

UNITEST

Universally configurable platform for every lab

Mechanical Testing • Tribology Testing • Microscopy • 3D Profilometry

DUCOM INSTRUMENTS



INTRODUCTION

Needs of a lab can change quickly. With the UniTest, you can have an adaptable and universal test system that can be reconfigured quickly to meet your testing and characterization needs.

Carefully engineered, our latest test platform has the ability to comply with various test and measurement standards while giving you capabilities to go far beyond them.

INNOVATE WITH DUCOM INSTRUMENTS.

THE PLATFORM



WITH AN OPEN ARCHITECTURE DESIGN, THE UNITEST CAN TRANSFORM ITSELF INTO A HIGHLY CAPABLE MECHANICAL TESTER AND AN IMAGING SYSTEM WITH EASE.

Engineered to be stiff and durable, the UniTest platform offers excellent positioning accuracies using high resolution stages and precise closed loop positioning and force feedback systems.

A wide selection of load heads, motion module and accessories the system can be configured to conduct a variety of tests on a single platform.



**TANDEM DUAL DRIVE
Z AXIS WITH HIGH
FREQUENCY CLOSED
LOOP CONTROL.**

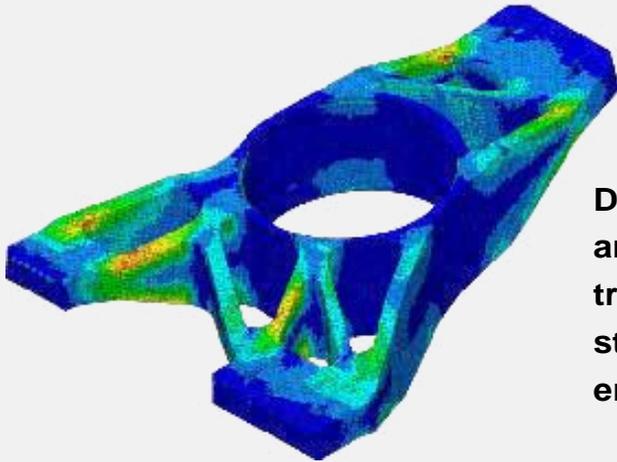
A tandem dual drive Z axis can apply forces over several orders of magnitude for tests ranging from Nano to Macro scales.

High precision position sensors embedded into the platform provide feedback for Z-axis control.

A large, open lower drive platform help keep the system ready for current or future drive systems and accessories.

The carefully engineered architecture has a high frame stiffness and excellent thermal dissipation for a highly stable test.

THE BACKGROUND



Designing the UniTest to be the most versatile and scalable platform for mechanical, tribological and surface imaging studies started with numerous concepts and an emphasis on the right fundamentals.

OPEN ARCHITECTURE

The open architecture of the UniTest makes it versatile and flexible so it can accept the rapidly our current and future options and modules.

**FUTURE READY DESIGN
FOR OUR IDEAS AND
YOURS.**

HIGH PRECISION ELECTRONICS

Good data begins with good design. With its high precision electronics, the UniTest give you clean and reliable data that you can use with confidence.

**CLEAN AND RELIABLE TEST
DATA. READY FOR YOU TO
USE.**

MULTI-SCALE TESTING READY

Engineered materials are used in virtually every domain of life. Testing and understanding them is vital. With the UniTest, you can now have a single platform that effortlessly scales from the Nano to Macro scales.

**TEST CAPABILITIES THAT
SPAN NANO TO MACRO
SCALES**

KEY FEATURES

TEST STANDARD COMPLIANCE



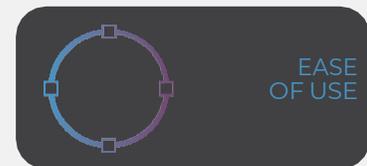
Using appropriate attachments, the UniTest platform can be configured to run over 25 different test standards like ASTM, ISO, DIN, JPI, SAE and many more.

CONFIGURABLE



With a wide open and accessible test area and numerous available attachments, the platform can transform from a mechanical tester to a tribology tester or an imaging system in minutes.

EASY SETUP



Equipped with quick change locks, you can add and remove load heads, imaging heads, motion modules and other attachments with ease.

INTEGRATED SURFACE IMAGING



Many mechanical and tribological tests start and end with surface measurements. With our imaging options that can be integrated right into the UniTest, your test specimens can go from initial inspection to testing and to final inspection all within the same system

INTUITIVE SOFTWARE



Our intuitive and easy to use software has several standard test protocols accessible at the click of a button. Custom tests can also be set up using our powerful custom test setup function.

