

COMPUTERIZED SINGLE AXIS SERVO HYDRAULIC FATIGUE TESTING MACHINE (RBE Series)



RBS -1000 (10 kN) with heating chamber

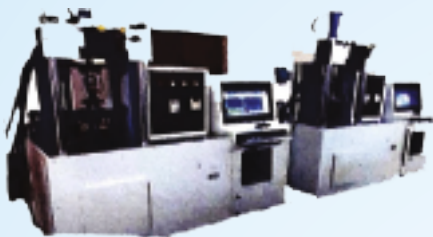


RBS -10000 (100 kN) without heating chamber



RBS-25000 (250 kN)

- Fully computerized
+1% accuracy
- 2mv/v output load cell
- Italian stroke sensor
- Labview software
- Variable test frequency
- Traceability to N.P.L.
- NI-USA/Germany
Interface card
- Countrywide service
support From REAL
- Two columns load frame
with maximum daylight
(load cell to actuator
piston end) from 50 to
1300 mm or 1600mm to
allow the testing of
required specimens.
- CE marked electrical
components



Real's RBE-25000 single axis Servo hydraulic fatigue testing machine made with heavy duty press frame assembly with neat and clean welding joints. Highly accurate, reliable and cost effective machines with minimum maintenance and user friendly windows based software. These machine are versatile suitable for wide variety of metals, rubber, Alloys and other parts etc.

RBE series machines comprises of a rigid steel frame with Servo hydraulic actuator. The actuator is provided with guide to avoid radial movement contamination. Servo actuator is interfaced with software to perform testing as per user defined parameters. The load frame having fatigue life rating and capable of withstanding at least 1.5 times the normal developed load.

Electronics used in machine is world class with HBM-Germany load cell, Italian stroke sensor, NI-USA/Germany/Hungary interface card, Labview software & CE marked electrical Peripherals/components.

Data recording is standard in software and user can analyze test data in tabular form or can transfer to XLS format. Both tabular and graphical data is available.

TECHNOLOGY:

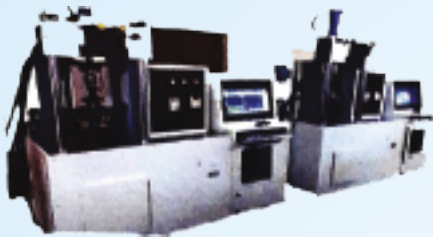
REAL's RBE single axis machines are designed after years of our research in Indian Rubber industry. Unlike other servo hydraulic machines, real has made several technological developments to make servo technology cost effective and in reach of SSI units.

DIGITAL CONTROLLER

Digital controller up to 4 input channels for stroke, load, strain and one extra to support the various wave generation like Square, Sine, Triangular, random and ramp signal etc. Fully digital, closed loop dedicated system based on 32-bit architecture. The digital control system is fully capable of controlling the actuator in position, load, and strain modes.. 32 bit resolution waveform generation with loop closure rate of 10 kHz.

Special features –

- High Speed GPDS Signal conditioners suitable for 100X noise free amplification and distortion free transmission upto 100Hz
- Automatic load cell recognition. Poka yoke for any new transducer
- Transducer can be automatically recognized. Calibration through password in software to prevent wrong input from unauthorized user
- Automatic high speed limit detection @ 1ms or better. Auto servo loop tuning @ 10Khz.
- Safety feature - Actuator crosshead clamping mechanism provided with automatic position control. The control system to ensure the load is kept within a predefined range during test set up and specimen loading. The minimum load is to be 0.2% of the maximum load or lower.
- Run tests through application programs running on PC. Accuracy of all transducer is Class-05 of ISO 9513. Hand held controller for cross head movement and also for initiating the test.

