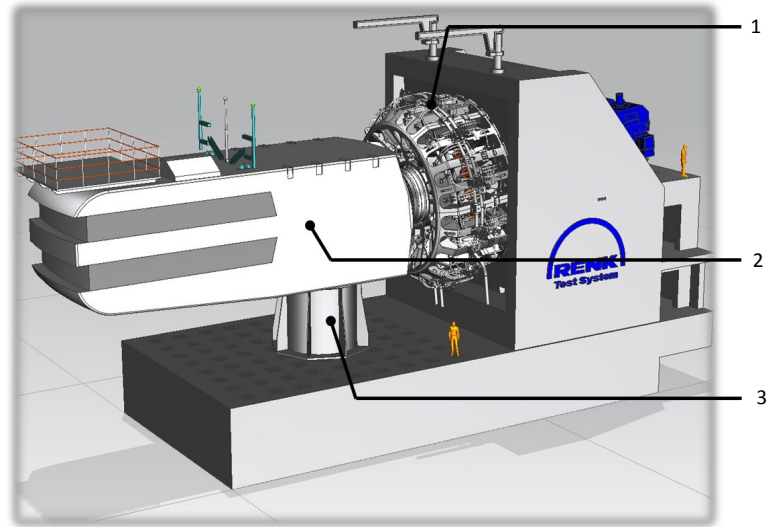


15 MW Test Rig Specifications

Test Rig

- Allows for testing of specimens up to a power of 15 MW
- Designed for testing endurance and acceptance in an R&D application as well as quality assurance
- Compatible with geared and direct drive specimens
- Ability to test at 50 and 60 Hz
- Ability to test low voltage and zero voltage ride through with the grid simulator



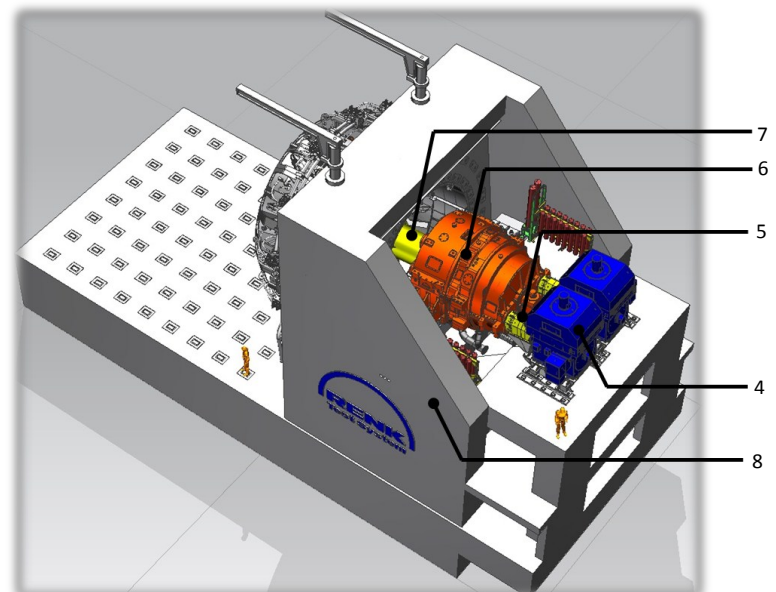
Fully Integrated Single Vendor Turnkey Test System

- High reliability, low maintenance, and long service life
- Easy accessibility for specimen interchange
- Flexible configuration for test of various specimens
- Noise and vibration optimization for all components
- Speed and torque controlled drive unit
- Manual and automatic test modes
- Telemetric system for special measurement signals

1	Load Application Unit
2	Test Specimen
3	Tower
4	2 Drive Motors
5	2 High Speed Shafts
6	Gearbox
7	Low Speed Shaft
8	Test Rig Foundation