NETWORKED



The UniTest is fully compatible with MOOHA 4.0 to allow access to instrument health data, near real-time live test data, easy and tamper proof reporting and much more. You can choose to network your system in the secure MOOHA environment or run it in a fully isolated mode.

CAPABILITIES

UPPER Z-AXIS GANTRY

Z-Axis gantry driven by tandem dual drive and embedded high resolution position sensors.

INTEGRATED MICROSCOPY, PROFILOMETRY

White light interferometry (WLI), digital microscope, 3D profilometer for surface imaging and evaluation. 2D digital imaging and 3D profilometry nm resolution.

QUICK INTERCHANGE

Quick locks for secure fastening during test and easy removal during setup and interchanging test modules.

LOWER INTERCHANGABLE TEST MODULE

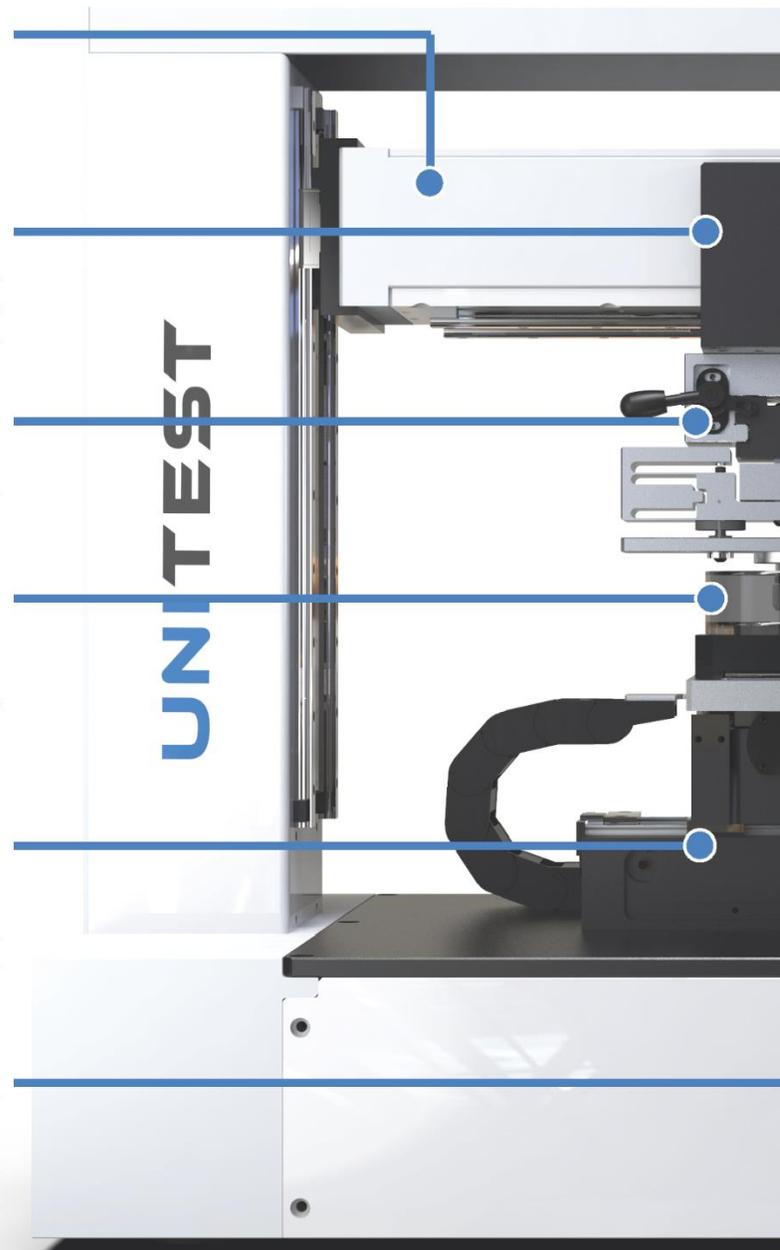
Interchangeable test modules to perform several tests on same platform (rotary, reciprocating, block on ring, fretting, scratch etc). The modules are mounted using fast-exchange.

