

European Strategic Wind Tunnels Improved Research Potential

ETW Database



Dennis Otten/ Dieter Schimanski

WP 2.4

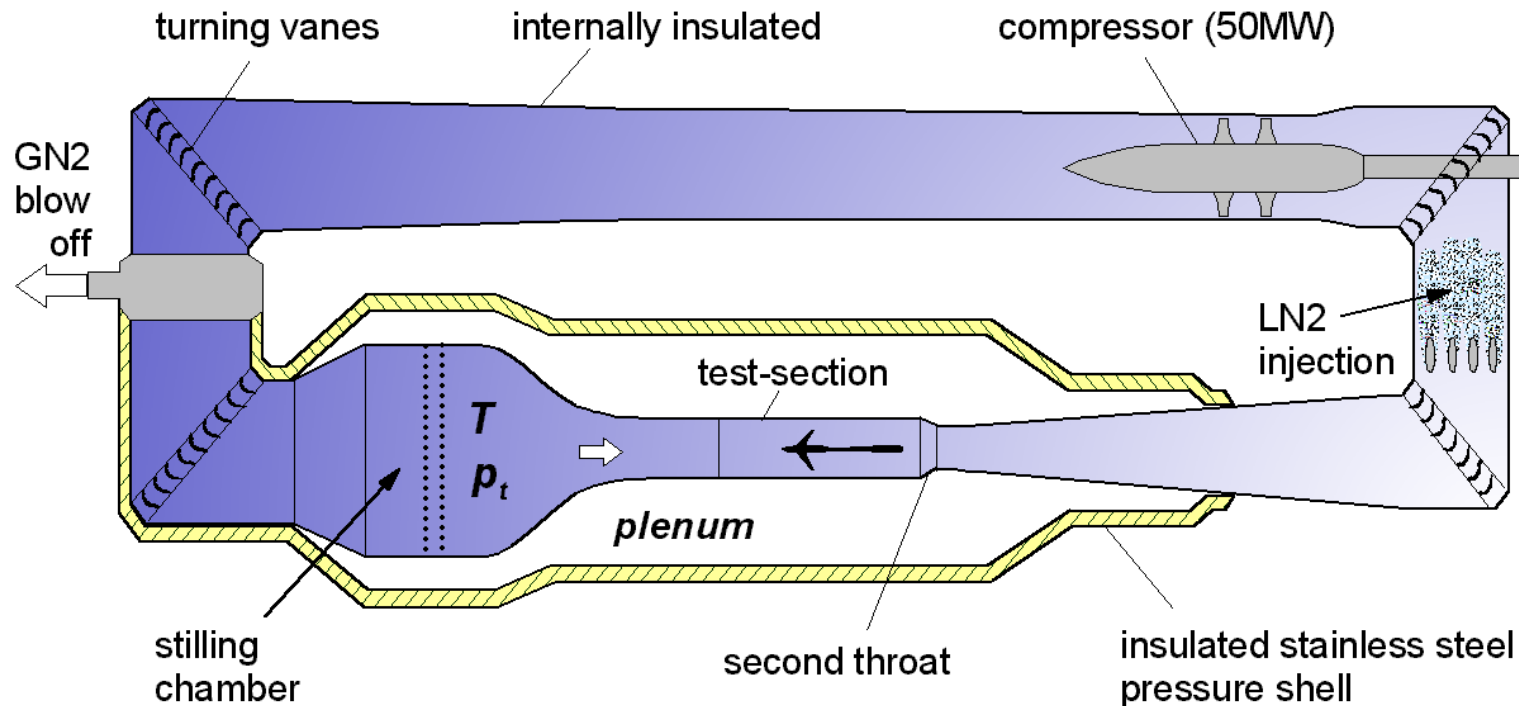
ETW Database

Main Characteristics

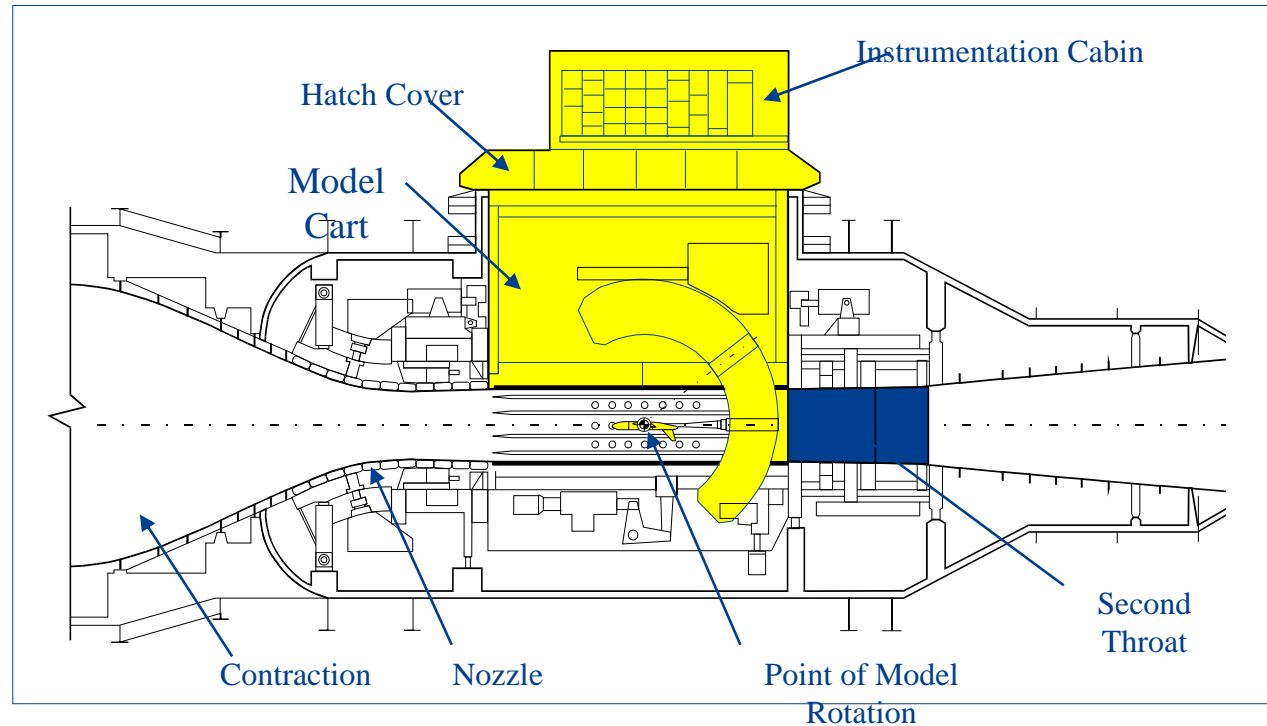
- Cryogenic continuous flow high speed wind tunnel
- Mach number range: 0.13 -> 1.3
- Stagnation pressure range: 1.25 -> 4.5 bar
- Temperature range: 110K -> 313K
- Reynolds Number: up to $85 \cdot 10^6$ for semispan models up to $50 \cdot 10^6$ fullspan models
- Test section size: 2.4 m width 2 m height 9m length
- Typical model span size 1.6m for full span models 1.3m for semi span models

