

Where innovation is standard



ANTENNA
Systems Solutions

A CELESTIA TECHNOLOGIES GROUP COMPANY



CORPORATE OUTLINE
Short Form

Dr. Carlo Rizzo
Sales & Marketing Director

Celestia Technologies Group

Group Structure and Technology Capabilities

MARKETS

AEROSPACE - DEFENCE - SCIENCE
TELECOMS - MEDICAL

RF & EM Technologies



- Active RF & MW
- Active Antennas
- Satcom-on-the-Move Solutions



- Antenna Test Systems & chambers
- Passive Antennas & Probes



- e-Scanning Ground Stations
- Advanced concepts for G/S



- Cryogenic RF products
- Ground segment Engineering Services



- Customised MMIC Design (GaN, InP..)
- Procurement of volume MMIC

Digital Technologies



- Satellite Test & Simulation, EGSE
- Modems for G/S, TM/TC



- IoT Network Sensors
- Smart Cities Network Solutions



- Ground Segment Engineering
- G/S M&C Solutions



- Advanced ADC & DAC
- System on chip (SoC) Vision



- Space digital modulation & demodulation
- Modem DSP design

Celestia Technologies Group Group Structure and Technology Capabilities



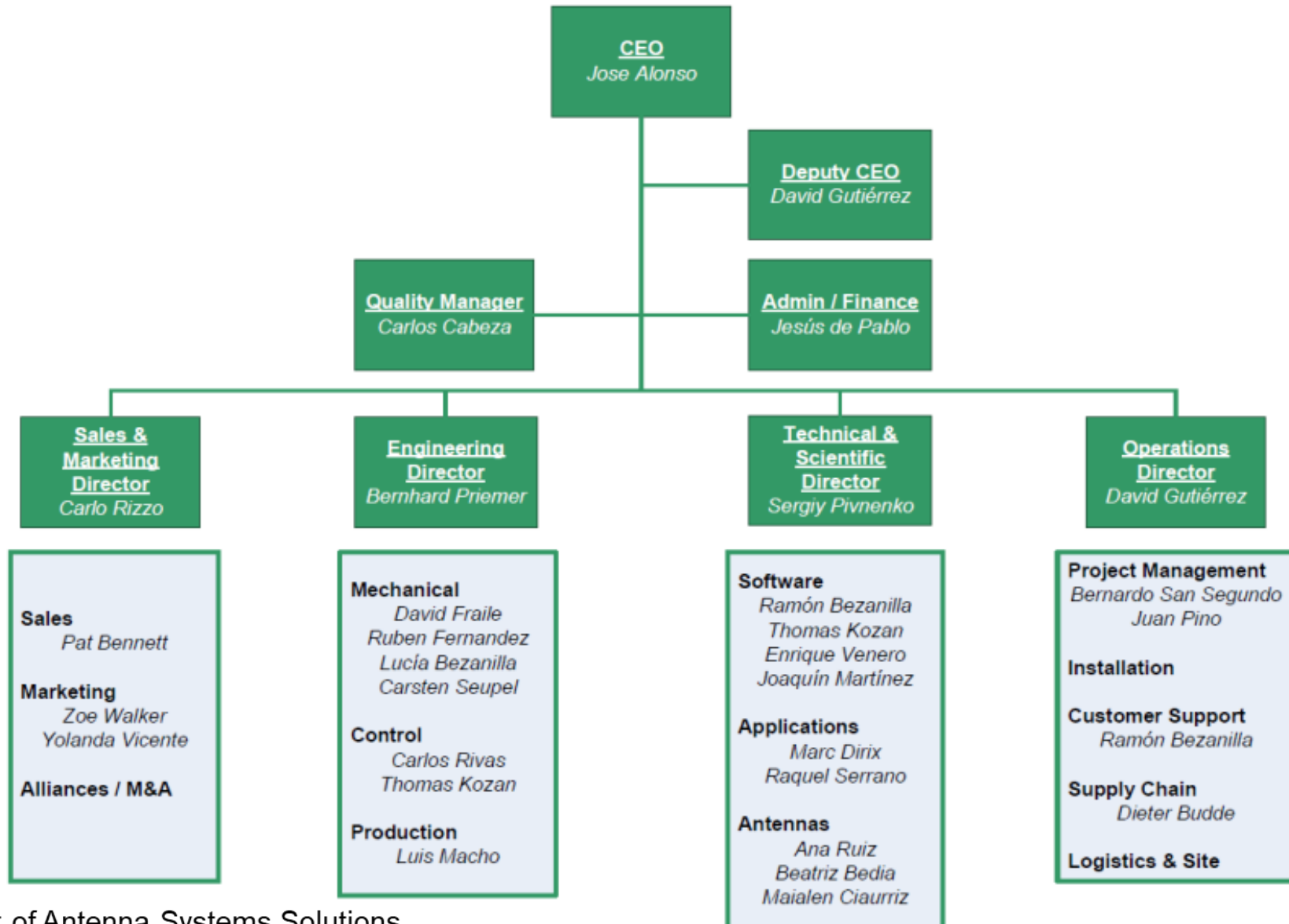
www.celestia-tech.com

ASYSOL Timeline



- 2010** Formed as a spin off company by members of the RF Department (Grupo de Radiacion) of the Technical University of Madrid, Spain.
- 2011** Supplied first multi-purpose antenna measurement system to the University of Kent (planar, cylindrical, spherical near-field, compact range from 400MHz to 110GHz) utilizing state of the art components sourced from the robotic and automation industry.
- 2012** Relinquished 52% of shares to Celestia Technologies Group (CTG) an international RF and Telecommunications company based in Santander.
- 2015** Celebrated 5th year in business with a record annual turnover.
- 2016** CTG acquires 85% of shares. ASYSOL expands workforce and market by acquiring new projects and developing a range of new products and software packages.
- 2017** Exceeded 6M€ turnover and expanded workforce with a headcount of 30 people.
- 2018** Development of new generation controller

Organisation Chart



ASYSOL Senior Management Team



Jose' Alonso
CEO & Partner
(ex ESTEC-ESA)



Carlo Rizzo
Sales & Marketing Director
& Partner
(ex MVG-ORBIT, NSI-MI)



David Gutierrez
Deputy CEO
(ex Indra)



Bernhard Priemer
Engineering Director
(ex MVG-ORBIT/FR)



Sergiy Pivnenko
Technical Director
(ex TUD-ESA)



Greg Hindman
CEO of NPM
(founder of NSI)

ASYSQL Locations



Corporate Offices: Santander (Spain)

Branch Offices: Munich (D), London (UK)

Noordwijk (NL), Los Angeles (USA)

Distributors and Representatives:

Europe: UK, Ireland, Italy, Spain, Portugal, France, Germany, Sweden, Finland, Poland, Turkey, Denmark, Czech Republic, Slovakia, Russia, Greece, Bulgaria

Rest of World: India, China, Japan, Israel, USA

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Corporate Offices: Santander (Spain)

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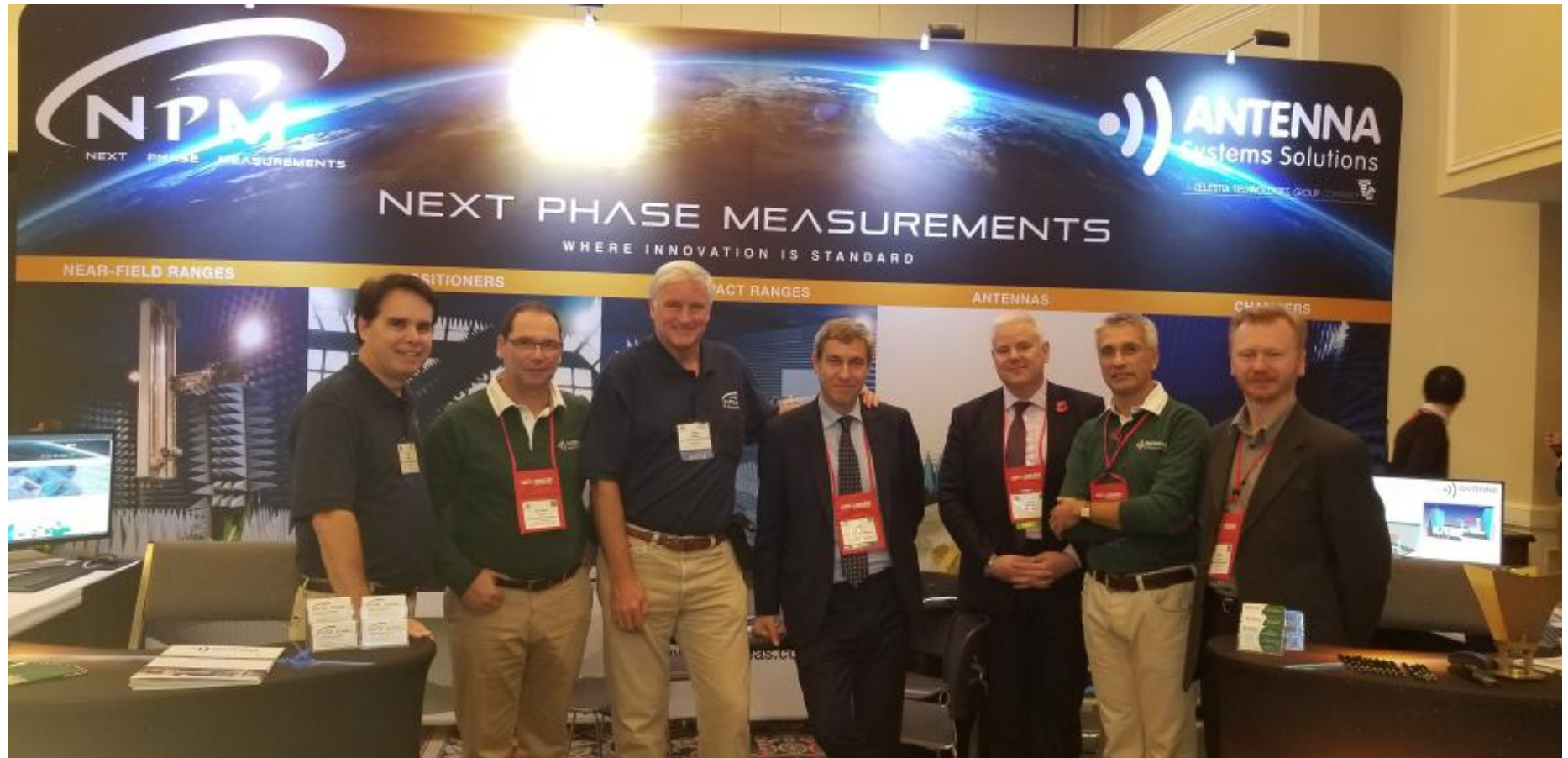
Noordwijk (NL), Los Angeles (USA)

Distributors and Representatives:

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NPM Launch



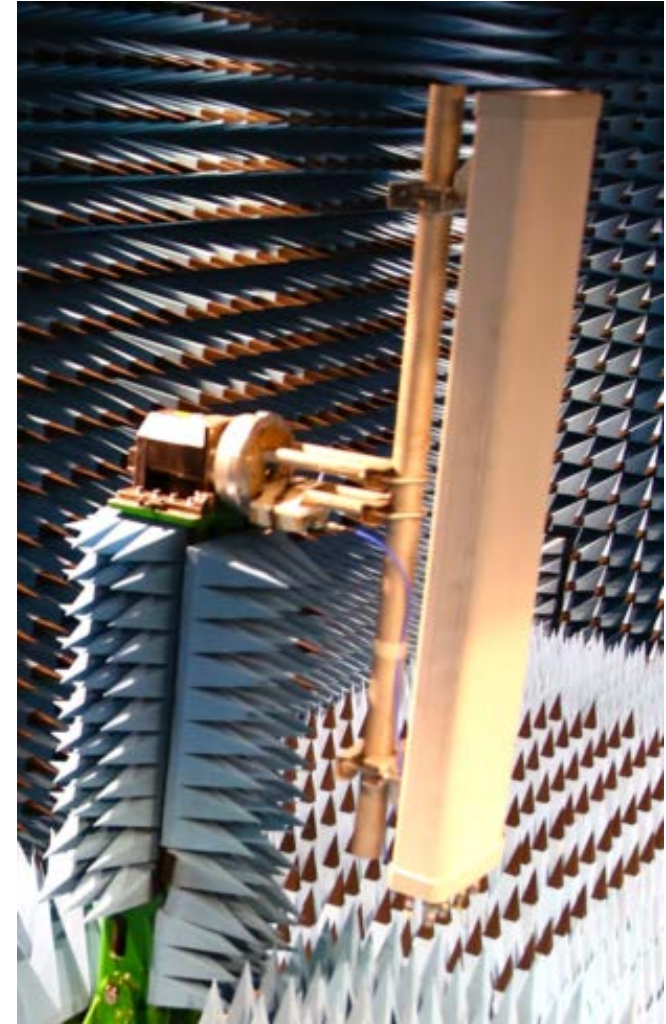
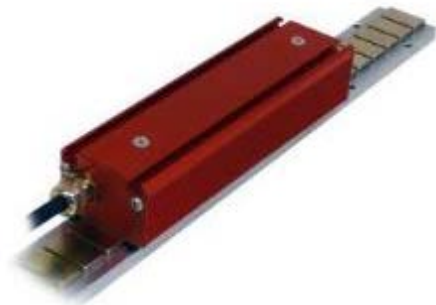
ASYSQL Technology Capabilities:



- Planar Near-Field Ranges
- Cylindrical Near-Field Ranges
- Far-Field/Spherical Near-Field Ranges (Roll/Azimuth and Gantry)
- Compact Antenna Test Ranges (FF, CF and LF)
- Reconfigurable Test Ranges (CATR+NF)
- RADOME Test Systems (CATR based)
- RCS Test Systems (Gated CW and Short Pulse based)
- Customised Solutions
- Probes and Standard Gain Antennas
- Motion and Control Components
- Full RF Configuration Analysis
- Acquisition and Analysis Software
- Training and Teaching
- In-house Testing Capabilities

Industry Standard Motor and Control Technology

- Industry standard components
- Distributed control, fastest available bus technology for highest measurement speed and highest measurement accuracy
- Compact servo brushless motors
- Direct absolute encoders
- Remote access to system status for service assessments



Control Equipment ASY-CONT Series



State of the art controller (ASY-CONT-8)

- Driving stepper and servo motors
- Supporting incremental and absolute encoders
- BUS communications
- Sequential control of up to 16 axes
- Simultaneous position display of up to 8 axes

Local Control Unit (LCU-1000)

- Wireless tablet based
- Remote position mode for motion control
- Remote manual mode for motion control
- Main controller screen replica