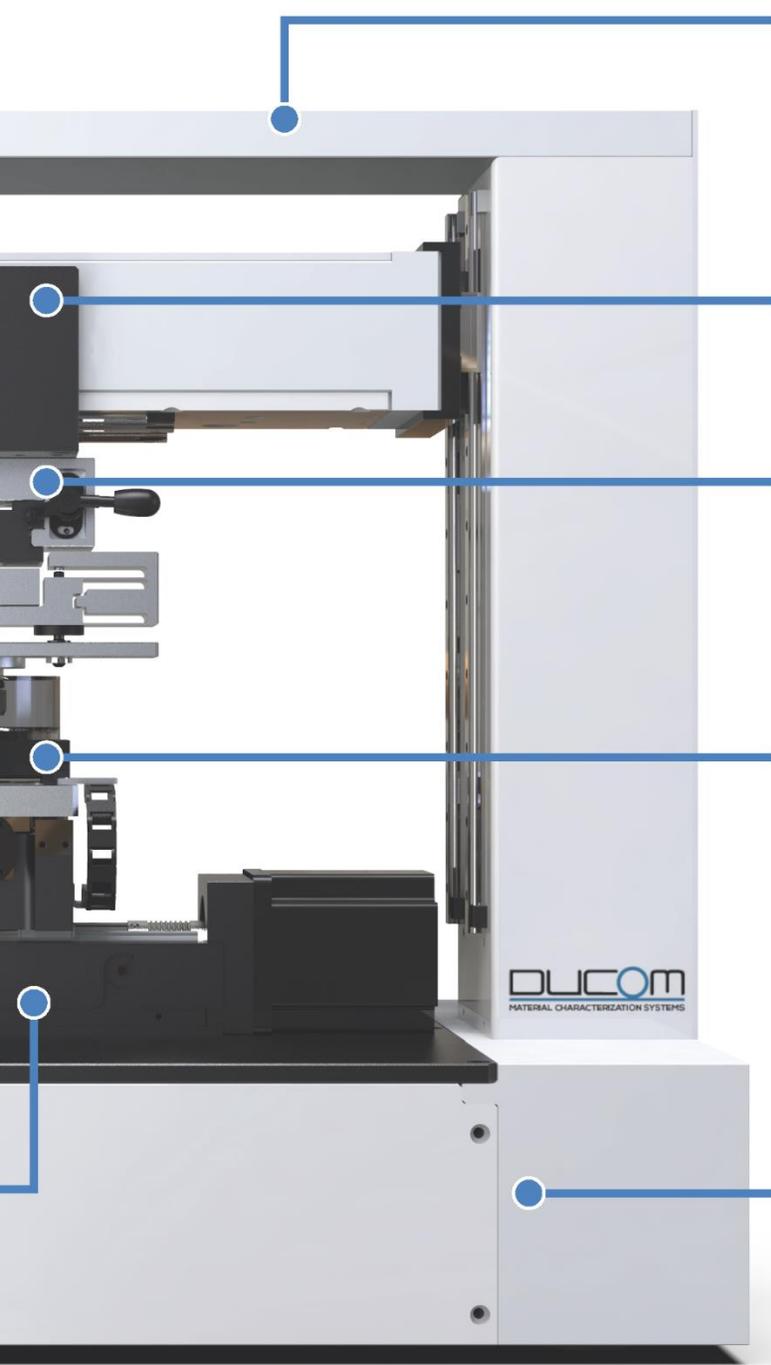
ENVIRONMENT CONTROL (TEMPERATURE, HUMIDITY, LUBCRICATION)

High and low temperature sensing and control options, humidity control and sensing and lubrication modules.

TEMPERATURE, HUMIDITY AND OTHER SENSING AND CONTROL OPTIONS

Temperature, humidity control and sensing. Electrical Contact Resistance, Acoustic Emission and TriboCorrosion sensing.





ENVIRONMENTAL ISOLATION

Enclosure to reduce acoustic and thermal interference, exposure to fumes and increase safety.

EMBEDDED X-AXIS

Moving high precision X-Axis carriage is embedded into the moving gantry for excellent precision.

LOAD HEADS

Interchangeable load heads from mN to kN load ranges. 2 axis, 3 axis and 6 axis force sensing options available.

INTERCHANGABLE MOTION MODULES

Motion modules for precise ultra low speeds to ultra high speeds. Linear Reciprocating Drives (Fretting, Scratch, Long Stroke), Rotary Drive (Pin on Disk, Four-Ball, Block on Ring, Timken OK Load), Multi-Axial Drive (Biotribological profiles).

MOTION CONTROLLER, DATA ACQUISITION

Advanced high speed, low noise, fast feedback, highest data acquisition rate controllers.