ETW Database

Overall view



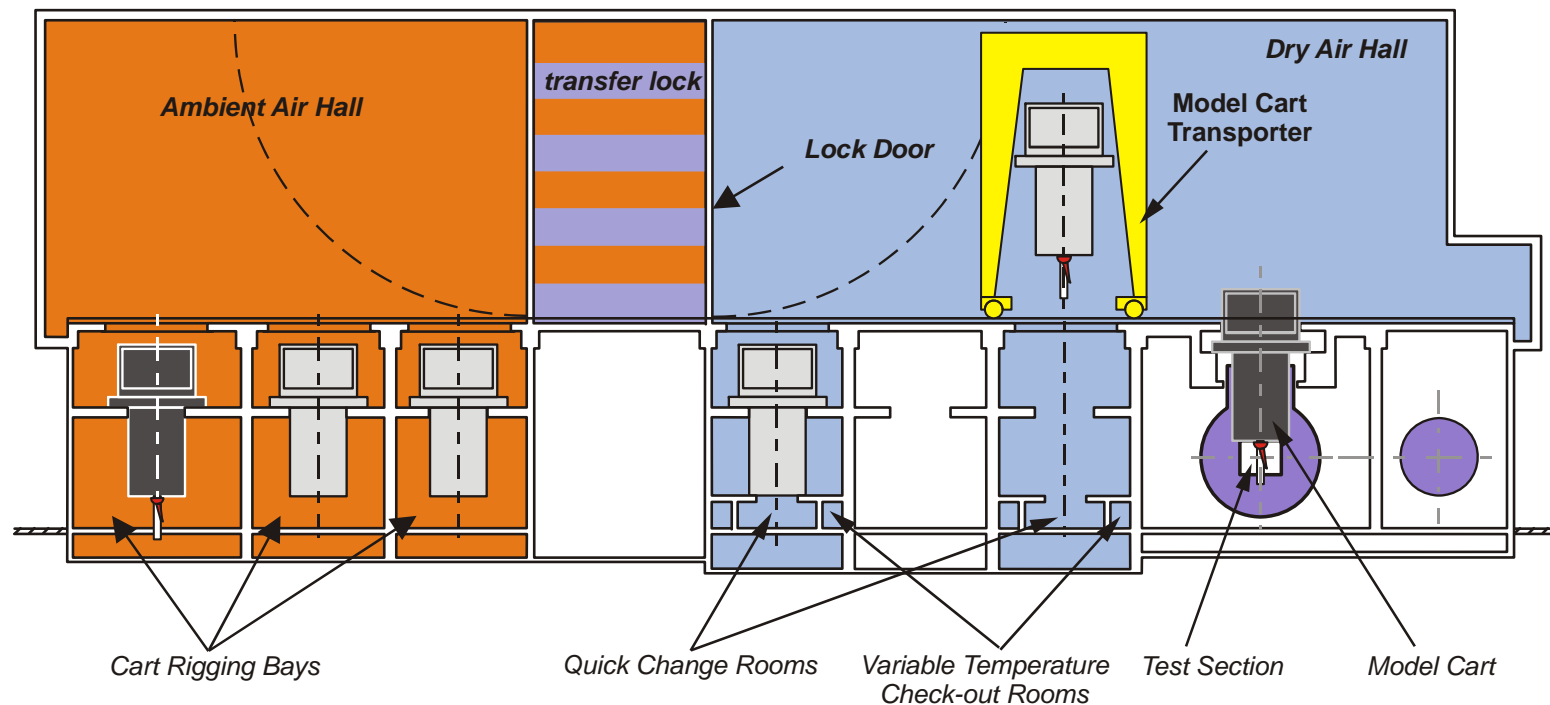
- The ETW is equipped with a two stage fan with a drive power of up to 50 MW
- The flow temperature and pressure level are controlled by injection of liquid nitrogen and exhaust of gaseous nitrogen



- Slotted Test Section 2.4m x 2.0m
- Exchangable Model Cart System provides high productivity
- High quality Mach number control with second throat concept

ETW Database

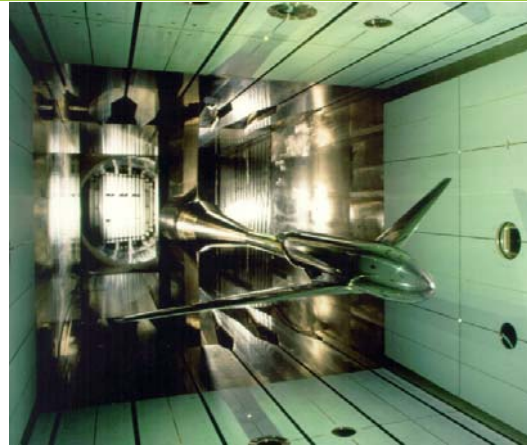
Model handling



- Interchangeable Model Cart System allows interleaving test sequences with multiple client activities in parallel