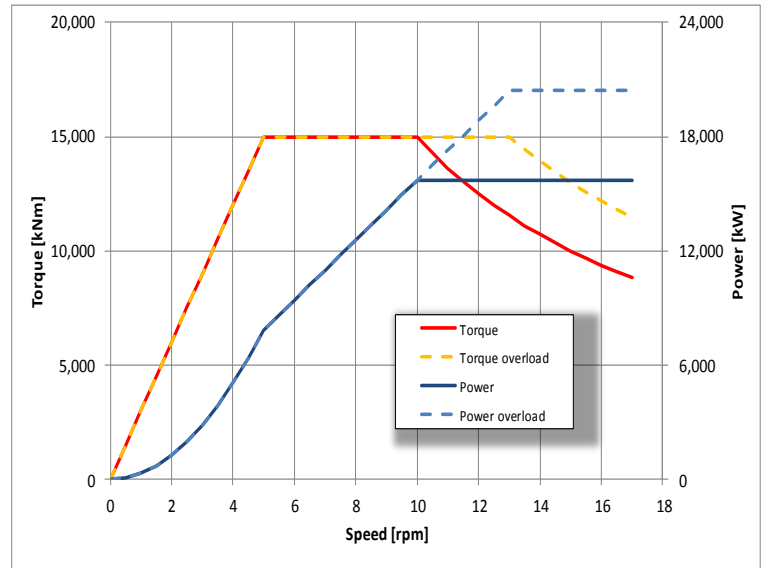
Data Acquisition

- 750 channel high speed data acquisition system designed by Savannah River National Lab
- Time synchronization between all systems
- Redundant Removable Hard Drive RAID 5 Drive System
- Real time data stream through high speed fiber optic link to vendor
- Data encryption up to NSA approved Suite B used for VPN between Charleston and vendor
- Data stored in TDMS format

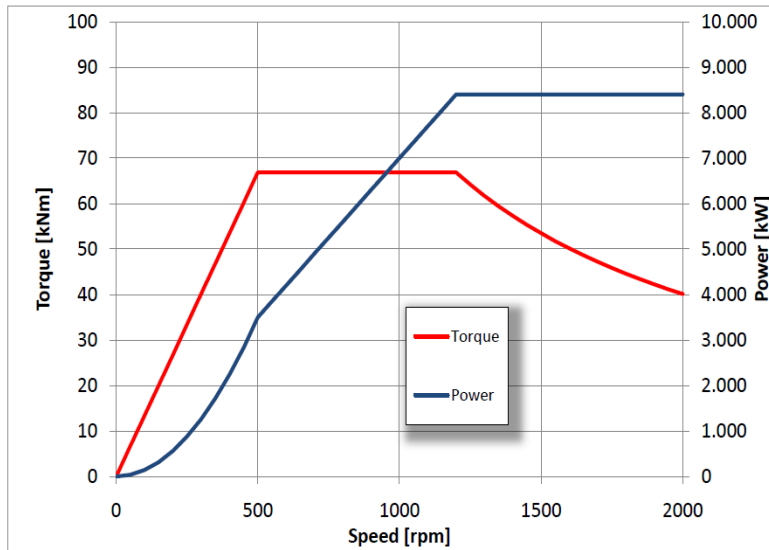


Features	
Power (Electrical Closed Loop)	15,700 kW
Number of Motors	2
Number of Converters	4
Test Rig Dimensions (L x W x H)	35 x 12 x 11 m
Test Specimen	
Maximum Diameter	13 m
Maximum Length	20 m
Test Rig Drivetrain	
Test Power	15,700 kW
Nominal Test Torque	15,000 kNm
Nominal Test Speed	10 rpm
Max Test Speed	17 rpm
Inclination	6 °
Shaft Height to Specimen	Approx 7,000 mm

Test Rig Torque & Power vs. Speed



Drive Motor Torque & Power vs. Speed



Drive Motor	
Power	8,400 kW
Nominal Torque	66,850 Nm
Nominal Speed	1,200 rpm
Max Speed	2,000 rpm
Gearbox	
Power	17,000 kW
Ratio	Approx 120
Torque (Low Speed Shaft)	Approx 16,000 kNm
Torque (High Speed Shaft)	Approx 68 kNm
Nominal Speed (Low Speed Shaft)	10 rpm
Max Speed (Low Speed Shaft)	17 rpm
Max Speed (High Speed Shaft)	2,000 rpm

Coupling Between Gearbox and LAU		
Maximum Torque	16,000 kNm	
Maximum Speed	17 rpm	
LAU		
Axial Coupling Displacement	± 20 mm	
Radial Coupling Displacement	± 20 mm	
Max Coupling Angular Misalignment	0.8 °	
LAU Static Loads		
Axial Force	± 4,000 kN	$C_A > 400 \text{ kN/mm}$
Radial Force	± 8,000 kN	$C_R > 800 \text{ kN/mm}$
Bending Moment	± 50,000 kNm	$C_B > 3,580 \text{ MNm/rad}$
LAU Dynamic Loads		
$M_B = 0.7 \cdot M_{Bmax} + 0.3 \cdot M_{Bmax} \cdot \sin 2\pi \cdot 1\text{Hz}$	$C_B > 6,000 \text{ MNm/rad}$	
$F_R = 0.7 \cdot F_{Rmax} + 0.3 \cdot F_{Rmax} \cdot \sin 2\pi \cdot 1\text{Hz}$	$C_R > 700 \text{ kN/mm}$	
$F_A = 0.7 \cdot F_{Amax} + 0.3 \cdot F_{Amax} \cdot \sin 2\pi \cdot 1\text{Hz}$	$C_A > 700 \text{ kN/mm}$	