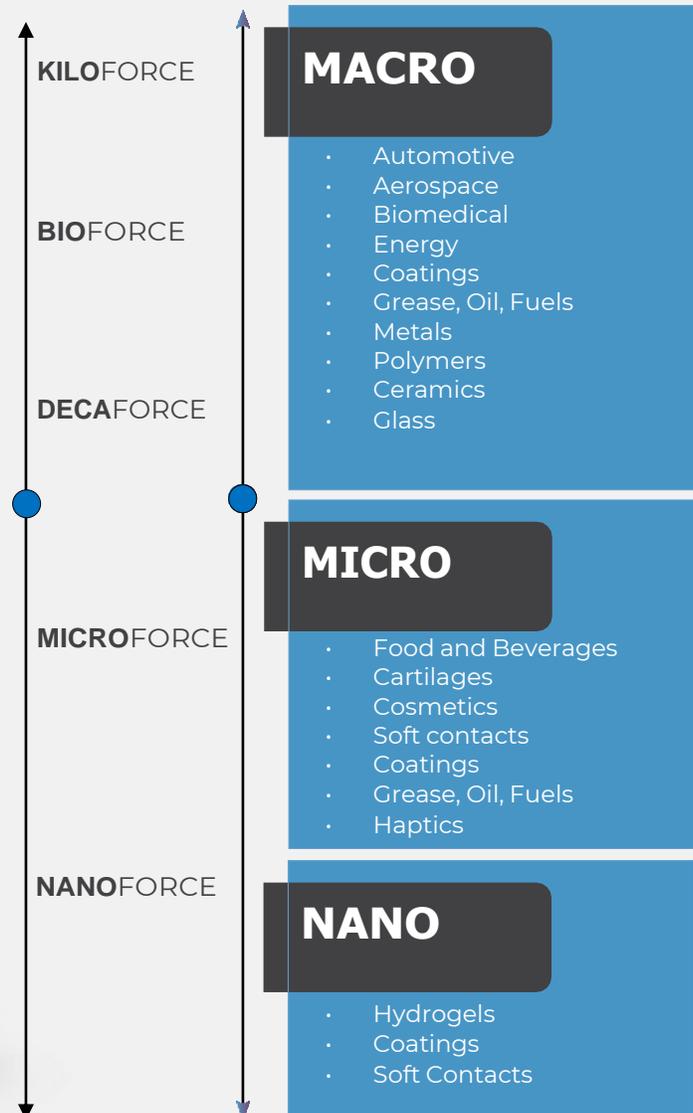
LOAD HEADS

Load heads designed for the UniTest are capable of measuring forces in the Z-axis (normal load) as well as Y-axis (lateral force, frictional force). Optional 3 and 6 axis force sensors can measure forces in the X-axis and torque measurements respectively. Specialized fully mechanically de coupled sensors for high resolution force measurements are also available.

Sensor technologies include Capacitive transducers for low-drift temperature stable measurements, Piezoelectric transducers for high frequency measurements and actuation and Strain Gauge based systems for cost effective and extended ranges of measurements.

Advantages:

- Quick change
- Low noise floor
- Low thermal drift



MOTION MODULES

ROTARY VERTICAL	<hr style="border: 0; border-top: 1px solid black; margin-bottom: 10px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 10px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 10px;"/>	<p>PIN ON DISK/PLATE BALL ON DISK/PLATE BALL ON BALL DISK ON DISK</p>
ROTARY HORIZONTAL	<hr style="border: 0; border-top: 1px solid black; margin-bottom: 10px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 10px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 10px;"/>	<p>BLOCK ON RING REICHERT TEST TIMKEN OK LOAD FOUR BALL TEST</p>
LINEAR MICRO	<hr style="border: 0; border-top: 1px solid black; margin-bottom: 10px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 10px;"/>	<p>SCRATCH LINEAR RECIPROCATING</p>
LINEAR MACRO	<hr style="border: 0; border-top: 1px solid black; margin-bottom: 10px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 10px;"/>	<p>SCRATCH LINEAR RECIPROCATING PISTON RING & CYLINDER LINER</p>
LINEAR HIGH PERFORMANCE	<hr style="border: 0; border-top: 1px solid black; margin-bottom: 10px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 10px;"/>	<p>SCRATCH FRETTING WEAR LINEAR RECIPROCATING</p>
MULTI-AXIS	<hr style="border: 0; border-top: 1px solid black; margin-bottom: 10px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 10px;"/>	<p>SCRATCH LINEAR RECIPROCATING BIO PROFILES FULLY USER DEFINED PROFILES</p>



SENSING & ENVIRONMENT MODULES

SENSING MODULES

ELECTRICAL CONTACT RESISTANCE (ECR)

Electrical contact resistance checks for and records current flow between specimens. Useful when coatings or lubricating fluid is nonconductive, and the specimens are conductive.

ACOUSTIC EMISSION

Acoustic emission sensor can be added on to detect initiation of failures in brittle coatings.

VIBRATION SENSOR

Vibration sensor can be used for detecting wear phenomenon like pitting and spalling.