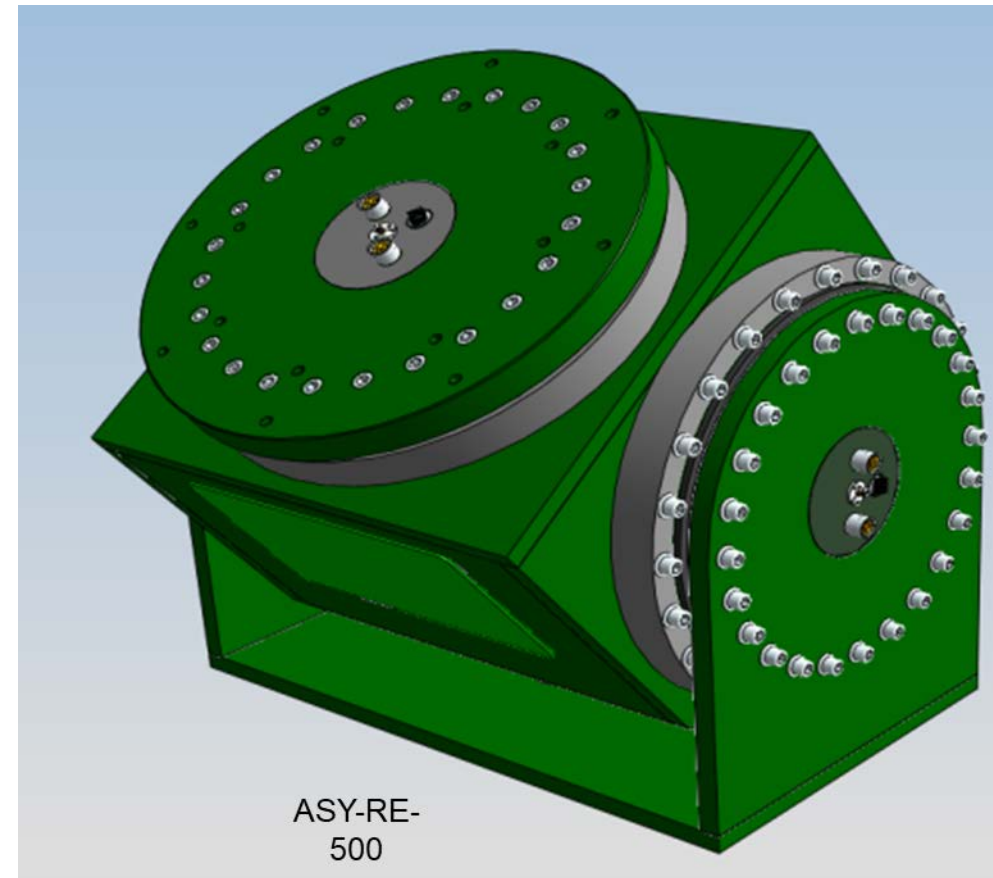
Azimuth Positioners

- High speed and torque
- Absolute direct encoders
- Integrated slip rings (12 channels) and rotary joints (up to 50GHz)
- Loads up to 1,280kg
- Rotation speed up to 10rpm
- Standard position accuracy 0.02°, high-accuracy options better than 0.005°



Azimuth over Elevation Positioners

- Most compact Az/El solution
- Load up to 10.000Kg
- High rigidity and accuracy due to chassis design
- Elevation travel: $\pm 92^\circ$
- Continuous rotation (Azimuth)
- Slip ring (16ch) and rotary joint as standard
- Direct absolute encoders
- Standard position accuracy 0.02° ,
high-accuracy options better than 0.005°
- Counterweight option



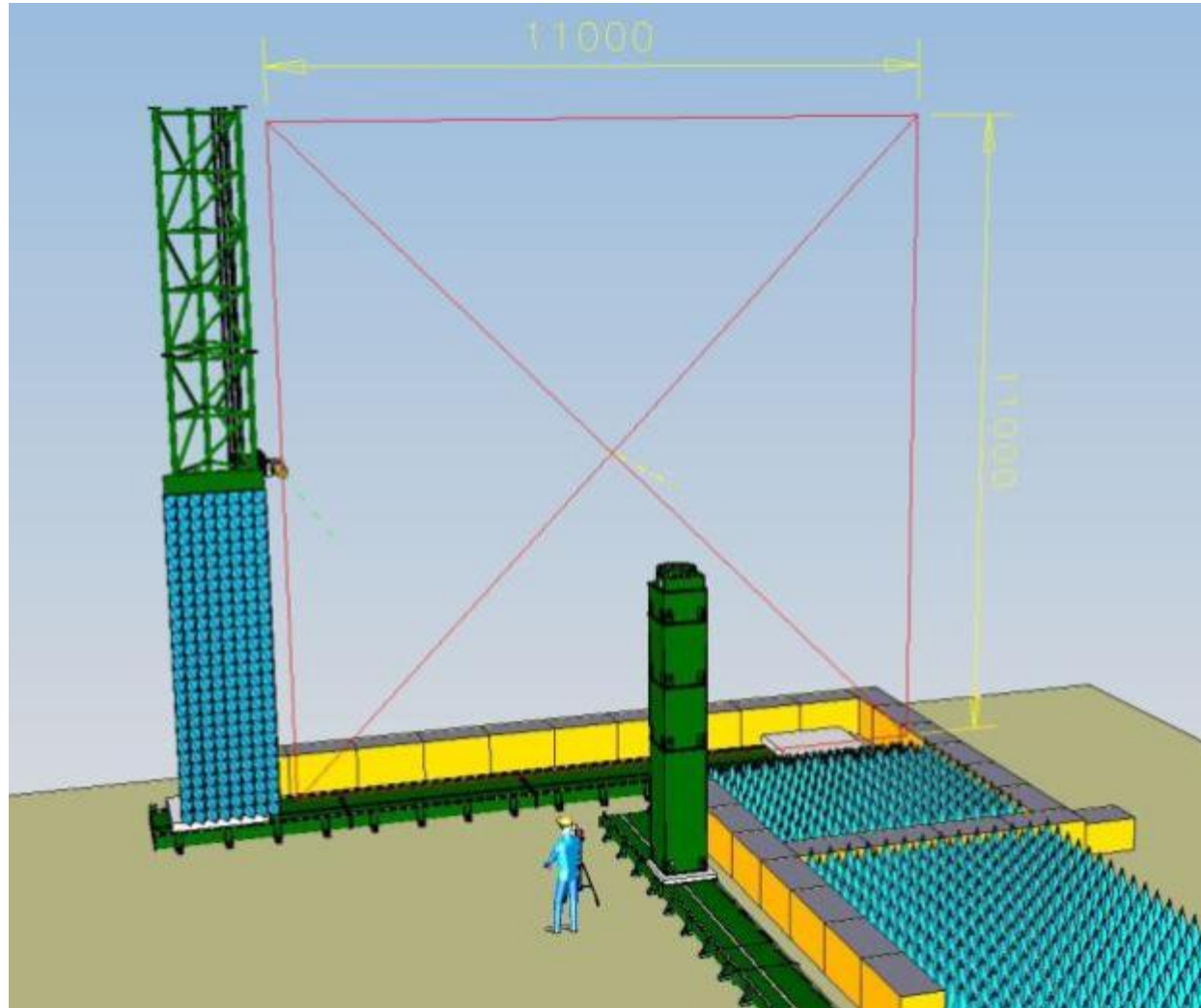
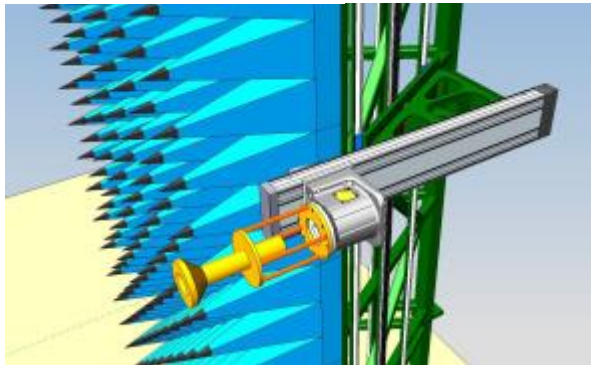
Positioner Stack-ups

- Guaranteed orthogonality 0.02°
- Axes intersection 0.05mm or less
- Tilted mast for AUT pick-up
- Low cross-section roll head
- Global positioning accuracy guarantee
- Customised sizing
- Counterweight options available



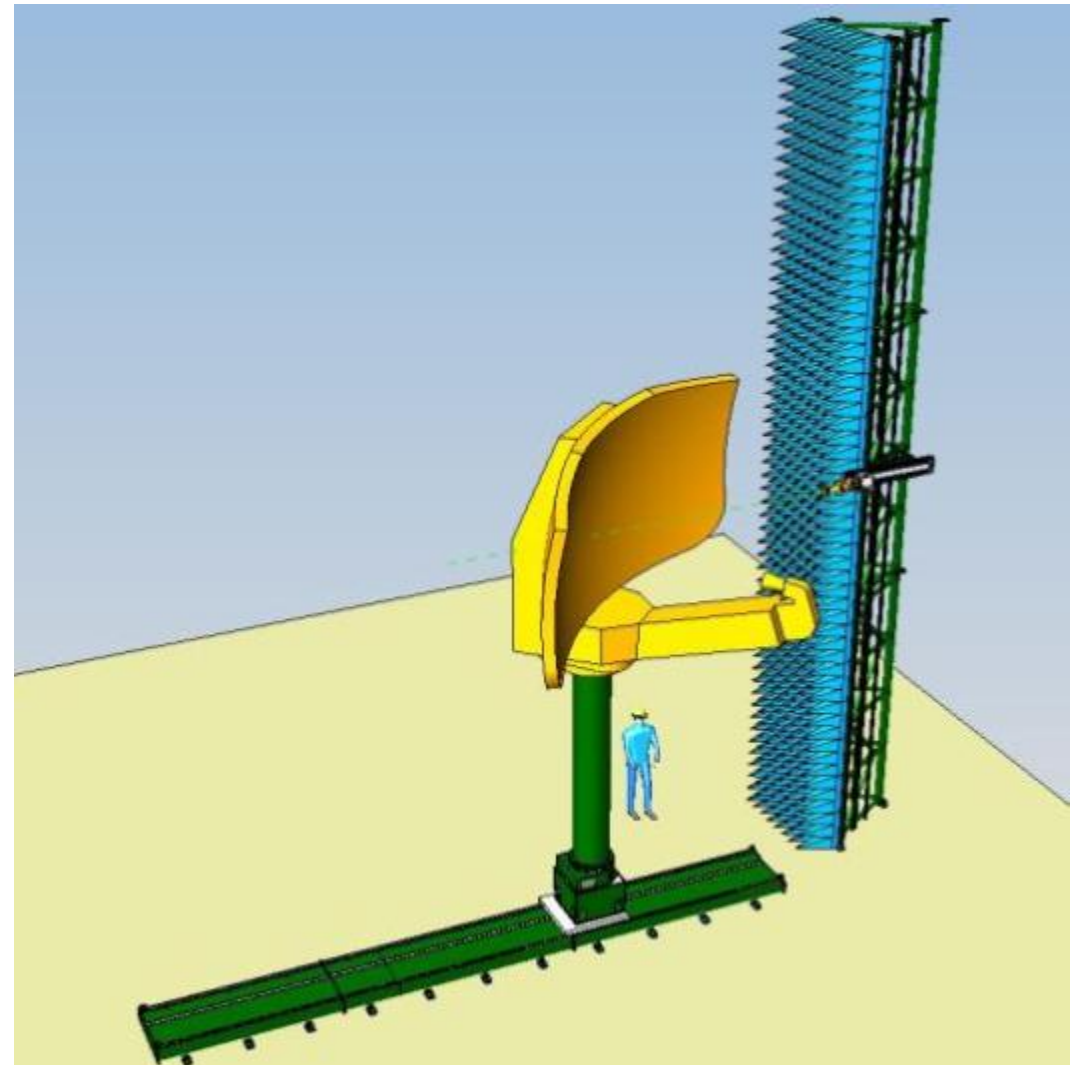
Planar Near-Field Test Ranges

- High accuracy planarity (0.15mm uncorrected - <0.06mm corrected)
- Scan area up to 40.0m x 17.2m
- Inverted "T" frame design
- X axis speed: 400mm/sec
- Y axis speed: 700mm/sec
- Absolute encoders as standard
- Improved tower design to minimise scattering
- Simultaneous dual polarised acquisitions



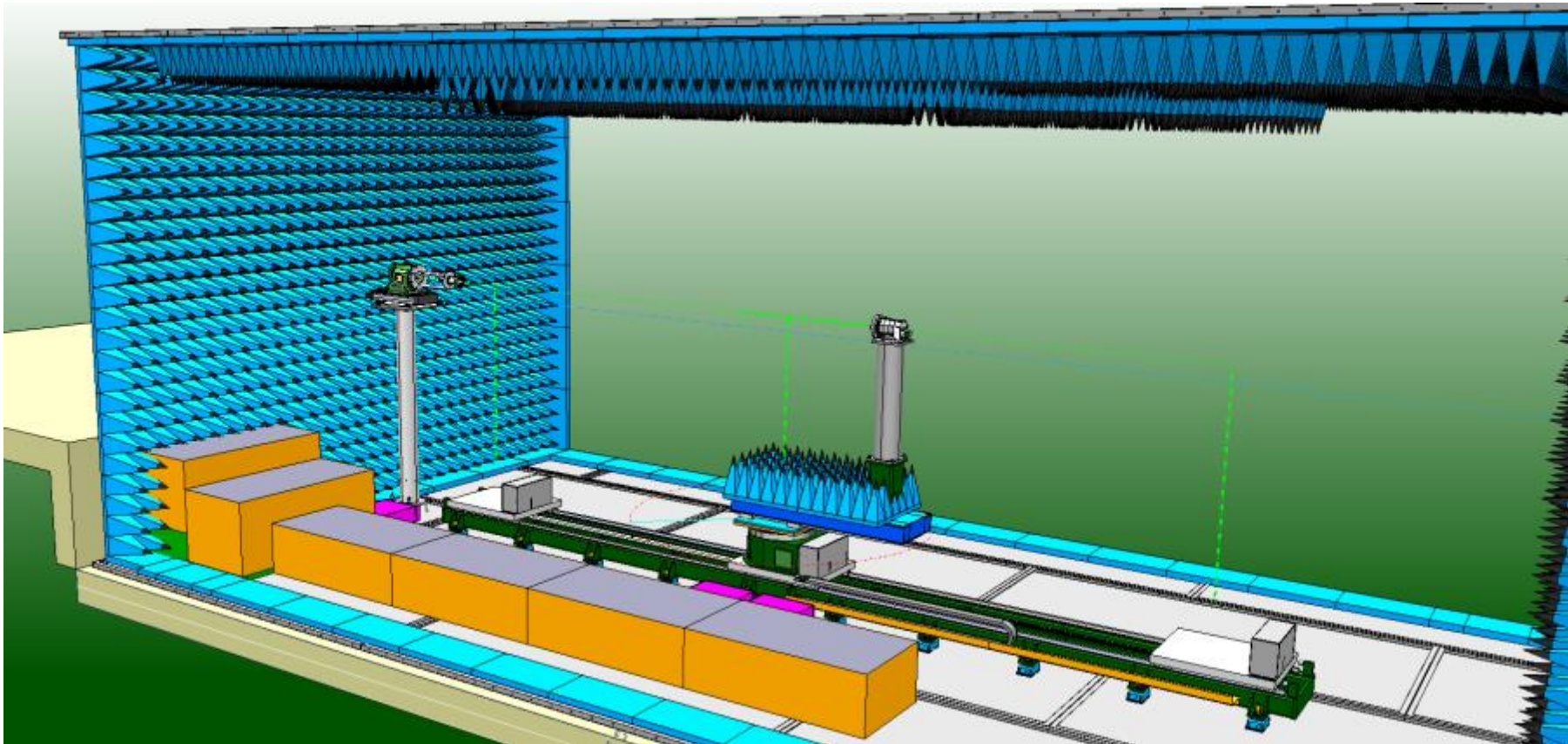
Cylindrical Near-Field Test Range

- High accuracy
0.15mm uncorrected
<0.06mm corrected
- Scan Length: up to 17.2m
- Y axis speed: 700mm/sec
- Absolute encoders as standard
- Simultaneous dual polarised acquisitions