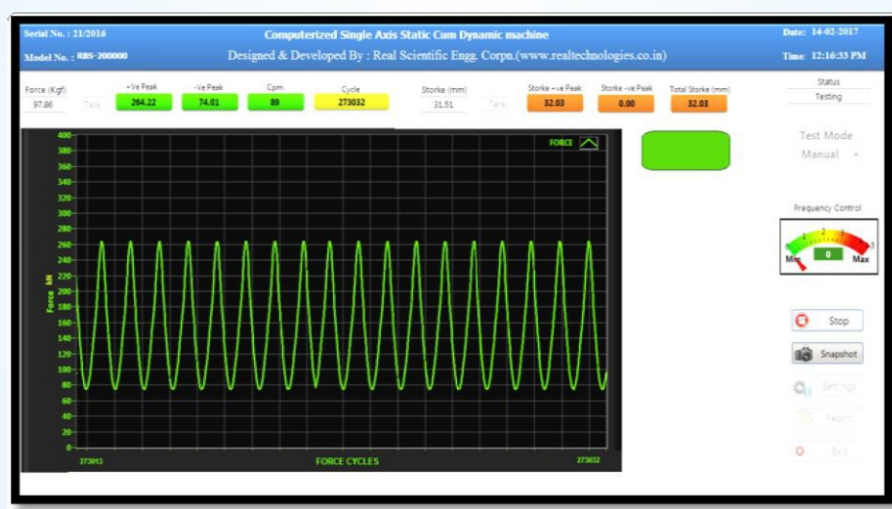


SOFTWARE:

REAL is having expertise in developing tailor made applications on NI LABVIEW platform. We have gone through a variety of test requirements in rubber industry and developed this software. Some of the unique features are : User friendly menu, Easy recipe format, Error support, Data recording w,r,t. Bath/Date/Part no., Data transfer to Xls/Txt/HTML, Snapshot facility for making presentations etc

INTERFACE:

RBE machine are equipped with world famous NI Interfacing cards (USA/HUNGARY) Sampling speed per channel is maintained above 10 kHz to take accurate measurements. Real is not using any additional software based filtering in either of the measuring system as the signal conditioners are specifically designed to provide a smooth and noise free output. GPDS series Signal conditioners are fast, reliable and works comfortably, even without Air-conditioning.



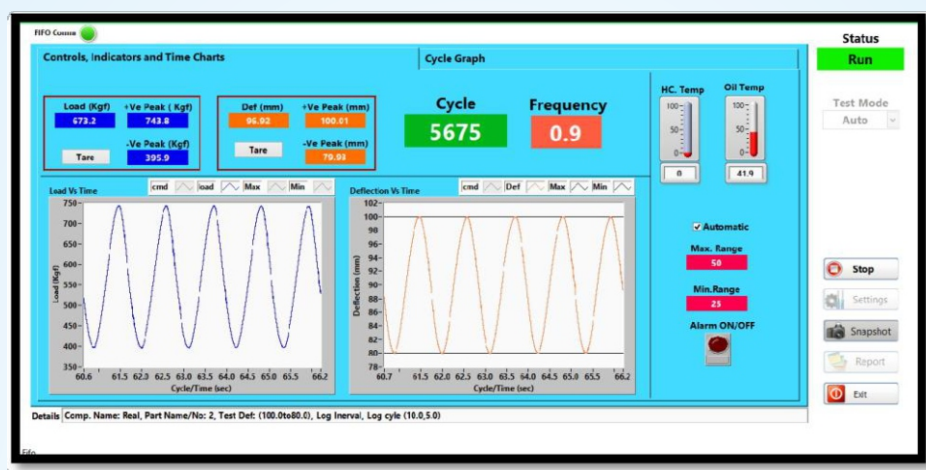
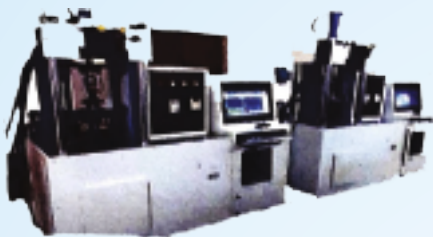
Fatigue test window @ 5Hz

SERVO SYSTEM:

RBE is equipped with servo valves from Moog/Bosch/Atos/MTS. The valves are controlled from software using NI hardware. User can have force or stroke(mm/deg) control from software.

DISPLACEMENT TRANSDUCER :

RBE machine is capable of measuring the strain accurately. It can accurately measure of strain in range of $\pm 75\text{mm}$ with stroke length or 0- 150 mm. The resolution of stroke transducer is 0.01 mm and sampling rate is 0.1 ms. Transducer is with IP67 protection and suitable for working in any environment in temperature range of -25°C to $+70^{\circ}\text{C}$.