ETW Database

Model handling



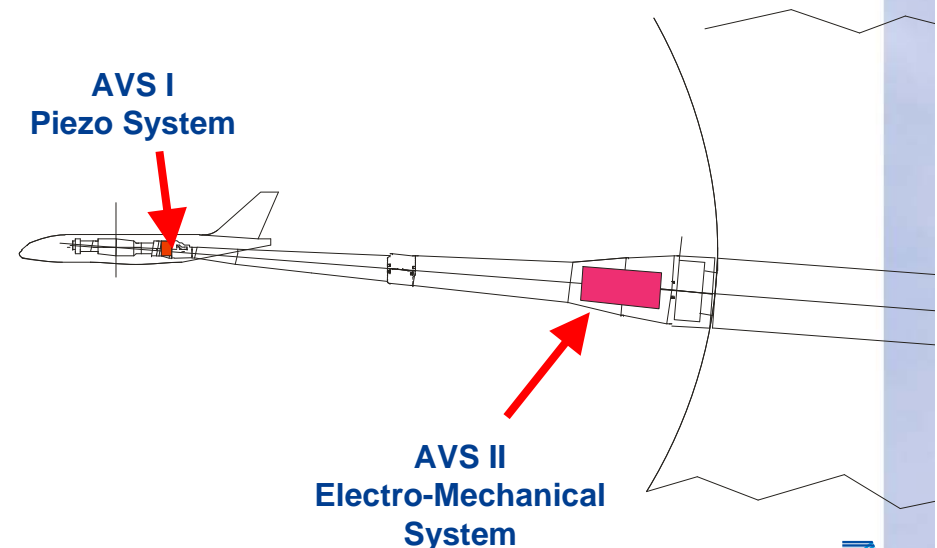
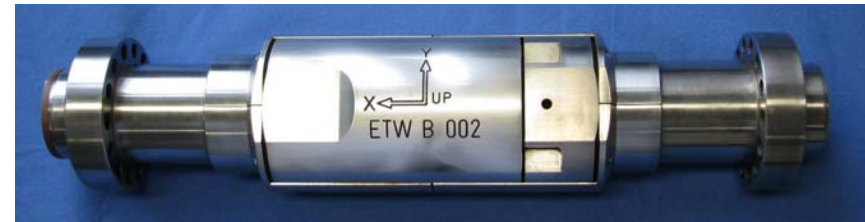
- Various sting supports for full span models
- Half model testing with top wall mounting
- Twin Sting Testing for afterbody models and sting interference determination



ETW Database Instrumentation

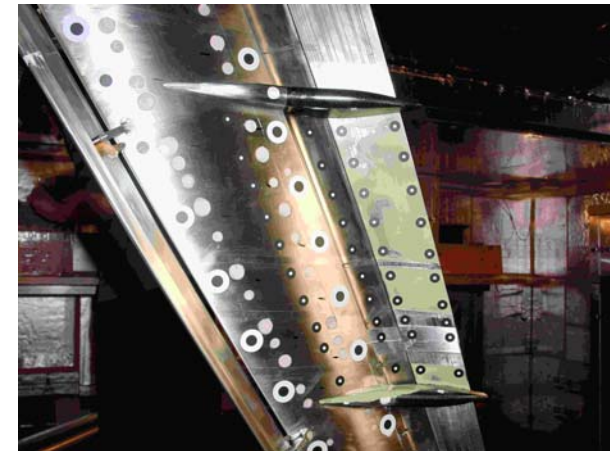


- Flange type strain gauge balances for performance measurements in full cryogenic environment
- Thermally controlled housings for pressure measurement with PSI 8400 System and model attitude measurement with servo-accelerometer inclinometer
- Kulite measurements and general High Speed Data Acquisition with 88 channels
- Anti Vibration System available for sting supported models

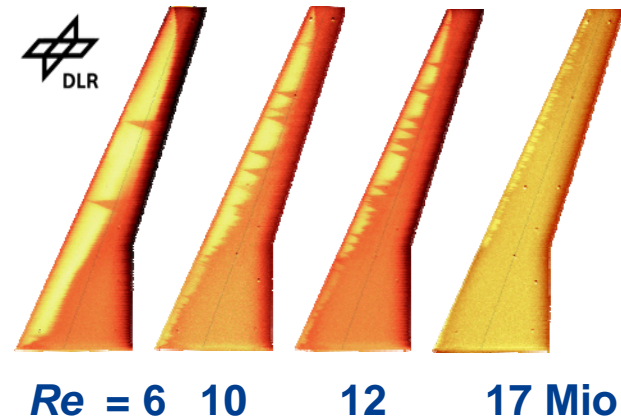


ETW Database Instrumentation

- Deformation Measurement System for full span, half span and model component measurements
- Temperature Sensitive Paint System available for complete tunnel envelope
- Mini Tuffts used in low speed conditions down to 120 K