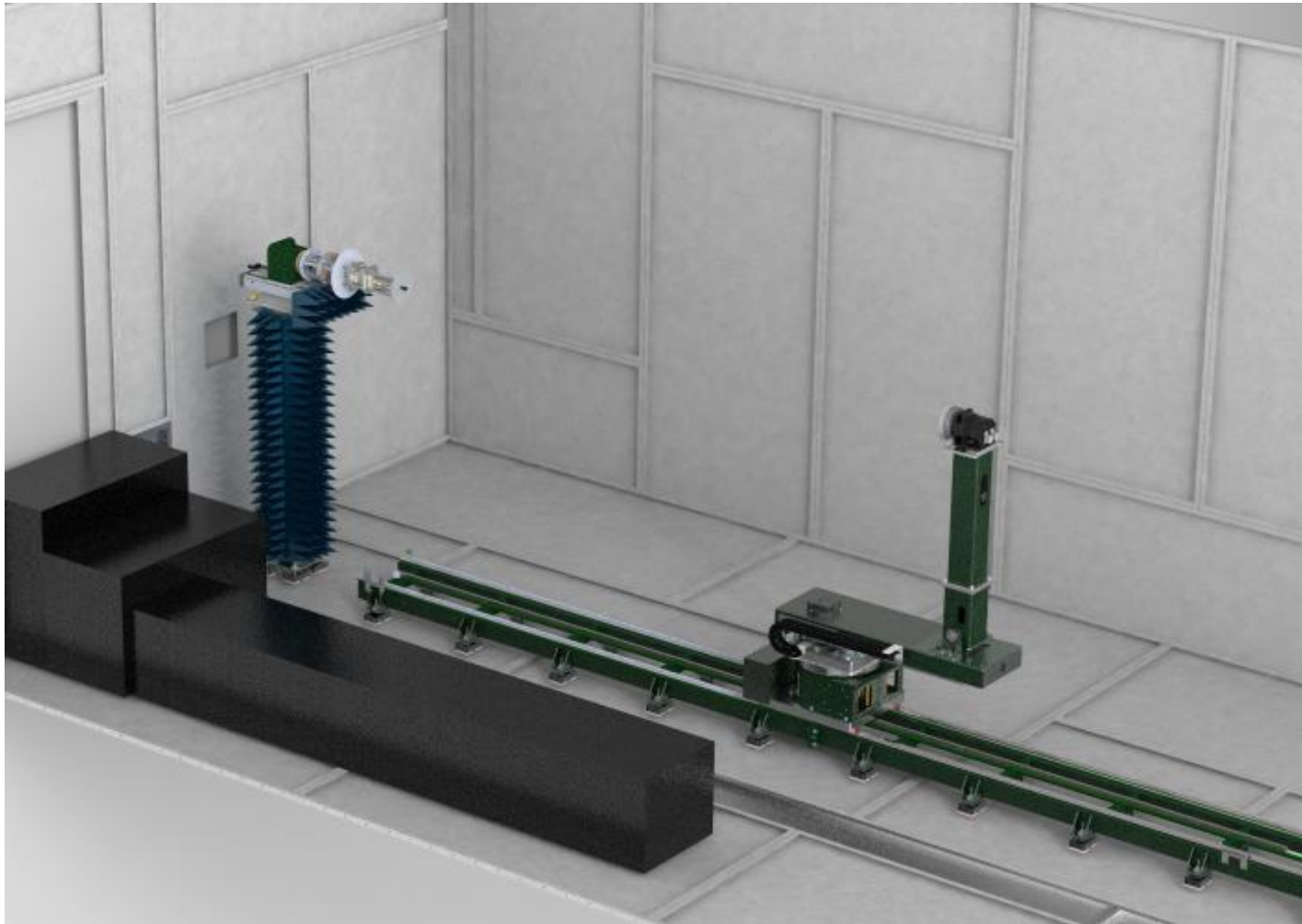


Spherical Near-Field Test Ranges: Phi over Theta

- Antenna load: up to 1500Kg
- Rotation speed: up to 3rpm (Az) and 5 rpm (Roll)
- Position repeatability: 0.02°
- Simultaneous dual polarised acquisitions



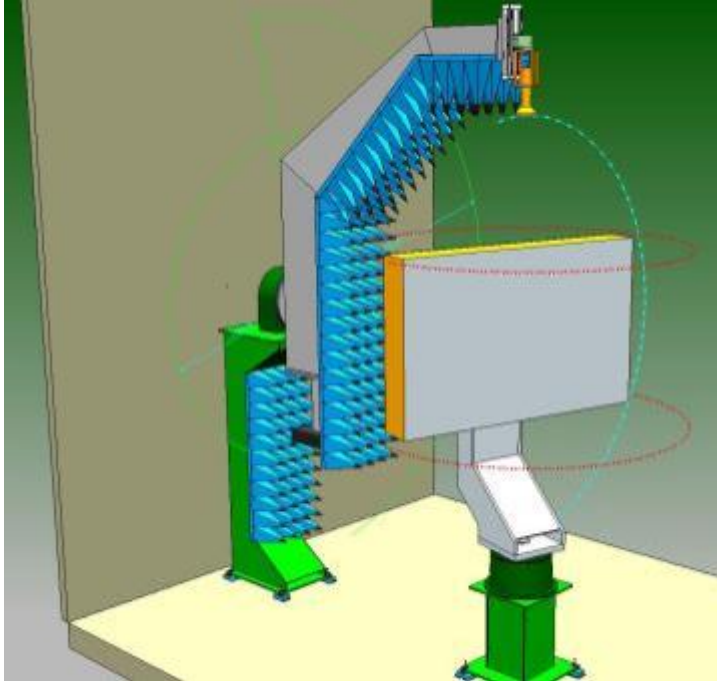
SNF/FF Systems



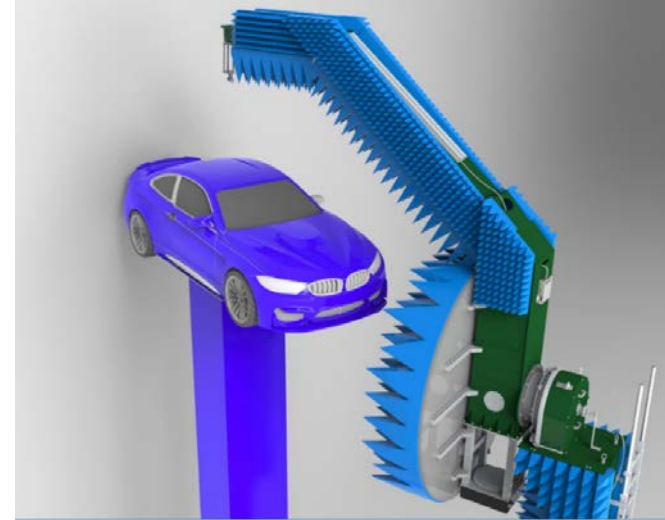
Applications:

- Base Station Antenna Measurements
- Wireless Antenna Measurements
- Microwave Point-to-Point Antenna Measurements

Spherical Near-Field Test Systems: Gantry over Azimuth

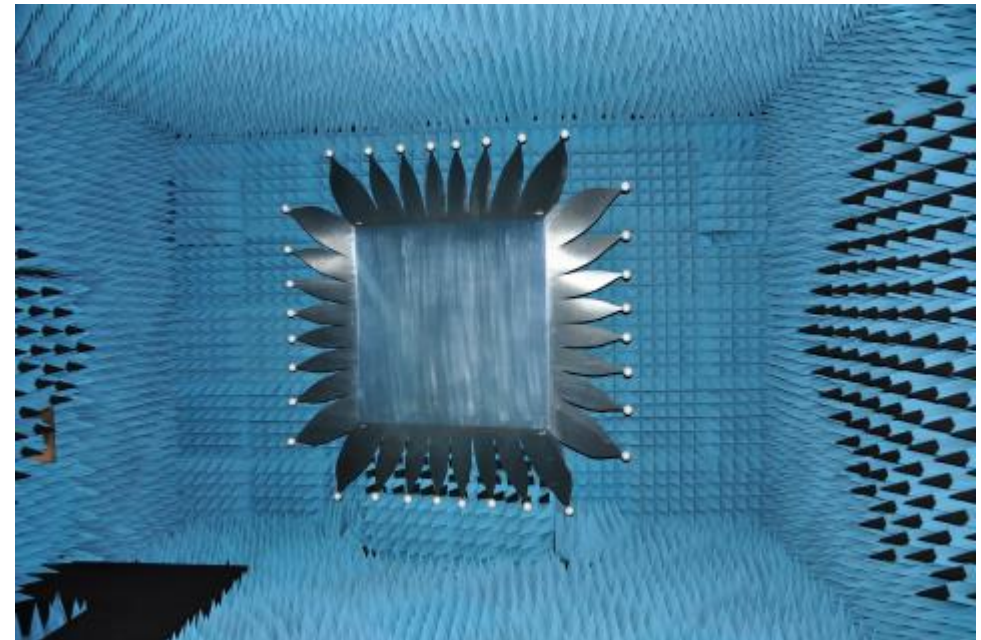
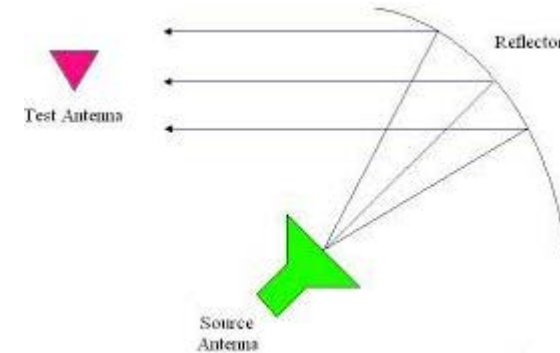


- Frequency: 300MHz to 40GHz
- Gantry radius: 1m to 10m
- Radial accuracy: 0.05mm
- Angular accuracy: 0.02°

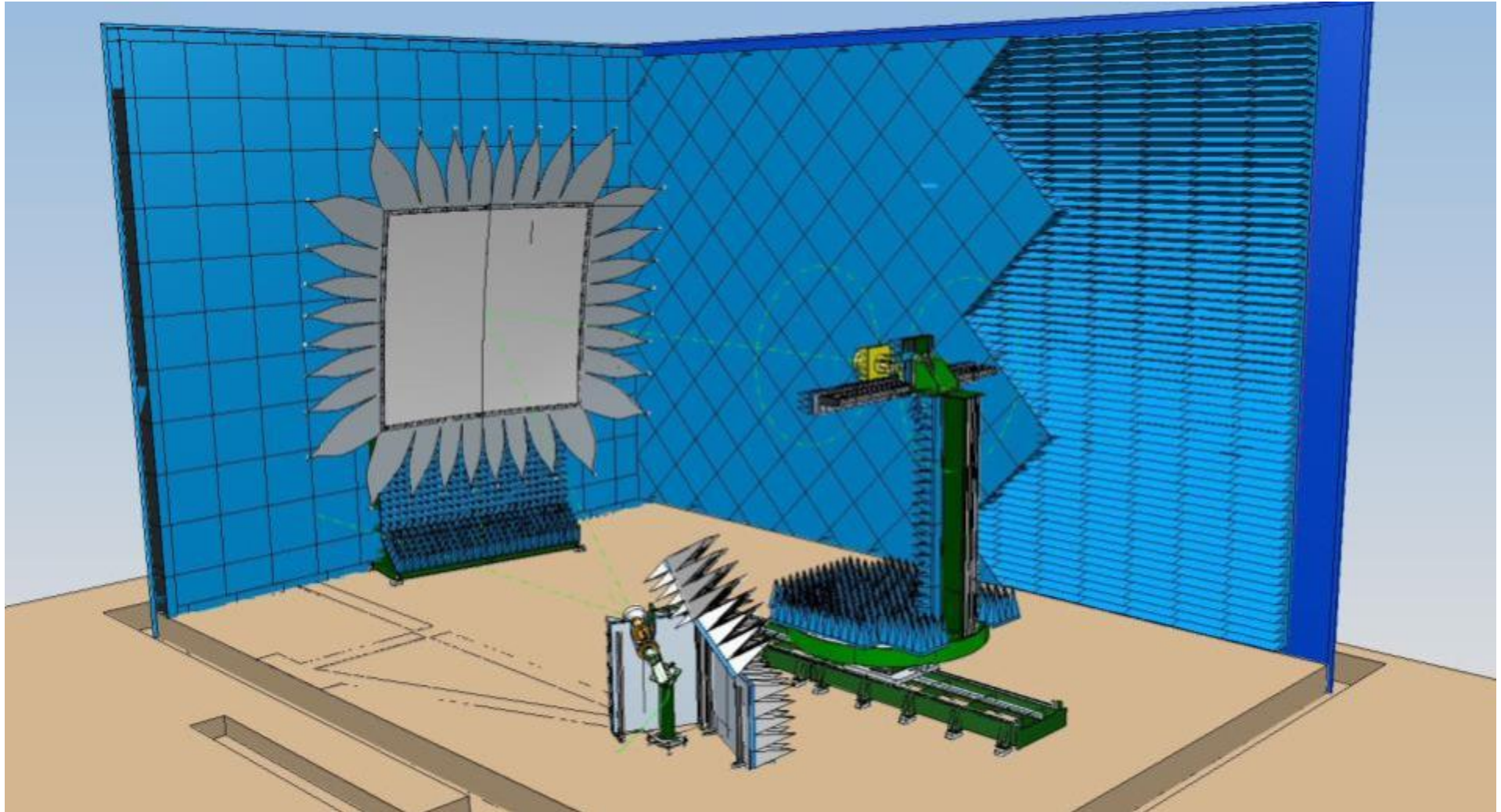


Compact Antenna Test Ranges

- Serrated and rolled single reflector series (500MHz to 200GHz+)
- Maximum quiet zone size of 6m
- Larger or custom size and shape upon request
- Reflectors machined from solid aluminium
- Positioner stack-up with electromagnetic low profile
- Provision for single or dual liner polarised feeds
- Cost-effective solutions

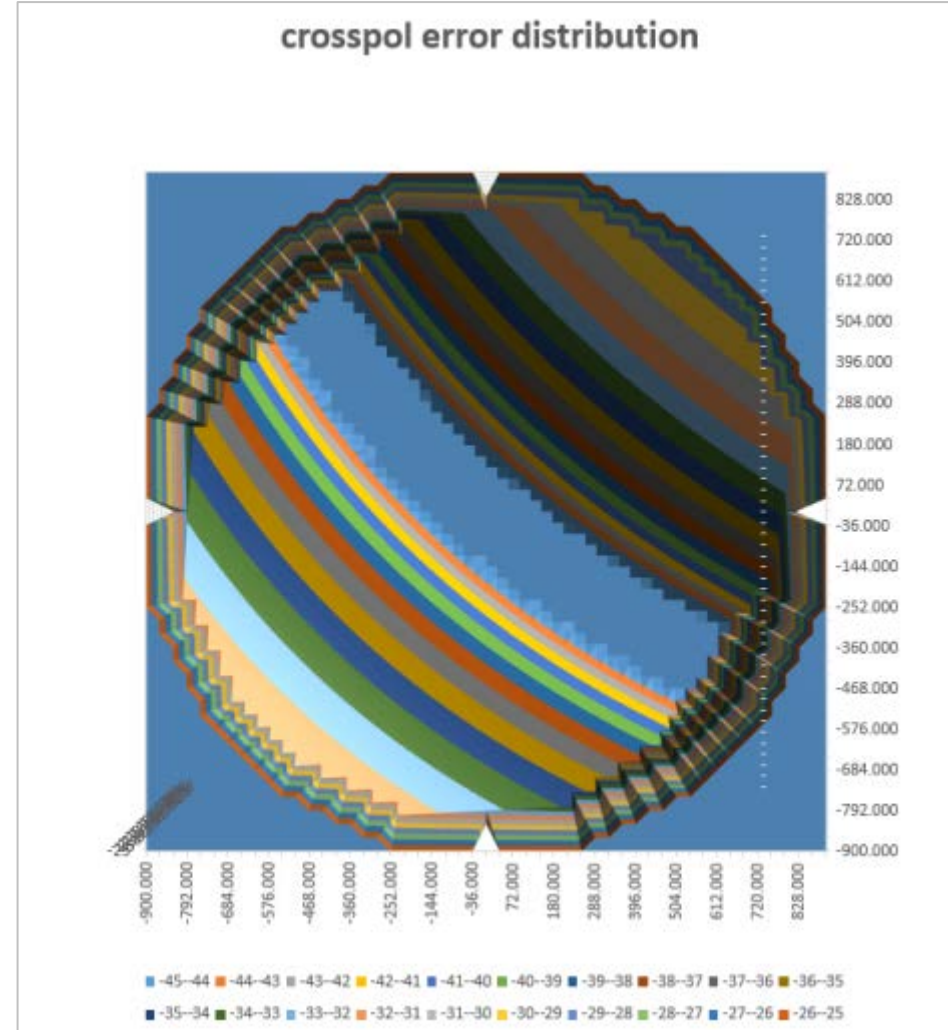
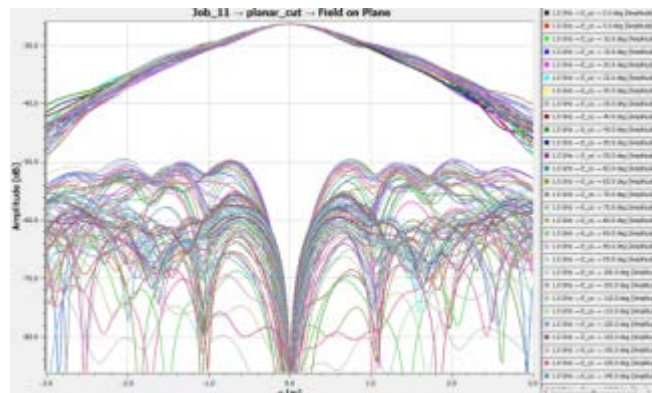
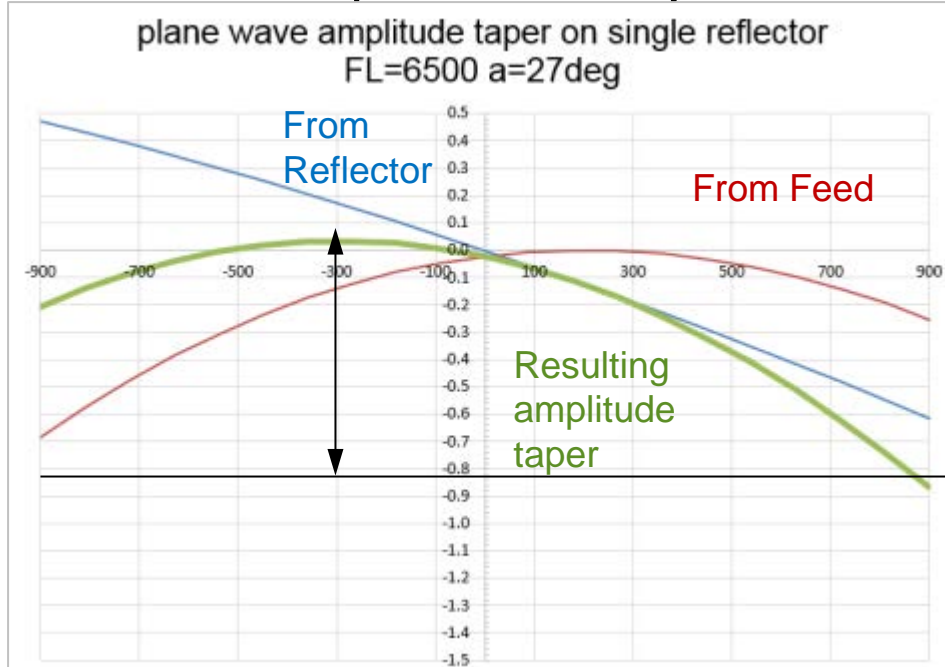