Fatigue tester @ 0.9Hz

SERVO POWER PACK:

RBE has a specialized hydraulic power pack made with utmost care. Tank is powder coated from inside & outside with chrome zinc pipe fittings, Italian inline filters of 3 Micron, Return line filters of 20 microns, Air blast/refrigerant based cooling system, Automatic oil temperature monitor cum controller, Overheat protection, Oil level, Oil contamination protection, low noise < 78 db and automatic interlock facility are some of the key features.

FEATURES -

1. Flow rate 62 LPM @ 210 bar.
2. Remotely controlled HPU through controller.
3. Electric motor to operate pump on 3-Phase supply which delivers 40 HP power.
4. Temperature sensor for monitoring temperature of oil and packed with power line filter, oil level, relieve valves, pressure sensors and anti vibration mountings. The capacity of oil reservoir is 400 Ltrs. approx. Temperature sensor interfaced with software for automatic temperature control through the refrigerant based oil cooler. Its intelligent cooling and saves on a considerable operation cost.

ACTUATORS:

We are using Single rod design actuators in our machines. Some of the key features are integral Italian magnetostictive stroke sensors with piston rod, Double seal set, High quality ground finish on Piston rod, Hydraulic burnished top mount manifold unit and fatigue rated load cell (3mv/v output). Linear actuator having displacement range of $\pm 75\text{mm}$ (0-150 mm total stroke length) with accuracy of 0.1mm. Displacement sensors are calibrated using NPL certified slip gauges. NPL's master standards are with accuracy of 0.1 microns. With those standard 0.1mm accuracy can be achieved.



COMPONENT CLAMPING:

Real is having expertise in designing versatile holding fixtures. The specially designed clamping fixture can accommodate different dia components with ease. Choice of manual/hydraulic grips.

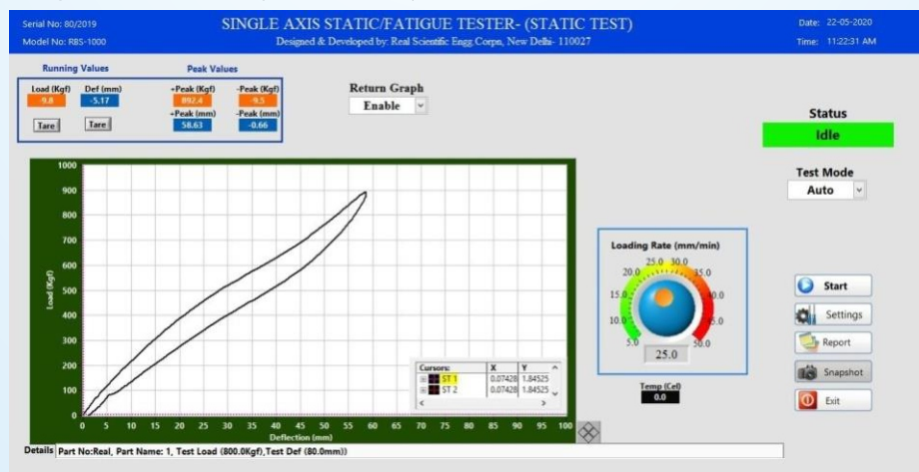
ACCURACY:

Machine is having $\pm 0.5\%$ accuracy with traceability to National Physical Laboratory, New Delhi. Individual calibration certificate is provided with each machine. Certification from TUV can be also provided against additional cost.

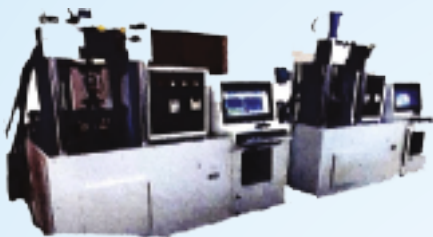
System load measurement accuracy is 0.05% as per ASTM E4; EN 10002-2 class 0.5; or equivalent. We are calibrating our load cells using NPL certified standards whose accuracy of NPL master standards is 0.06% . With these NPL standards, we are providing $\pm 0.05\%$ accuracy from 5% to 100% of measuring range. The load cells used in machine are fatigue rated as well as these are highly reliable. These can withstand overload upto 200% of their rated capacity. These are temperature compensated from -10°C to 60°C . Overall life of load cell is 50 million cycles. Real's test software is equipped with inertia nullification tool to remove all errors due to inertia.

