn from each other. The DNW team fully expects this collaboration to continue as more aircraft manufacturers use the system and as new test applications emerge.



MTS Systems

14000 Technology Drive
Eden Prairie, MN 55344-2290 USA
Telephone: 1-952-937-4000
Toll Free: 1-800-328-2255
E-mail: info@mts.com
Internet: www.mts.com

ISO 9001 CERTIFIED QMS

MTS is a registered trademark of MTS Systems within the United States. This trademark may be protected in other countries. RTM No. 211177.

©2021 MTS Systems
100-281-638 DNW_windtunnel • Printed in U.S.A. • 09/21