Compact Antenna Test Ranges

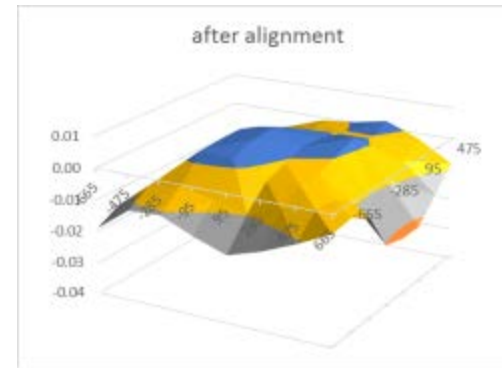


Compact Antenna Test Ranges

Performance prediction by simulation



Reflector Manufacturing & Verification



deviation after alignment in mm		positions in X								
		1	2	3	4	5	6	7	8	
		-665	-475	-285	-95	95	285	475	665	
positions in Y	1	-665	-0.019	-0.011	-0.011	-0.015	-0.019	-0.015	-0.011	-0.006
	2	-475	-0.015	-0.007	-0.005	-0.007	-0.010	-0.006	-0.004	-0.005
	3	-285	-0.020	-0.006	0.003	0.002	-0.003	-0.002	-0.005	-0.008
	4	-95	-0.024	-0.005	0.003	0.005	-0.001	-0.002	-0.009	-0.021
	5	95	-0.027	-0.007	0.004	0.005	0.002	0.000	-0.010	-0.022
	6	285	-0.025	-0.011	0.001	0.003	0.001	0.003	-0.009	-0.022
	7	475	-0.022	-0.013	-0.006	-0.002	0.000	0.000	-0.006	-0.015
	8	665	-0.013	-0.008	-0.004	-0.001	0.000	0.002	-0.002	-0.008

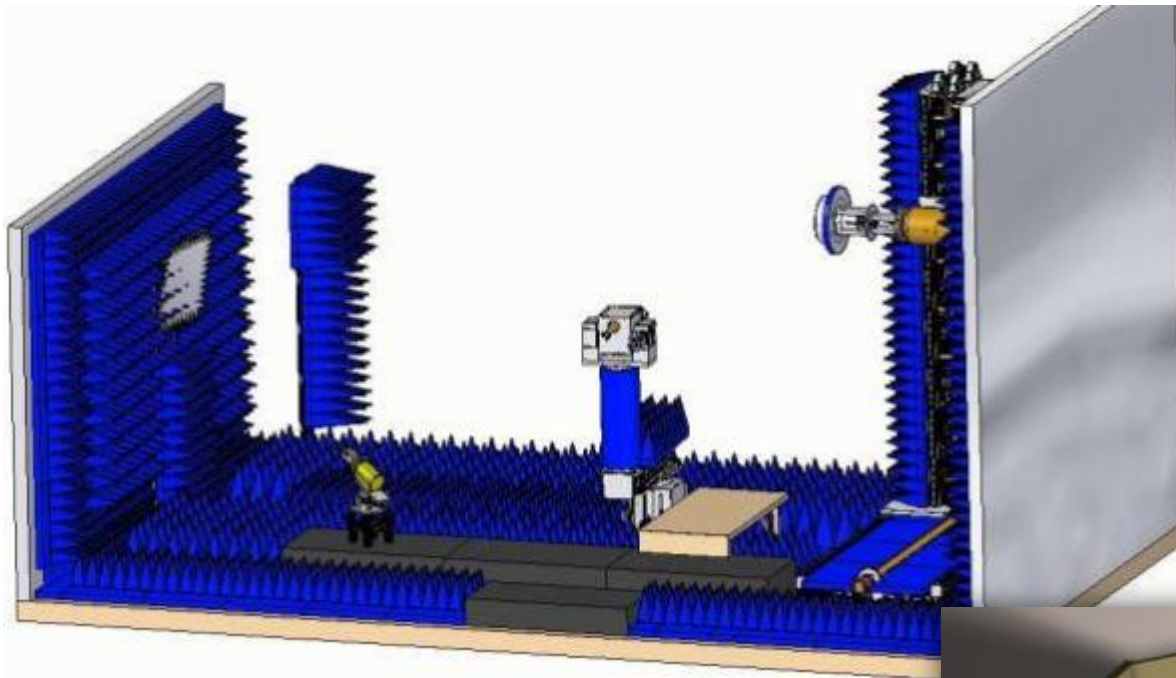
Outstanding surface accuracy

Verified Surface Accuracies 15µm pk to pk delivering a maximum frequency of operation of 300GHz within a 1m Quiet Zone!

complete Reflector
Min: -0.027 mm
Max: 0.005 mm
p-t-p: 0.032 mm
RMS: 0.008 mm

quiet zone only
Min: -0.010 mm
Max: 0.005 mm
p-t-p: 0.015 mm
RMS: 0.005 mm

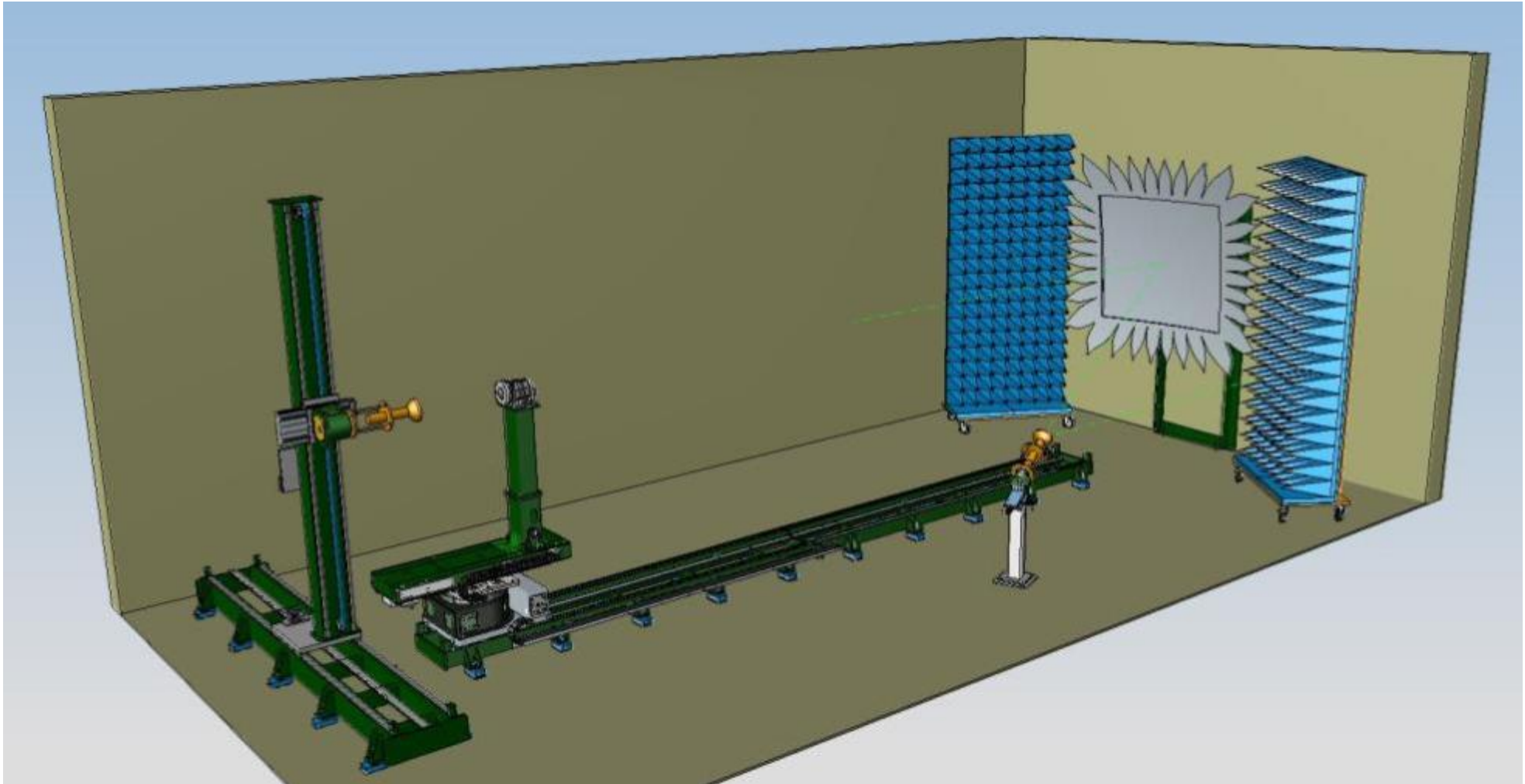
Reconfigurable Test Ranges



Compact/Planar/Cylindrical/
Spherical/Far-Field
400MHz-110GHz



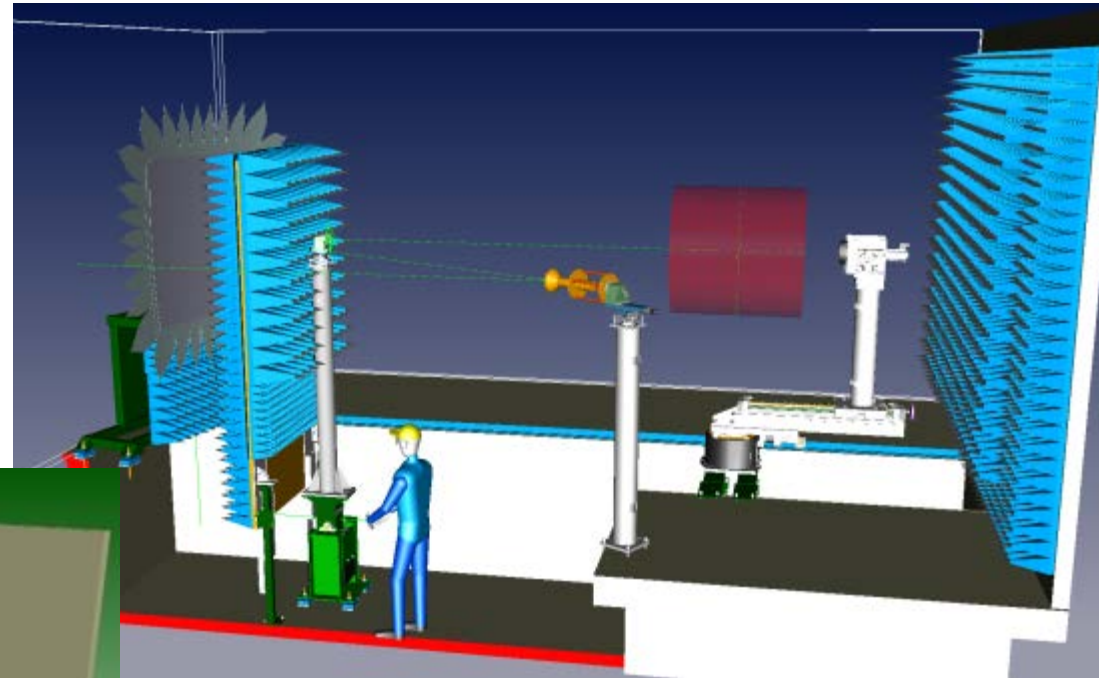
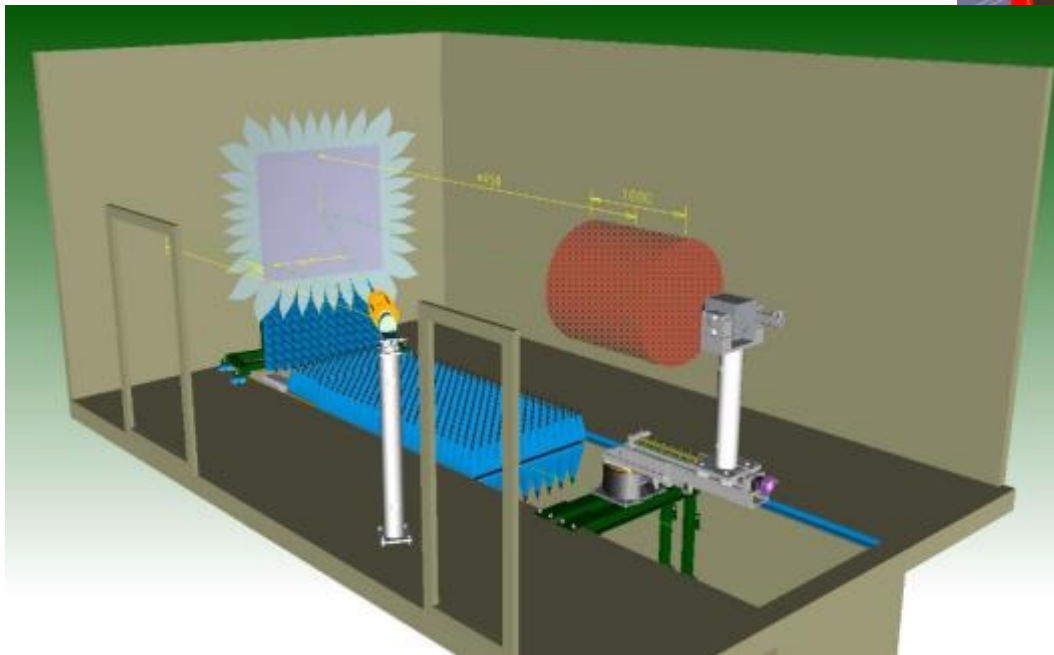
Reconfigurable Test Ranges (CATR+SNFTR+PNFTR)