GRIPS AND FIXTURES

1. Axial Fatigue rated Hydraulic Wedge Grips having capacity of 250 kN to test the specimen according to ASTM E606/E60M-20, ASTM E-8.
2. It can accommodate flat specimen between 1 mm (or less) to 25 mm thick (or higher).
3. Threaded fixtures will be provided for specimen with the radius of M6, M10, M20, M22
4. Fixture for fracture toughness testing would be according to ASTM E399 and ASTM E1820.
5. Compression platen of 150 mm diameter, spherical seating on plate, etched ring for non-slippage of samples (ASTM E-9)



Static test @ 25mm/min



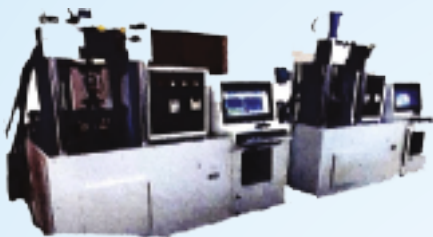
COMPUPTER PANEL & SOFTWARE:

Interface cards used in machine is from NI-USA/Germany/Hungary . Software is based on world famous NI-LABVIEW. The RBE software is specifically designed considering providing ease to user. Just select the part name and system will automatically load the test control parameters .

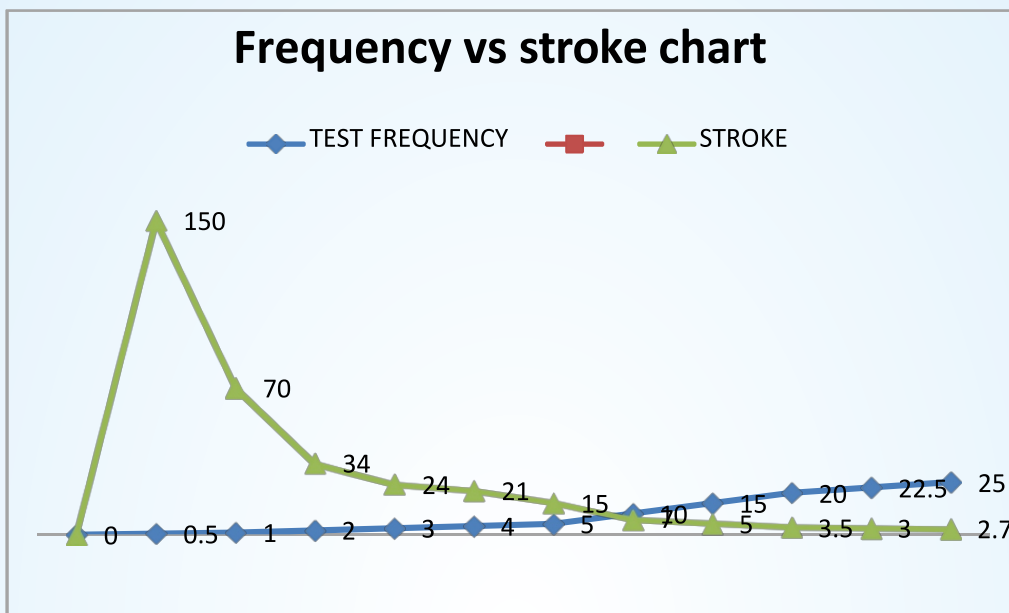


TECHNICAL SPECIFICATION

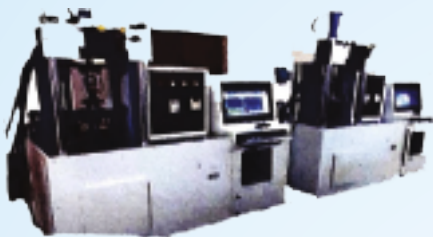
Model No.	: RBS-25000 Single axis
Capacity	: $\pm 250\text{kN}$
Stroke	: $0 \pm 75\text{mm}$ (or 0-150mm)
Type	: Fully Computerized (Software controlled)
Overall accuracy	: $\pm 1\%$ with traceability to NPL
Load cell	: 300kN capacity {Fatigue rated}
Load Cell make	: HBM/TEDEA/FORSENTEK (3mv/v output)
Deflection sensor	: $0 \pm 150\text{mm} \times 0.001\text{mm}$, sensitivity 0-25mm x 0.0001 mm sensitivity
Deflection sensor make	: Italian (Magnetostrictive)
Loading mode	: Servo hydraulic actuator
Force control	: from software
Stroke control	: from software
Test speed control	: from software
Frequency control	: from software
Vertical clearance	: 0 to 1100mm clearance available between platens for Compression/tension testing
Distance between columns	: 625mm
Space for test part	: 500 (L) x 500(B) x 1100(H)
Test Freq.	: 0.01 to 25Hz (Variable from software) Refer to the stroke & frequency graph