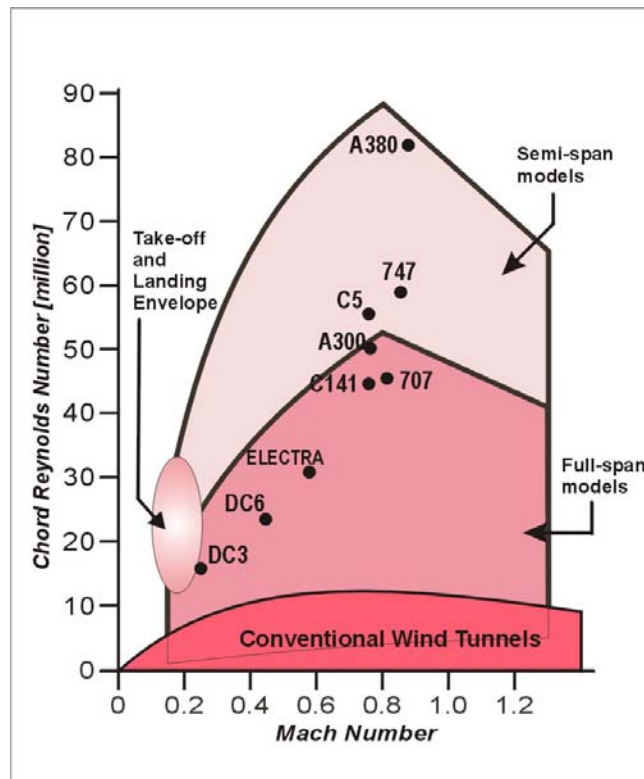


Main wing and flap deformation measurement with wing surface markers

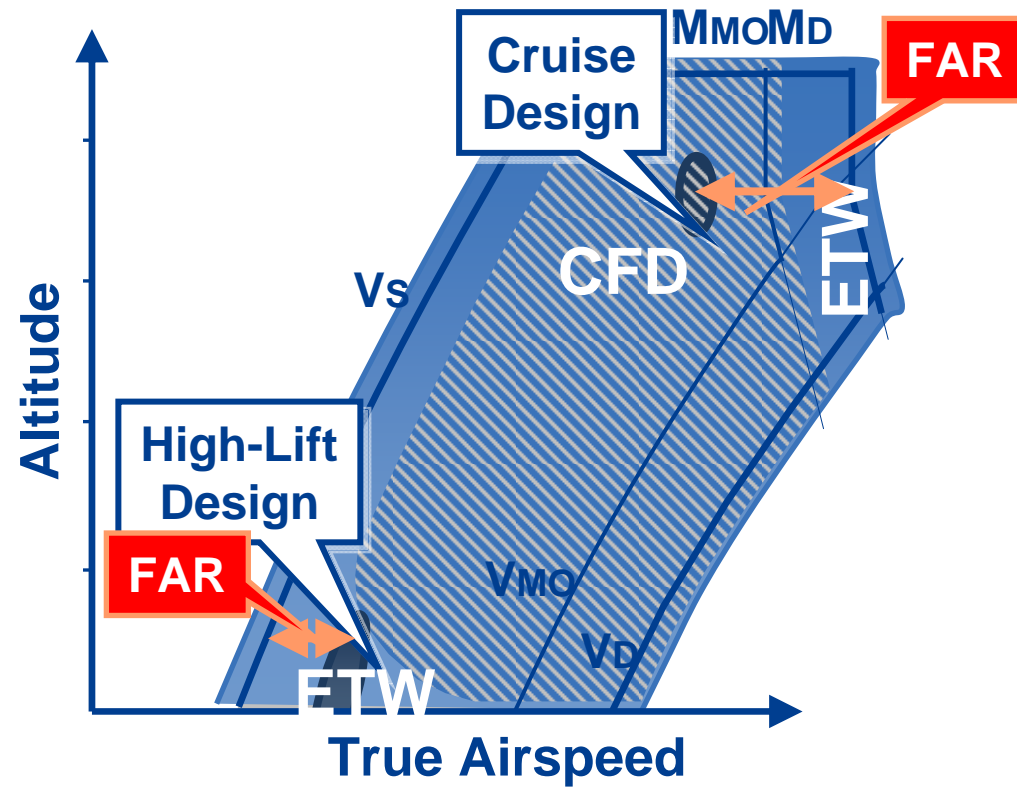


ETW Database

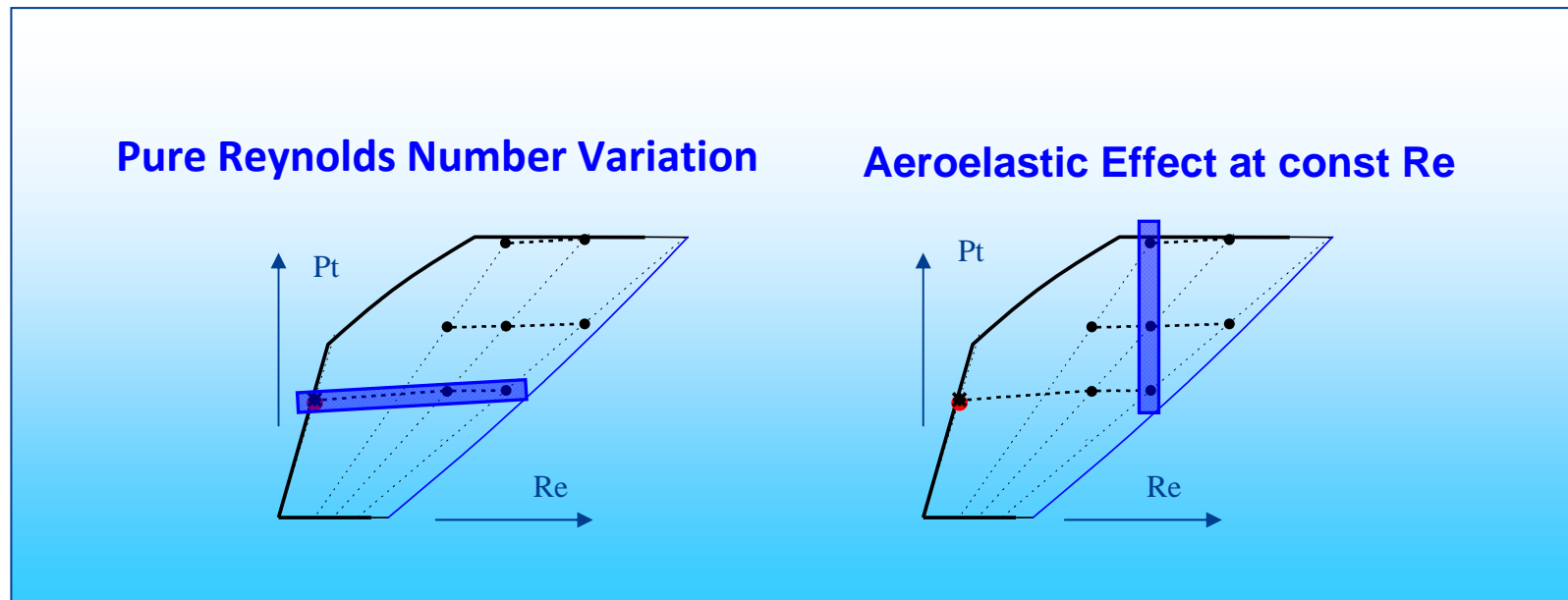
Typical tests



ETW Performance Envelope



- Flight Reynolds number testing for full-span and semi-span models at cruise conditions and extreme borders of flight envelope



- Separation of Reynolds number and Aeroelastic effects

ETW Database

For further information

- www.etw.de
- ETW user guide
- Technical Contact: jq@etw.de