Reconfigurable Test Ranges (CATR+SNFTR)

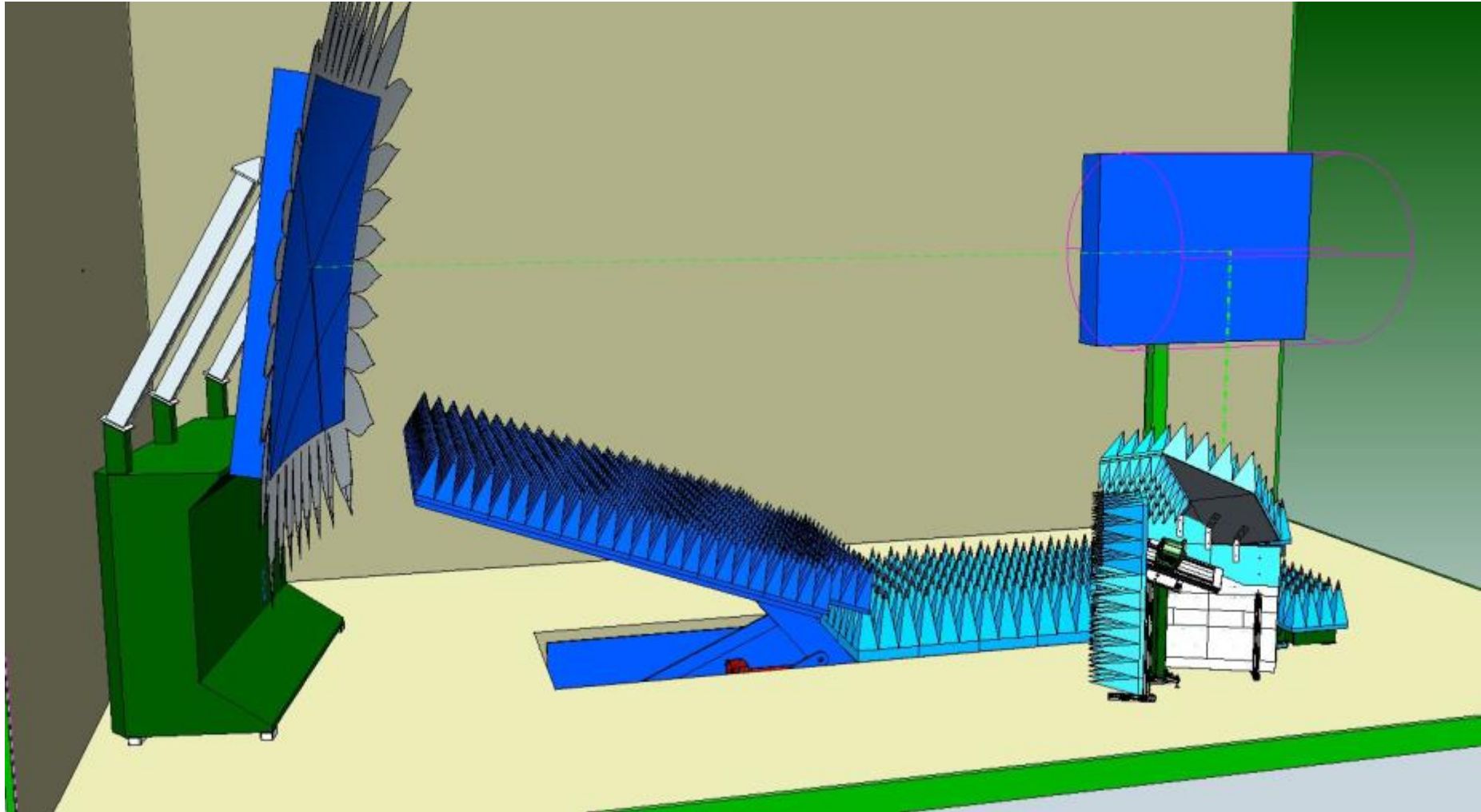
- Wide band solution: 600MHz to 110GHz
- Completely reconfigurable
- Using existing customer chamber
- One common positioning system
- Resulting in customer cost-savings

CATR Mode

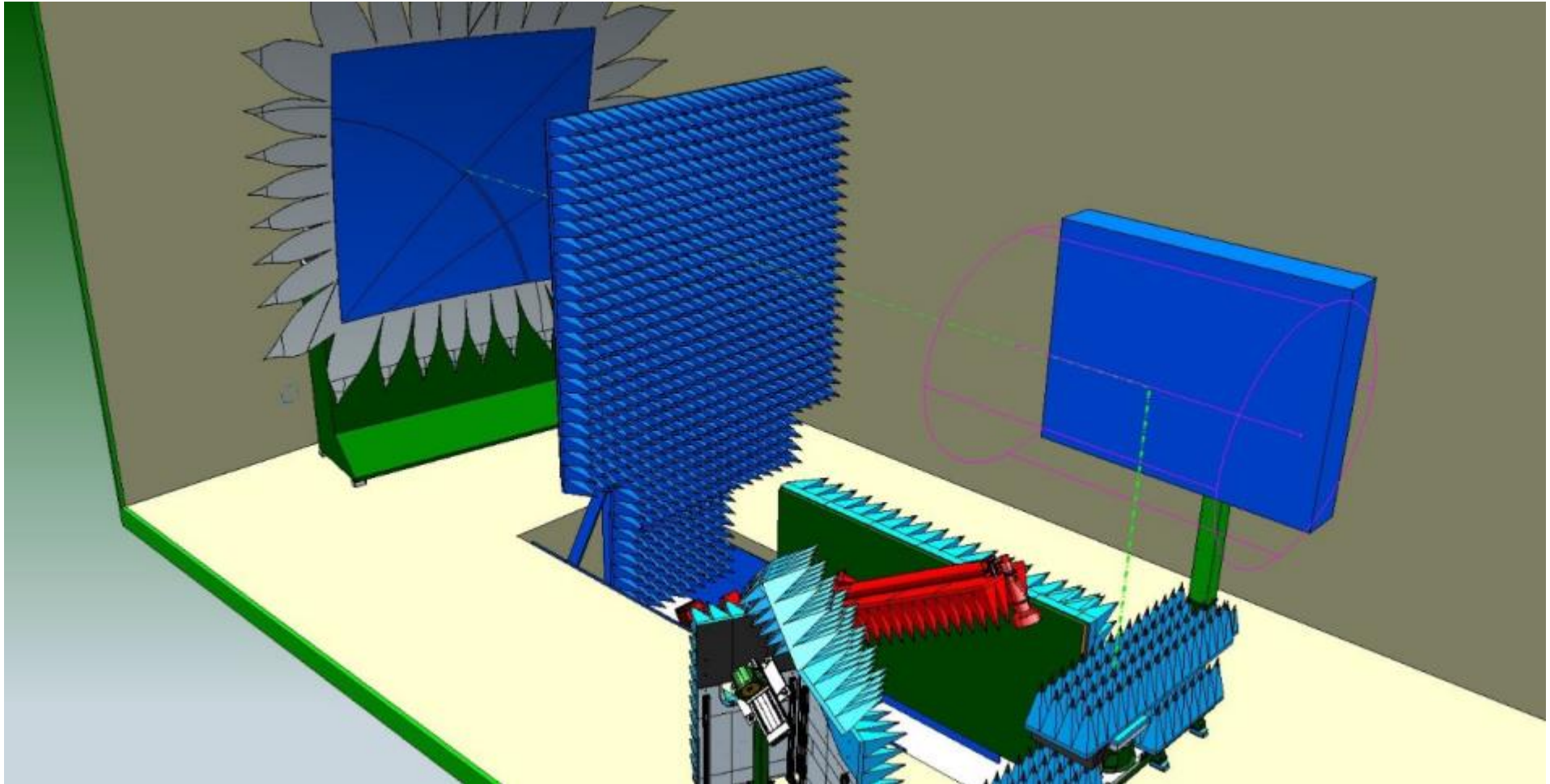


SNFTR Mode

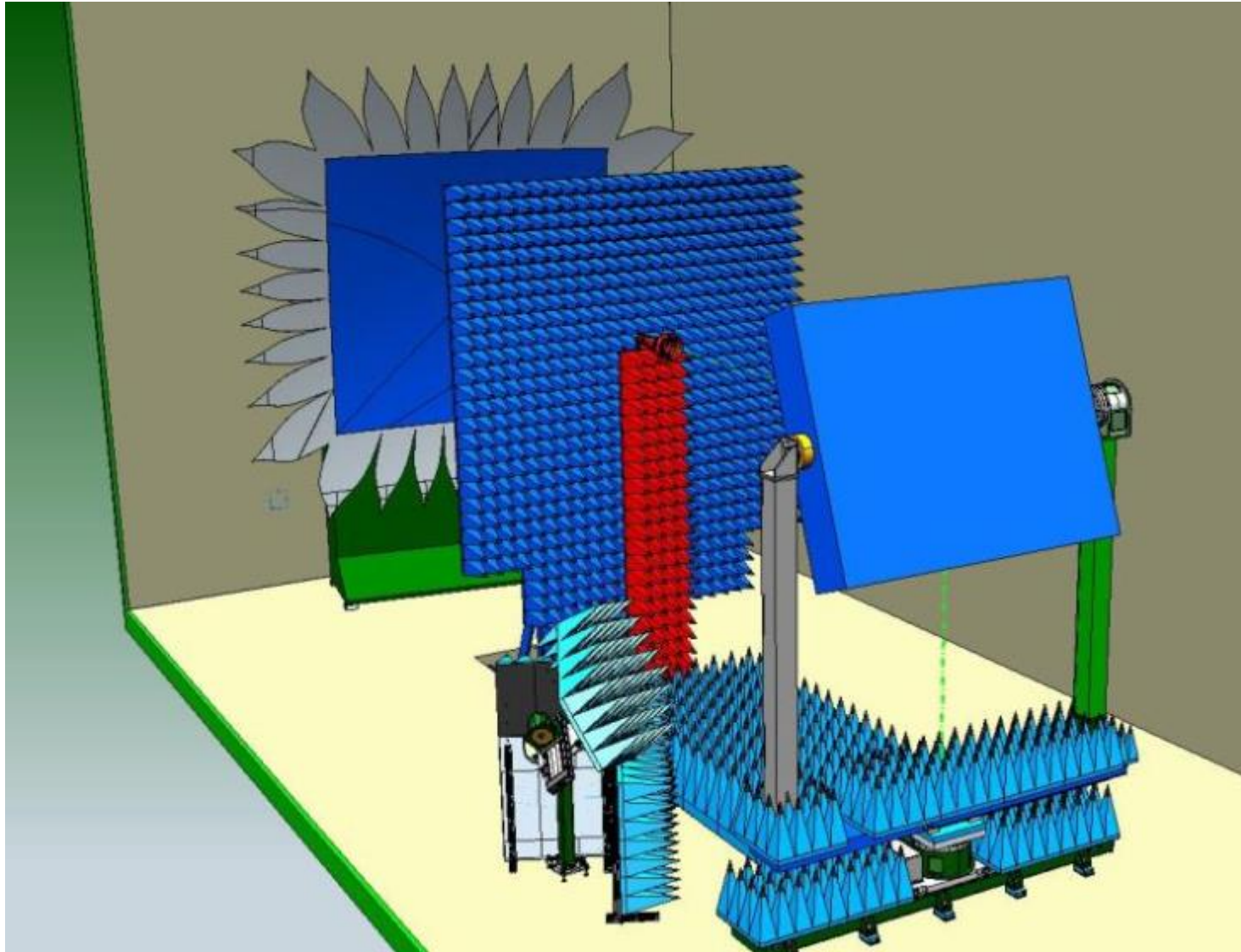
Reconfigurable (CATR+SNFTR) Automated



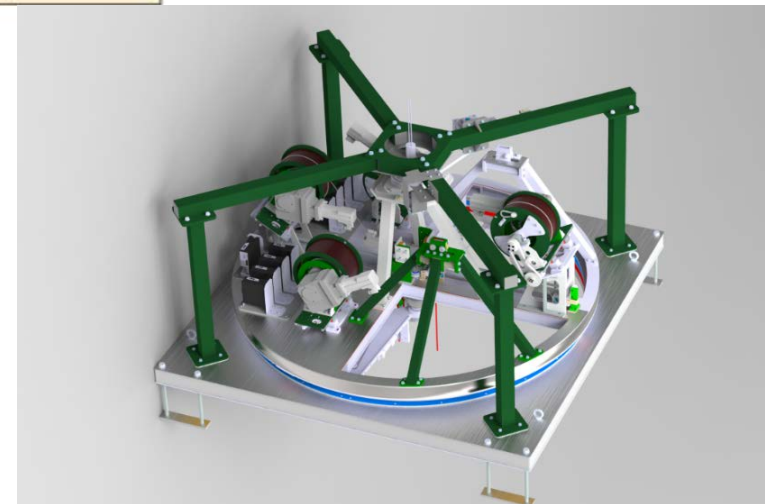
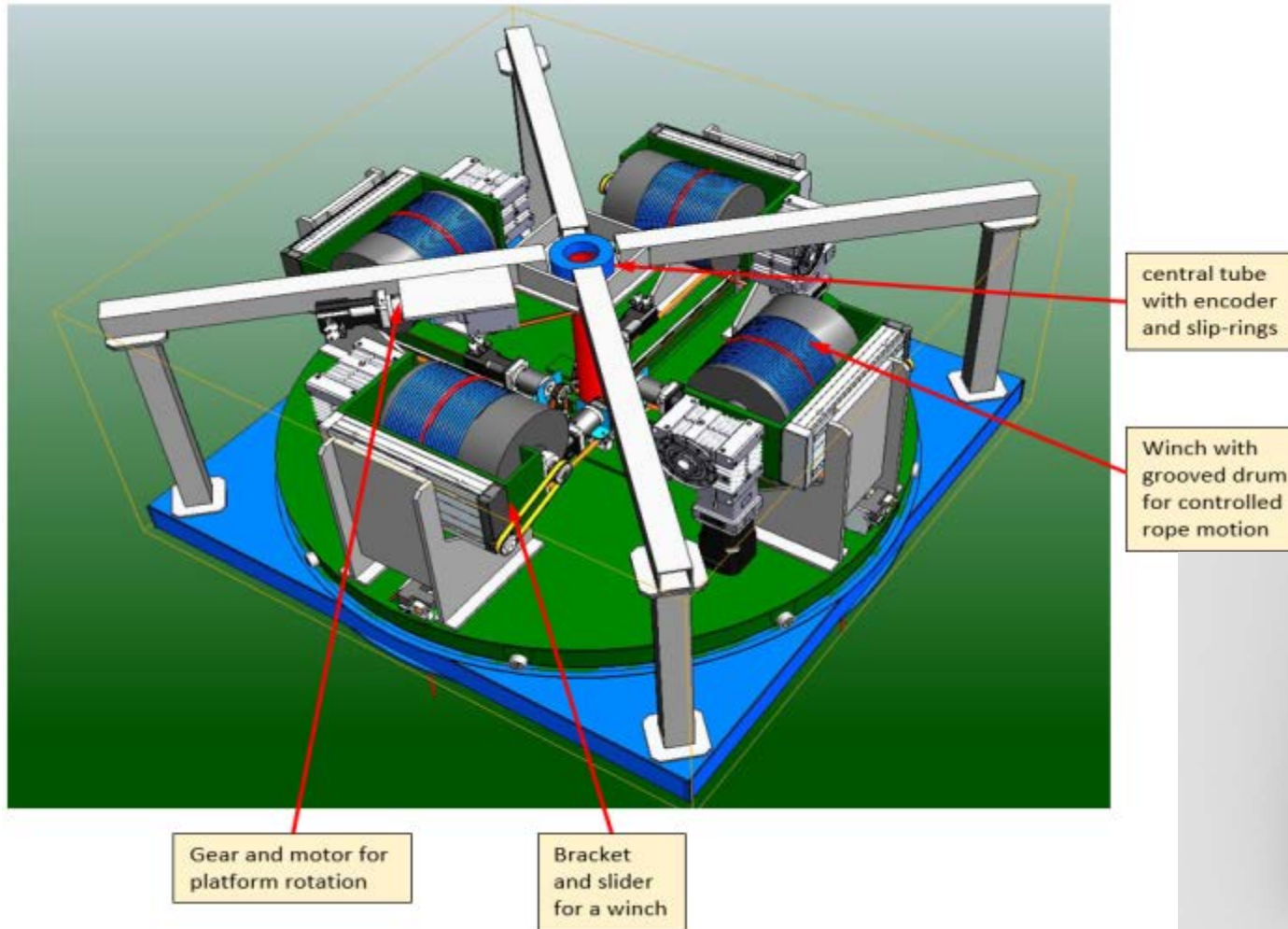
Reconfigurable (CATR+SNFTR) Automated