Frequency vs stroke chart



Protection	Overload/Over travel protection, Emergency stop, Auto stop on completion of test cycles, Auto Power pack control from software, Automatic oil Temp controller to avoid heating of oil, Hydrostatic bearing For side load protection
Display	Display of all parameters on computer monitor i.e., Force, Stroke, Pre-load, Cycles, CPM, Force vs cycle graph, Force vs time graph, Component no., Part name, Date, Time etc
Data recording	: Available for each & every part tested on machine Data can be stored w.r.t. BATCH # or DATE Data for any of the part can be analyzed just by clicking on the DATE in Recording
Testing mode	: Fully automatic. Just feed the load/Stroke/Frequency limits. Machine will automatically load the component and display test results.
Computer	: Latest computer with Intel i5 Processor, 500 GB HDD, 8 GB, RAM, 19" TFT screen with all standard accessories such as DVD writer, UPS, Colored Deskjet printer, UPS etc.
Software	: REAL's tailor made software for spring testing
Interface	: NI-USA/GERMANY/HUNGARY
Signal conditioner	: High speed (GPDS) C RIO from NI System Hungary Data speed : >100kHz
Servo Valve	: Moog/MTS/Vickers/Atos (100LPM capacity) Control from 0-10VDC as well as 4-20mAmps Servo loop time: 10kHz or better
Line Pressure	: 10-210 Bar (Adjustable)



Power pack

: 800 ltrs powder coated tank with Bosch-rexroth/yuken Pump, strainer, Inline filter (3 microns), Temp indicator Auto trip on rise of temp. Electrical panel, refrigerant based Energy saving oil cooler controlled through software etc

Standard accessories

: Pair of compression platens, Wedge type grips, Operation/instruction manual, Electrical circuit, Hydraulic circuit and works calibration certificate With Traceability to N.P.L., New Delhi

Dimensions

: 1487(L) x 1080(B) x 1942(H) Main machine
700(L) x 680(B) x 980(H) Power pack
600(L) x 600(B) x 1670(H) Computer panel

Weight

: 2230 kgs approx

Power req.

: 415V, 3Phase, 50Hz

सी एस आई आर - राष्ट्रीय भौतिक प्रयोगशाला
CSIR-NATIONAL PHYSICAL LABORATORY
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अवकाशक प्रमाण पत्र
CALIBRATION CERTIFICATE
FORCE PROVING INSTRUMENT
प्रमाण पत्र संख्या/Certificate No. 17059148/D1.05/C-150

दिनांक/Date: 30.05.2017 अवकाशक हेतु अनुमति तिथि/Recommended date for next calibration: 30.07.2019 पृष्ठ/ Page: 1 पृष्ठों की संख्या/No. of Pages: 2

1. Calibrated for: M/s Real Scientific Engg. Corpn.
B-150A, Shivaji Vihar, Near Shivaji Enclave,
New Delhi-110027.
Ref. No.: NPL/LI, Dated: 15.04.2017

2. Description & Identification of instrument
Type: Integral Ring Dial gauge St. No. BADA333
Capacity: 30 kN Manufacturer: Baker
SI. No.: J0KN.142.2017 Resolution: 0.1 div
1 div. = 0.002 mm
Accessories: Self-aligning compression pads

3. Environmental conditions: Temperature: (23 ± 1)°C, Relative humidity: (50 ± 10)%

4. Standards used
Associated uncertainty: 50 kN Dead Weight force machine
±0.007% (k=2)

5. Traceability of standard used: The standard used is traceable to the NPL primary standard of force through precision force transfer standard, calibrated directly against NPL primary standard of force.