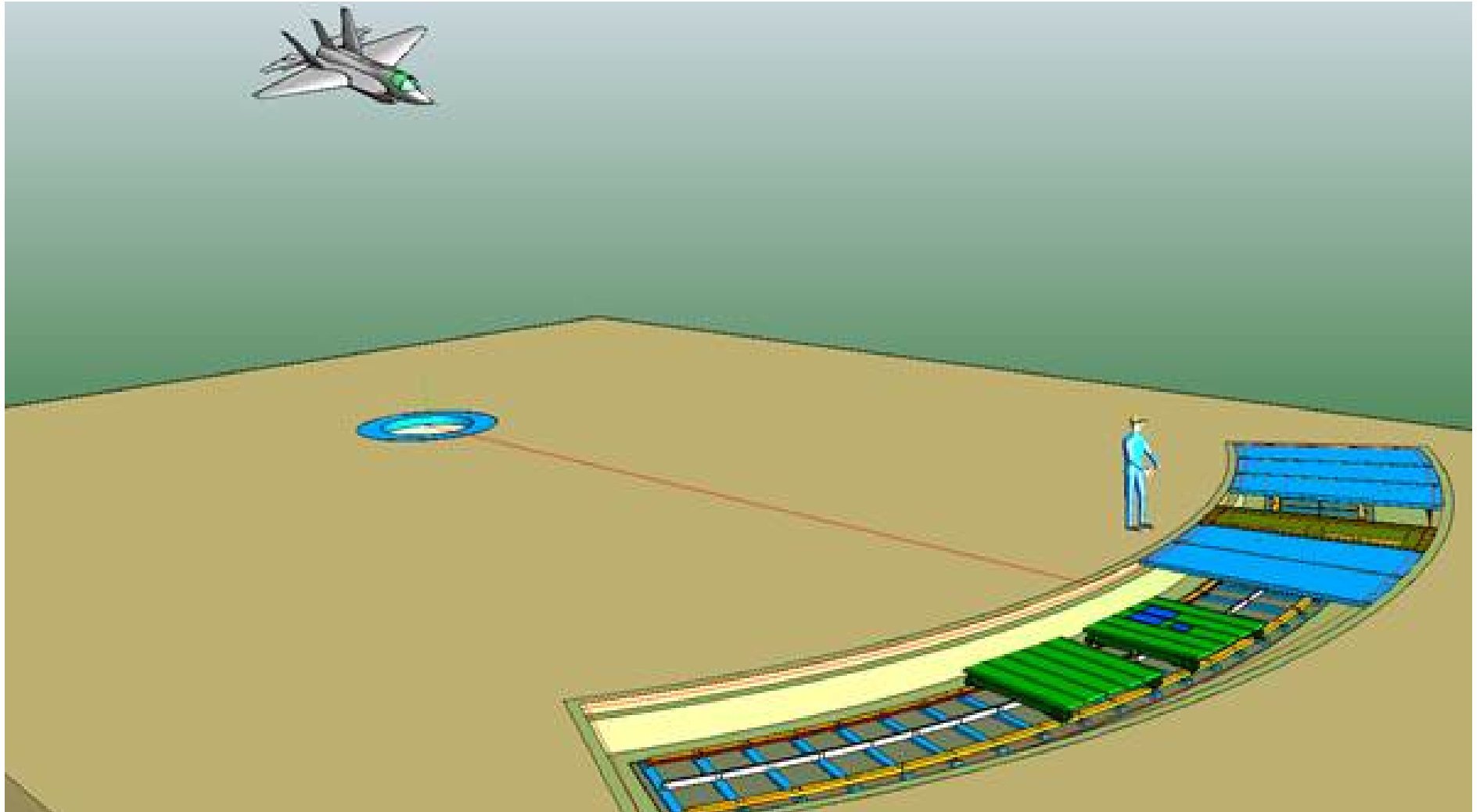
Reconfigurable (CATR+SNFTR) Automated



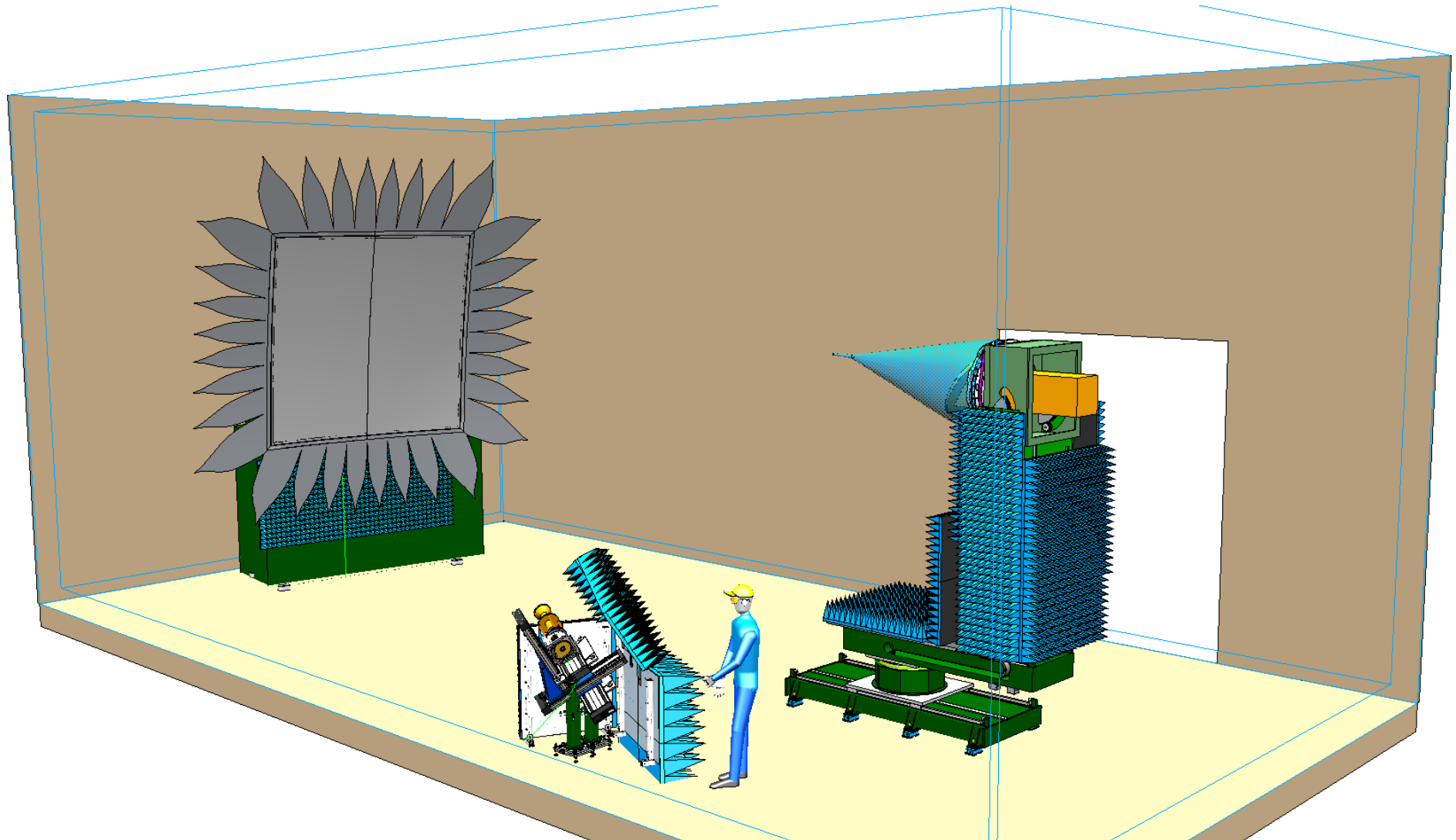
Customised Solutions – String Reel Positioning System (11 Axes)



RCS Aircraft Measurements



RADOME Test Systems



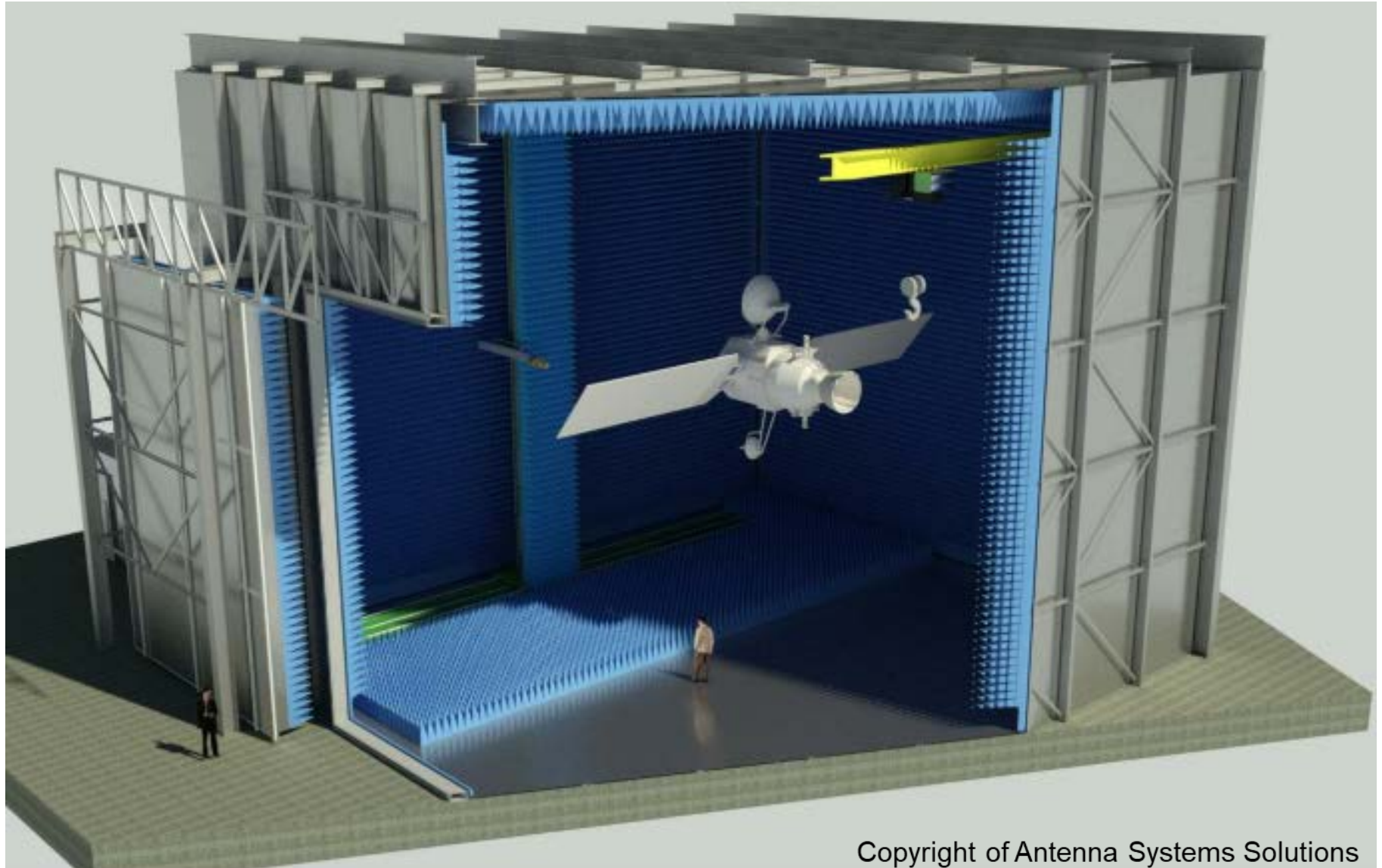
Automotive Test Systems



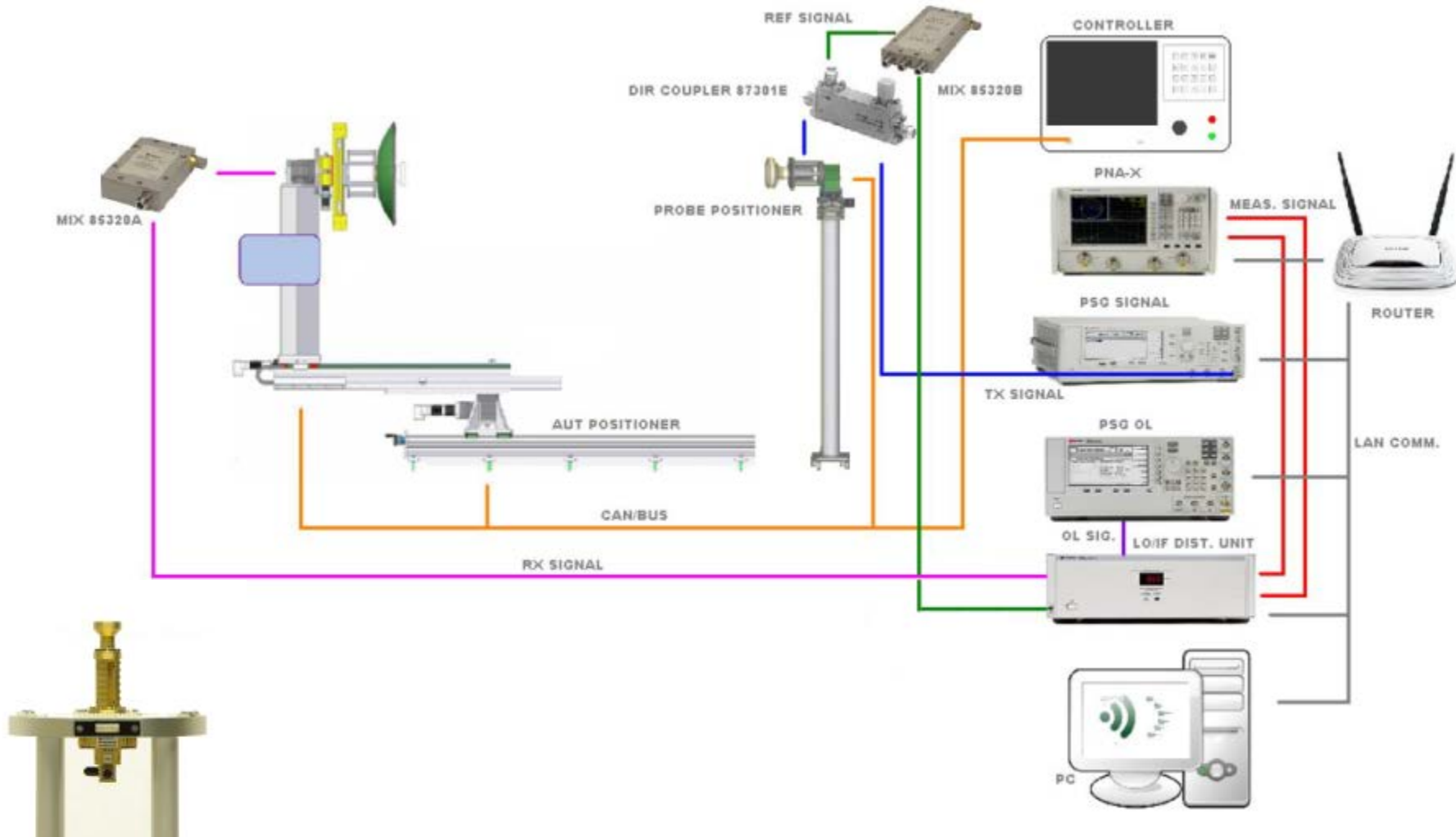
Automotive Test Systems



Satellite Test Systems

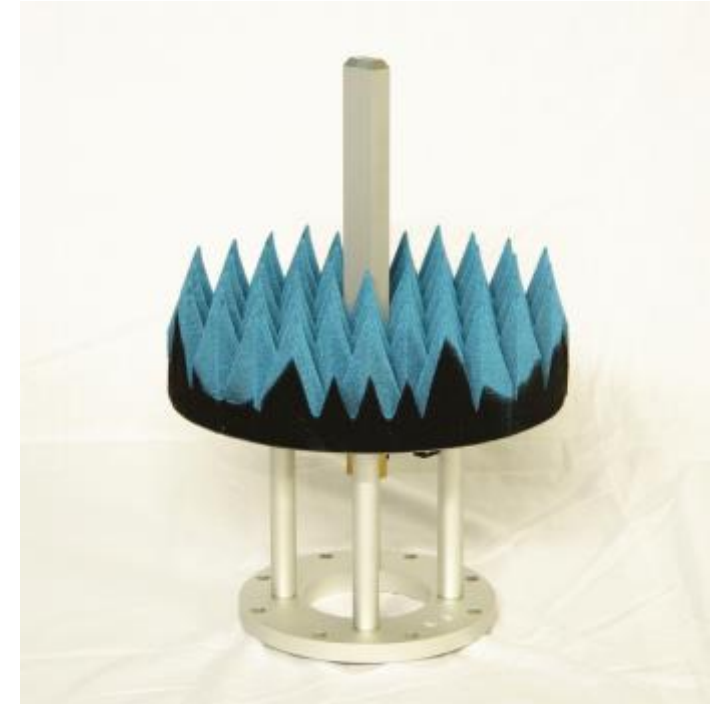
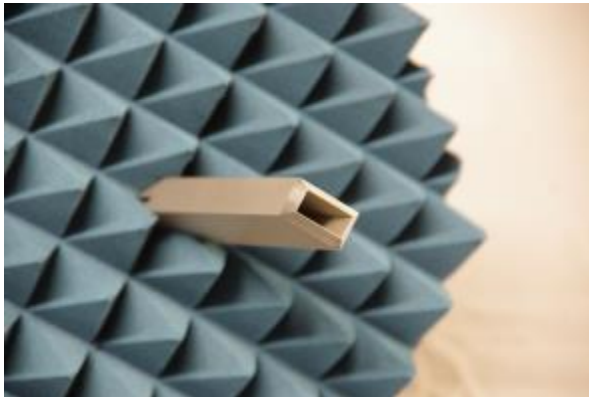


Engineered RF Configuration



Rectangular Probes ASY-RWG Series

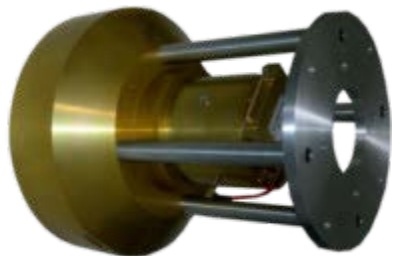
- Application: planar and cylindrical near-field measurements
- Low diffraction effect
- Low loss and high efficiency
- Standard ASYSOL circular interface
- Waveguide input for standard waveguide bands
- Lightweight for ease of handling



Cylindrical Probes/Feeds

ASY-CWG-(S/D) Series

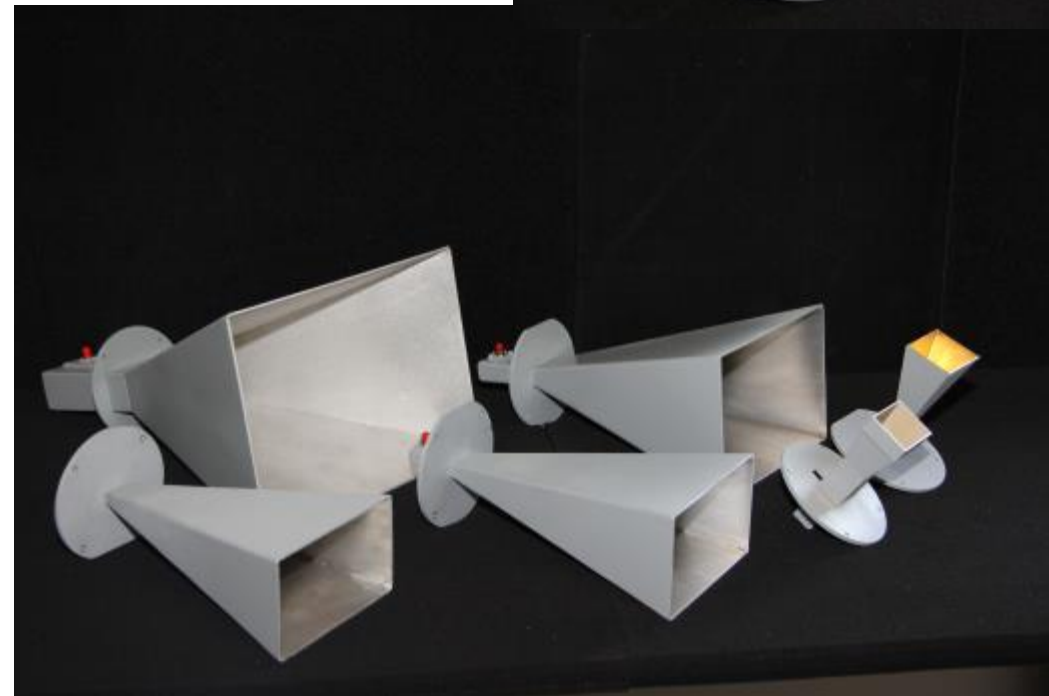
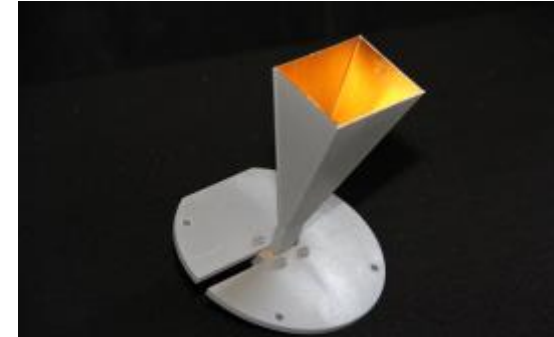
- Application: spherical near-field and CATR
- Frequency: standard waveguide bandwidth
- Rotational symmetric pattern
- Very low cross-polar radiation
- Standard ASYSOL circular interface
- Coaxial input for all band
- Optional dual polarised (adding OMT or compact hybrids)
- Lightweight for ease of handling
- Corrugated aperture (choke)



Standard Gain Horns

ASY-SGH Series

- Very low on axis cross-polar radiation
- Standard ASYSOL circular interface
- Lightweight for ease of handling
- Standard spirit level
- Low error aperture phase

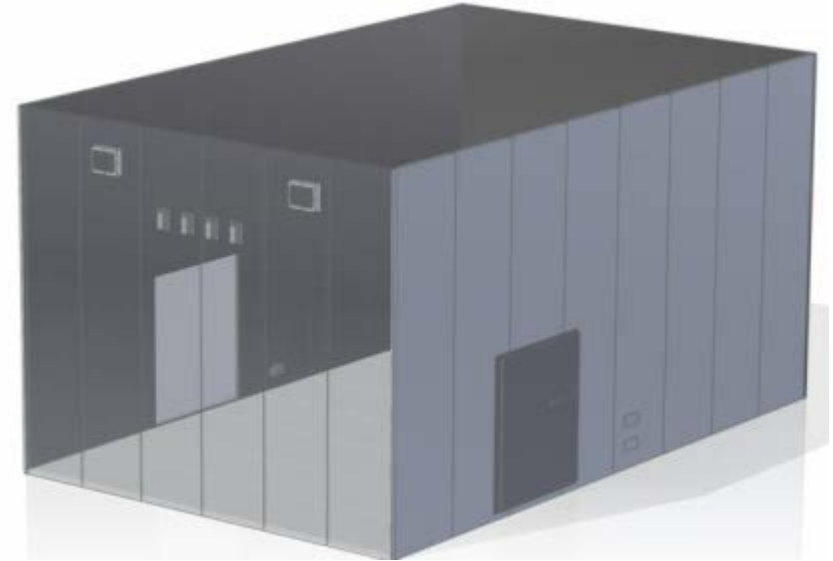


Anechoic Chambers

**Bespoke chamber design for
antenna measurement projects**

Typical shielding of 70dB up to 40GHz

- Modular design
- Up to 5-6m high panels
- Self-supporting
- Included:
 - honeycomb ventilation panels
 - penetration connector panel
 - AC filters (optional)



ASYSOFT Hedgehog



ACQUISITION MODULE :

- ✓ Fully automated
- ✓ JAVA based modular approach
- ✓ Scripting as standard
- ✓ Video help tutorials
- ✓ Instruments:
 - ✓ Rohde & Schwarz
 - ✓ Keysight Technologies
 - ✓ Anritsu

AVAILABLE NEAR-TO-FAR FIELD TRANSFORMATIONS:

- ✓ Spherical with probe correction
- ✓ Cylindrical with probe correction
- ✓ Planar with probe correction

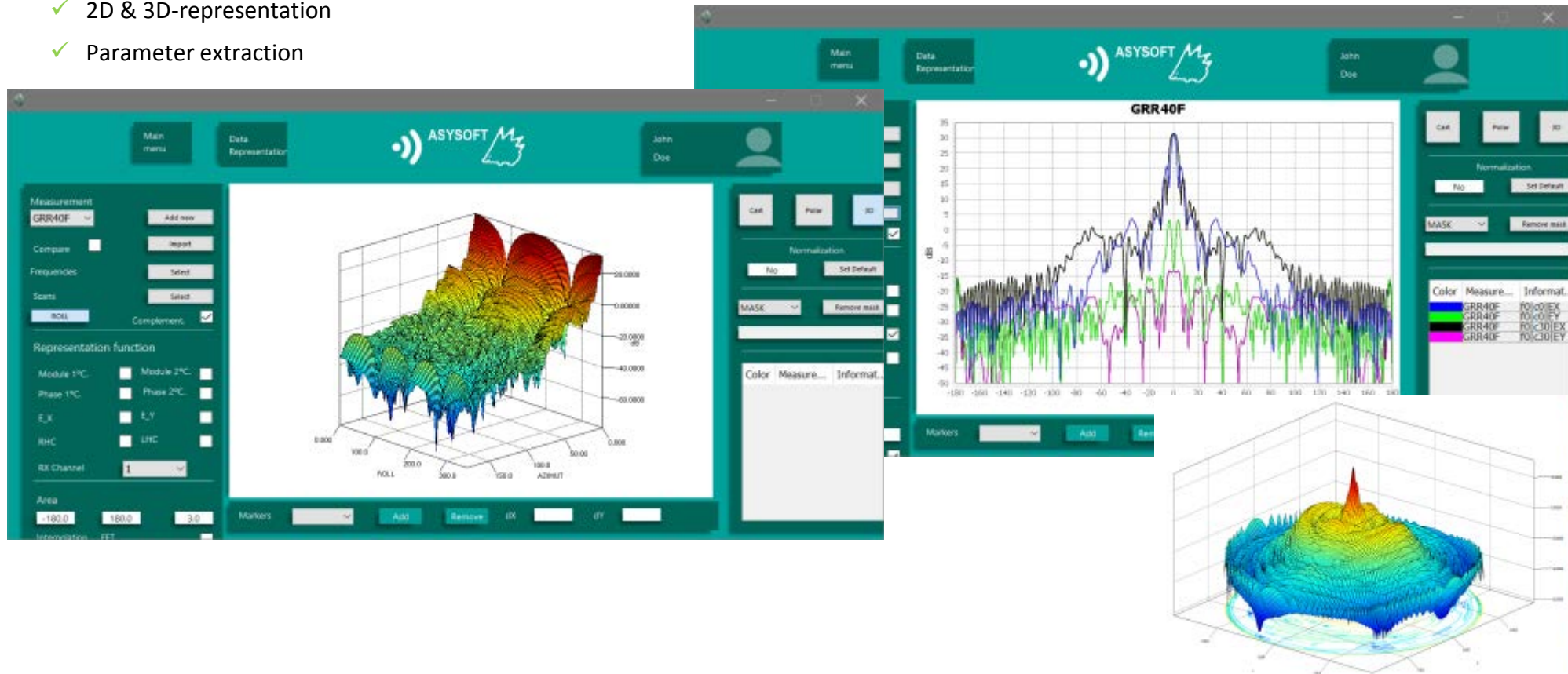


ASYSOFT Hedgehog



DATA VISUALISATION AND TRANSFORMATION:

- ✓ Interpolation, angle rotation,
- ✓ Back-projection
- ✓ Linear to circular polarisation transformation
- ✓ 2D & 3D-representation
- ✓ Parameter extraction



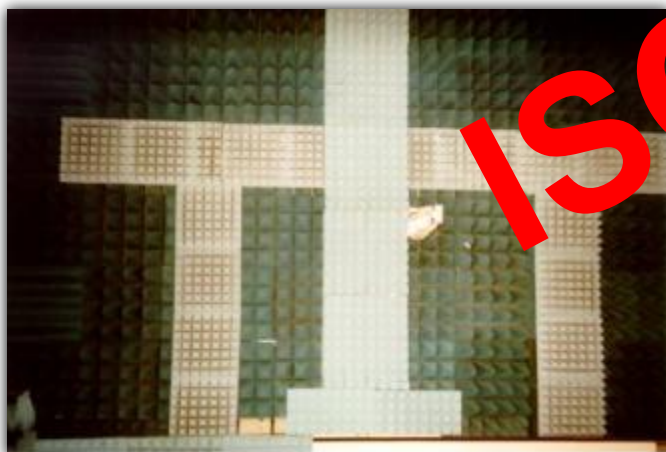
Testing Capabilities



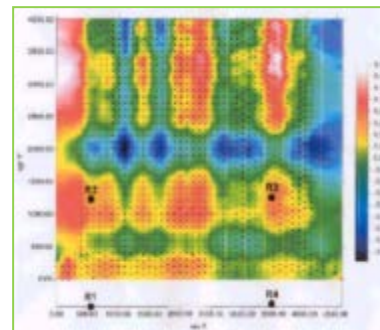
SNFS (1-40 GHz)