6. Principle/Methodology of calibration
NPL Calibration procedure No.: Sub-Div. FDS.05/Doc.#3/CPHFT/F-02 broadly based on IS 4169-2014.

Preloading: Before the application of the calibration forces, the instrument was preloaded thrice to its maximum capacity and kept at full load for about 90 seconds.

Calibration: The sequence of the applied calibration force in compression is given below:
At 0°: two series of calibration forces in increasing values. At 180° and 360° positions: One series of calibration force, such as increasing values. Creep test is performed by calculating the difference in output (I_{obtained} at 30s and I_{std} obtained at 300s after the removal of the maximum calibration force and express this difference as percentage of maximum deflection.
The calibration was made by using self-aligning Compression pads provided along with the instrument to ensure as application of the force.
Between each series, the instrument was rotated along its axis so as to occupy during the calibration three positions (0°, 180° & 360°) and the instrument was subjected to the full load once for about 90 seconds each time before starting in a position.
Between the loadings, readings corresponding to no load after waiting at least 30 seconds for the return to zero were noted. Prior to each reading the dial gauge was lightly tapped at the center of the dial cover.

अवकाशक-वश/Calibrated by: *Manish* जांचकर्ता/Checked by: *Rajesh Kumar* प्रमारी वैज्ञानिक/Scientist-in-charge: *Vijay K*
अवकाशक-वश/Issued by: *ANIKANDAN RM* जारीकर्ता/Issued by: *Dr. V. K. Gumber* S. S. K. T.

सी एस आई आर - राष्ट्रीय भौतिक प्रयोगशाला
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ई-मेल/E-mail: csi@nplindia.org वेबसाइट/website: www.nplindia.org

अवकाशक प्रमाण पत्र
CALIBRATION CERTIFICATE
FORCE PROVING INSTRUMENT
प्रमाण पत्र संख्या/Certificate No. 17059148/D1.05/C-149

दिनांक/Date: 01.10.2019 अवकाशक हेतु अनुमति तिथि/Recommended date for next calibration: 01.09.2021 पृष्ठ/ Page: 2 पृष्ठों की संख्या/No. of Pages: 2

7. Results: Compression
The calibration data obtained in Compression is valid for the following dial gauge setting only:
Large pointer at 12 O'clock position
Small pointer at 1
(Dial Gauge Reading in Divisions)

Applied Force kN	Position 0° series 1	Position 0° series 2	Position 180° series 3	Position 360° series 4	Average 1,3,4
0	0	0	0	0	-
5	106.0	106.0	106.1	106.1	106.1
10	213.5	213.4	213.5	213.5	213.5
15	319.9	319.8	319.9	319.8	319.9
20	429.0	428.9	429.0	429.0	429.0
25	539.0	538.9	539.0	538.9	539.0
30	648.0	647.8	648.1	647.9	648.0
35	756.0	755.8	756.1	756.0	756.0
40	871.2	871.0	871.3	871.2	871.2
45	983.1	983.1	983.4	983.4	983.4
50	1097.0	1096.9	1097.2	1097.1	1097.1
0	0.1	0.1	0.1	0.1	-

Classification: The force proving instrument is found to comply with the requirements of IS: 4169-2014 in respect of specific forces and classified as follows:

Class	Mode	From	To	Uncertainty of Measurement
Class 0.5	Compression	50kN	10kN	±0.005%
Class 1	Compression	50kN	5kN	±0.12%

The reported uncertainty is at coverage factor k=2 which corresponds to a coverage probability of approximately 95% normal distribution, considering the relative deviation of different components such as zero, repeatability, resolution, creep and combining with the uncertainty of the applied force.

8. Date of calibration: 01.10.2019

9. Remarks: The temperature correction of 0.027% should be applied to the calibration data for each degree diff. the working temperature from the calibration temperature where no temperature compensation is already done (it will be positive for rise and negative for fall in temperature).

अवकाशक-वश/Calibrated by: *Manish* जांचकर्ता/Checked by: *Rajesh Kumar* प्रमारी वैज्ञानिक/Scientist-in-charge: *Vijay K*
अवकाशक-वश/Issued by: *ANIKANDAN RM* जारीकर्ता/Issued by: *Dr. V. K. Gumber* S.

REAL's master standards are certified from National Physical Laboratory of INDIA & P.T.B. Germany