Gregorian Double Reflector CATR
(1-40 GHz) Quiet Zone 3m

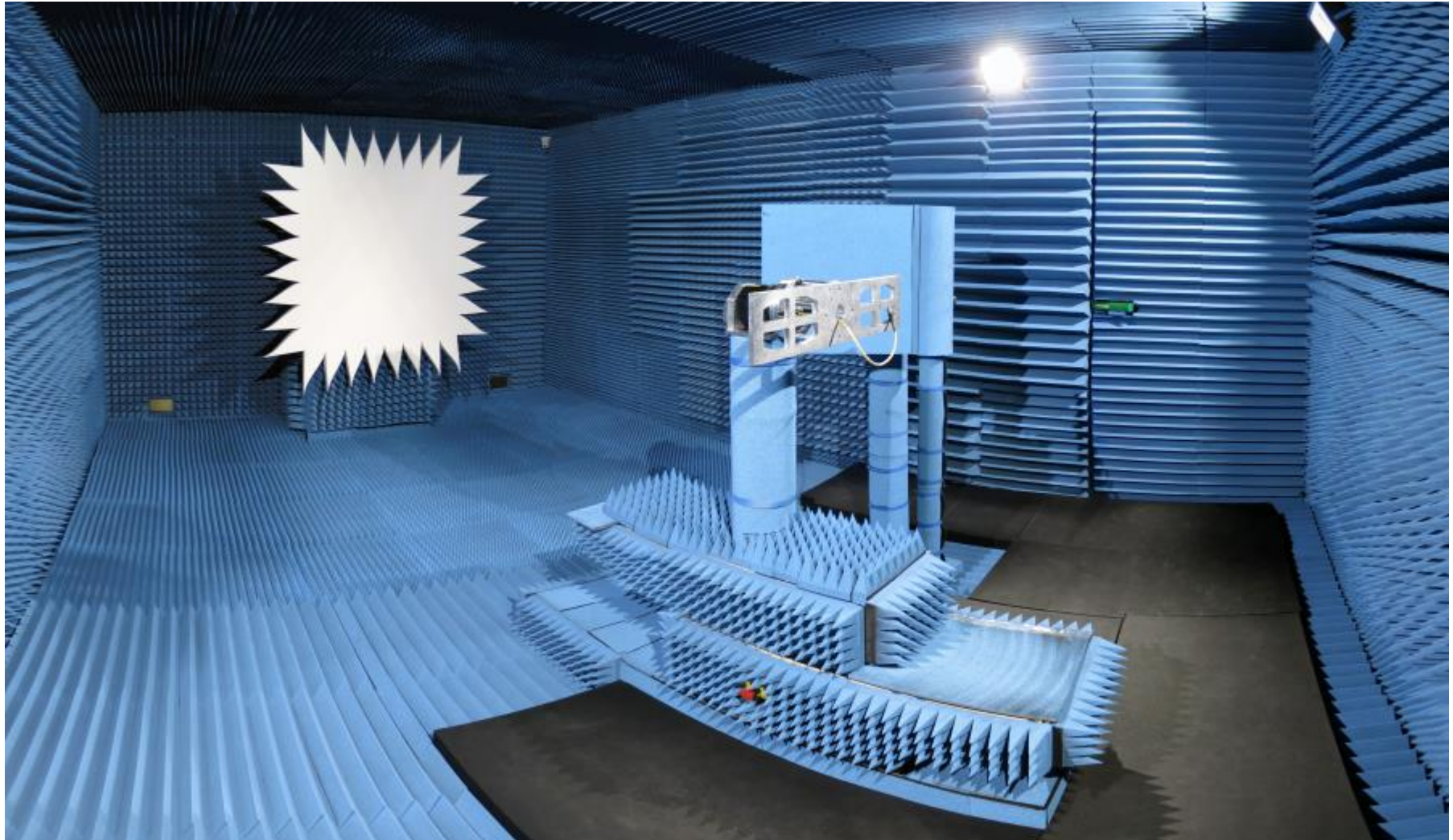


5x5m PNF Scanner (0.25mm planarity)

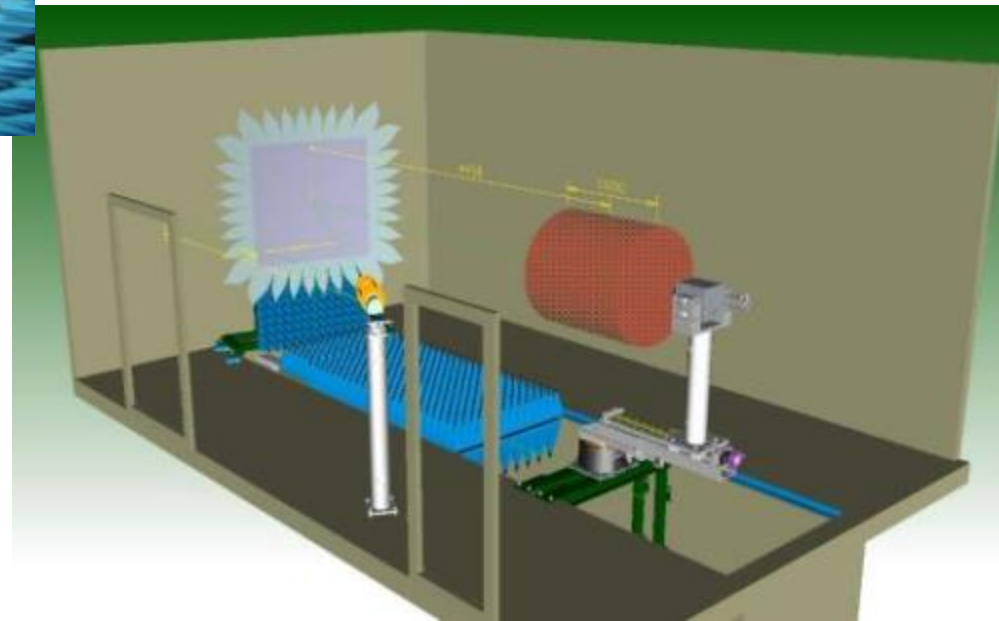
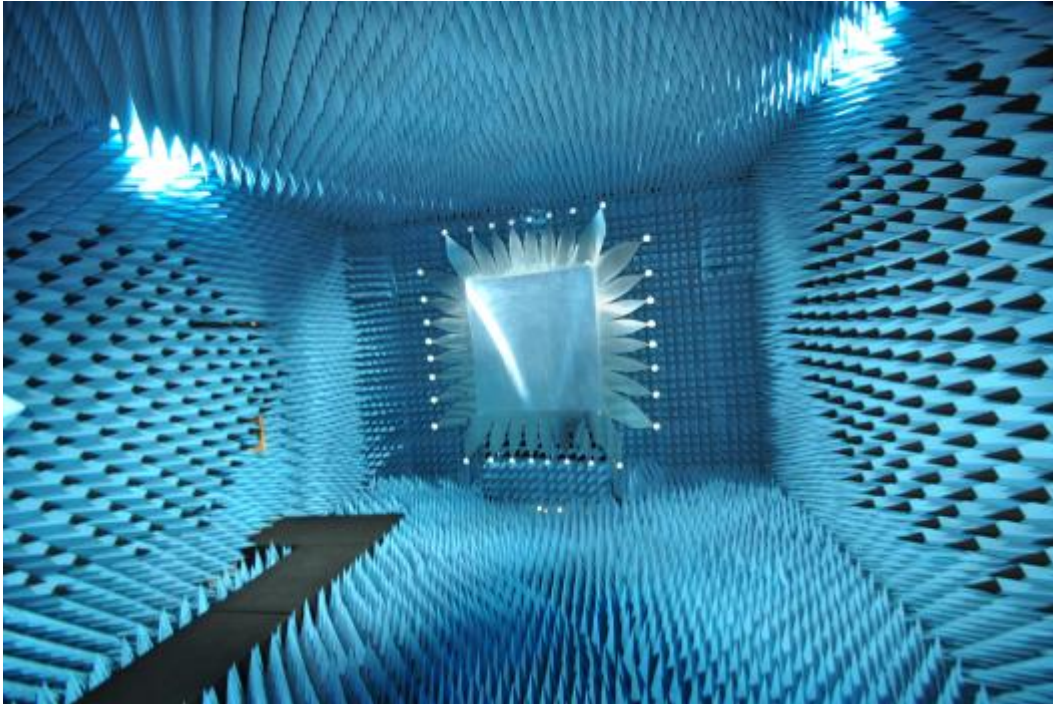


ISO-17025

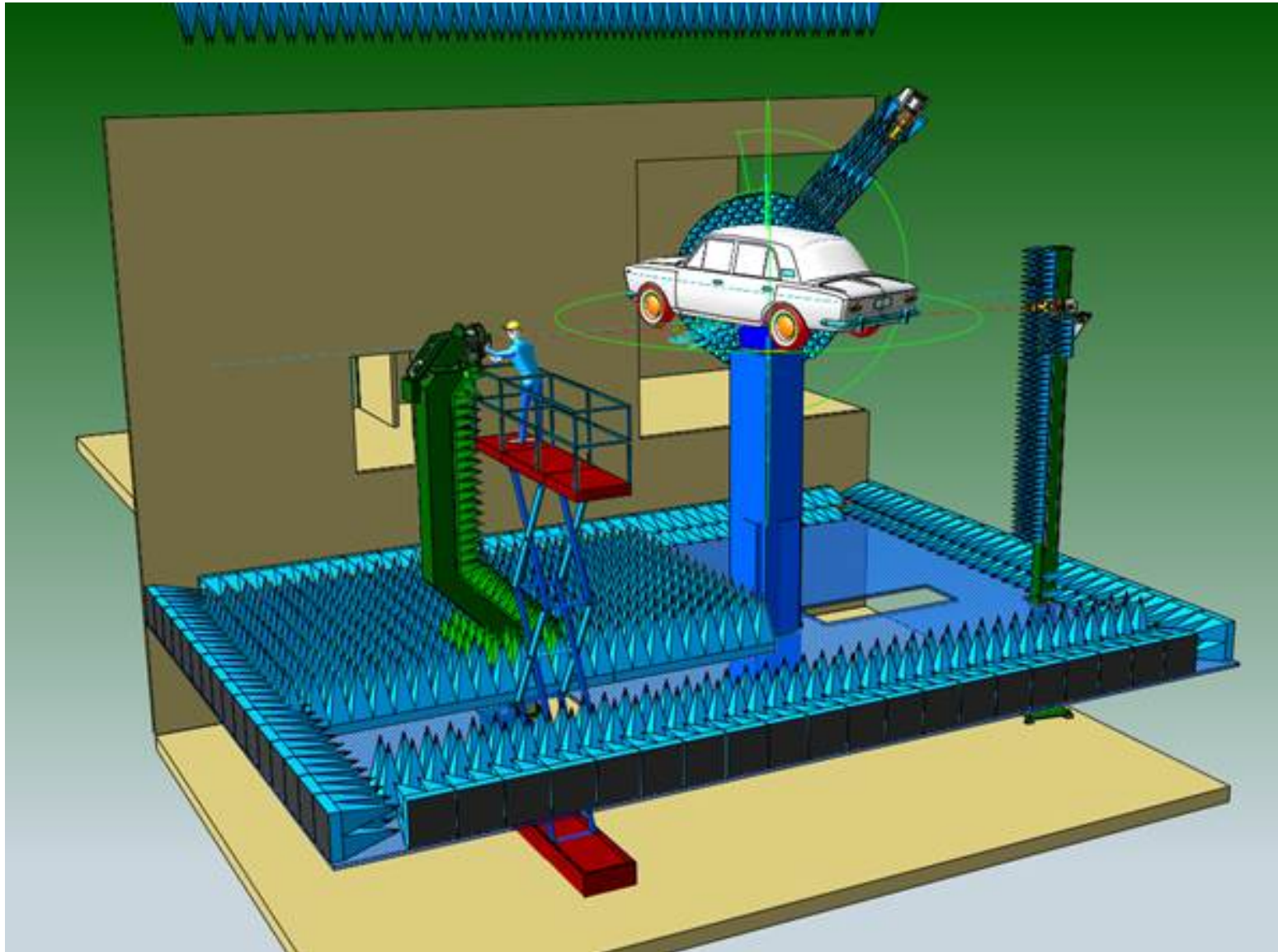
QEST Germany CATR 2-40GHz



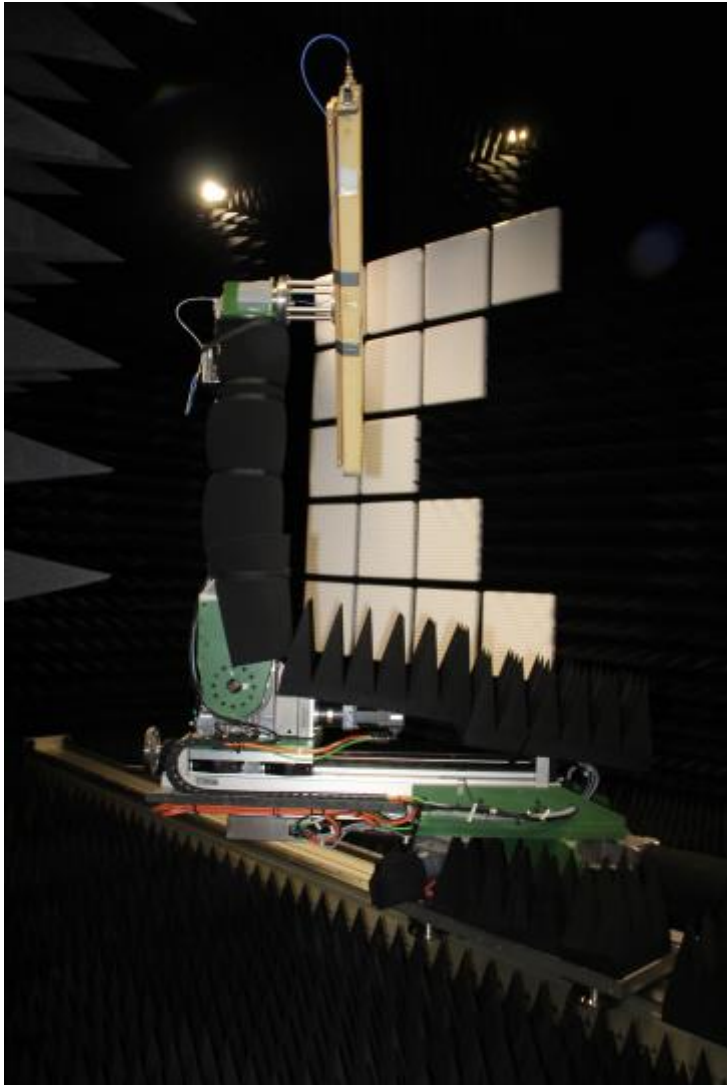
Telecom Italia CATR-SNFTR 650MHz – 110GHz



Aalborg University – Automotive System



METU (Turkey) Far-field Spherical Near-Field System ($<40\text{GHz}$)



Orange Labs (France) Spherical Near-Field System up to 110GHz



Orange Labs (France) Spherical Near-Field System up to 110GHz



ASYSQL customers include:



1. EADS Casa Espacio (Spain)
2. Metasensing (Netherlands)
3. SAAB Dynamics (Sweden)
4. SAAB Dynamics (Sweden)
5. SAAB Defence and Security (Sweden)
6. CEA Grenoble (France)
7. TTI (Spain)
8. Russian Systems Technology
9. QEST (Germany)
10. Thales UK
11. ERA (Czech Republic)
12. Telecom Italia (Italy)
13. Huawei Italy
14. Vodafone (Spain)
15. Orange Labs (France)
16. Filtronik (Sweden)
17. University of Cantabria (Spain)
18. University of Valencia (Spain)

- Planar Near-field System
- X band Surveillance Radar Antenna
- Upgrade of RCS Measurement System
- Spherical Near-field system
- Anechoic Microwave Chamber
- Far-field System
- Compact Antenna Test Range
- Compact Antenna Test Range
- Turn-key Compact Antenna Test Range
- String Reel and Curved Arch RCS Test System
- Spherical Near-field Test System
- Compact Antenna Test Range System
- Near-field/ Compact Test Range up to 140GHz
- Shielded Enclosure
- Anechoic Chamber Spherical Near-field 110GHz
- Low Frequency ORBIT/MVG CATR Upgrade
- Spherical Near-field System
- Anechoic Chamber plus Relocation

ASYSQL customers include:



- | | |
|---|---|
| 19. METU (Turkey) | Turn-key Spherical Near-field Test Range |
| 20. Tula University Test Centre (Russia) | Compact Antenna Test Range System |
| 21. Royal University of Stockholm (Sweden) | Turnkey Spherical Near-field Test Range |
| 22. Aalborg University (Denmark) | Automotive Spherical Near-field Test Systems |
| 23. Aalto University (Finland) | Spherical Near-field Turnkey System |
| 24. University of Barcelona (Spain) | Spherical Near-field Test Range |
| 25. University of Aveiro (Portugal) | Spherical Near-field System |
| 26. University of Kent (UK) | Reconfigurable antenna measurement system |
| 27. University of Montpellier (France) | Spherical Near-field System |
| 28. University Marne La Vallee (France) | Anechoic Chamber and Spherical Near-field |
| 29. LEAT (France) | Compact Antenna Test Range (<180GHz) |
| 30. Cambium Networks (UK) | Turnkey Compact Antenna Test Range |
| 31. KETZ (Russia) | Compact Antenna Test Range |
| 32. Telecom Italia (Italy) | Reconfigurable Low Frequency Compact Antenna Test Range (2m) and Spherical Near-field Range |
| 33. Tubitak Bilgem (Turkey) | Planar/cylindrical Near-Field (10m x 10m) |
| 34. VIASAT (Switzerland) | Spherical Near-field Test Systems (8m x 5m) |

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Thank you for your attention



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