ENVIRONMENT MODULES

HUMIDITY

The humidity module is available for both linear and rotary modules. It includes a humidity capsule with an embedded humidity sensor and an electronically controller humidity system.

LUBRICATION

The lubrication module includes a specially designed spill resistant lubrication cup, a removable heater and a temperature sensor. It also includes an electronically controlled lubricant dispenser.

TRIBOCORROSION

The tribocorrosion module is a specially developed system that is designed specifically for tribological studies. The tribocorrosion module has electrodes and materials that make it especially suited for tribological studies.

LOW TEMPERATURE

Low temperature options down to -30 °C and - 50 °C.

HIGH TEMPERATURE

High temperature options of up to 1000 °C are available.



SPECIALIZED TESTING MODULES

HOT HARDNESS TESTING

The hot hardness testing module is suitable for hardness testing at elevated temperatures. The module comes complete with an enclosed temperature chamber with gaspurging inlet and outlet ports to prevent oxidation at high temperatures.

PISTON RING AND CYLINDER LINER TESTING

The piston ring and cylinder liner module is especially designed for studying tribological properties of piston rings and cylinder liners. This module executes long stroke linear reciprocation.

BIOTRIBOLOGY TESTING

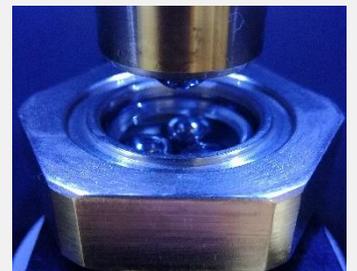
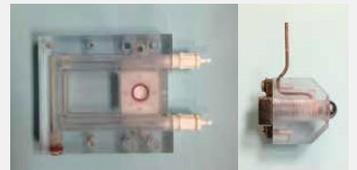
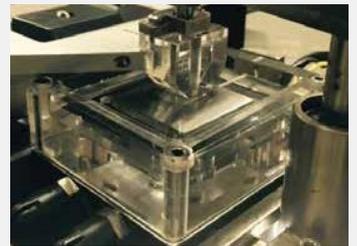
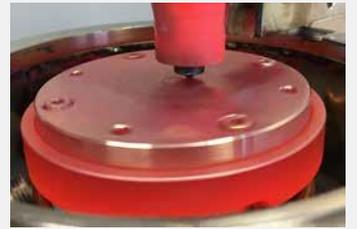
Together with the BioForce Load Head and the Multi-Axis Drive, the UNITEST can be set up for biomaterials testing using complex wear tracks and programmable loading cycles.

ENVIRONMENT CHAMBER

An environment chamber for purging test environment with non-toxic, non-corrosive gases or controlled humidity is available.

FOUR BALL TESTER ATTACHEMENT

Four ball tester attachment is especially designed to evaluate wear preventive and extreme pressure properties of lubricants and greases in compliance with all ASTM, DIN, IP and ISO standards.

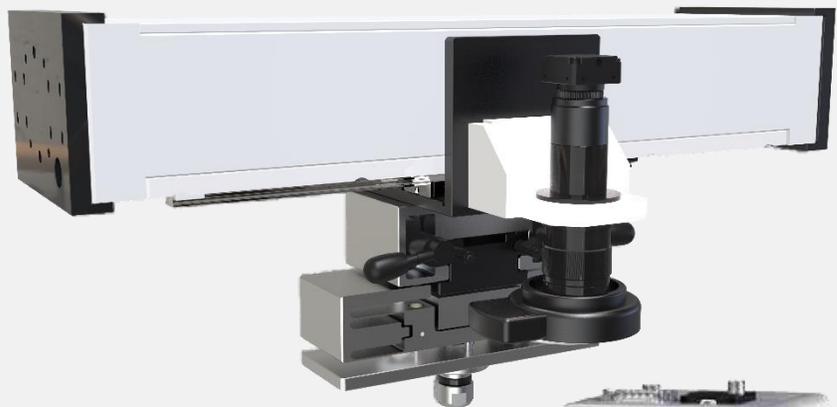


SURFACE EVALUATION MODULES

ANALYSIS MODULES

SURFACE/X10 DIGITAL IMAGING SYSTEM

The Surface/X10 is a high-resolution digital imaging system with a camera and optics designed for imaging of samples, 2D measurements and reporting. This easy and cost-effective module is an excellent addition to nearly all configurations of the UniTest.



SURFACE/X40 MICRO SCANNING PROBE MICROSCOPE (M.SPM)

The surface X40 is a stylus microprobe-based surface scanner that can be used for 2D and 3D imaging of specimens. It can also be equipped with an additional sensor for lateral force detection for micro scratch testing and micro indentation.



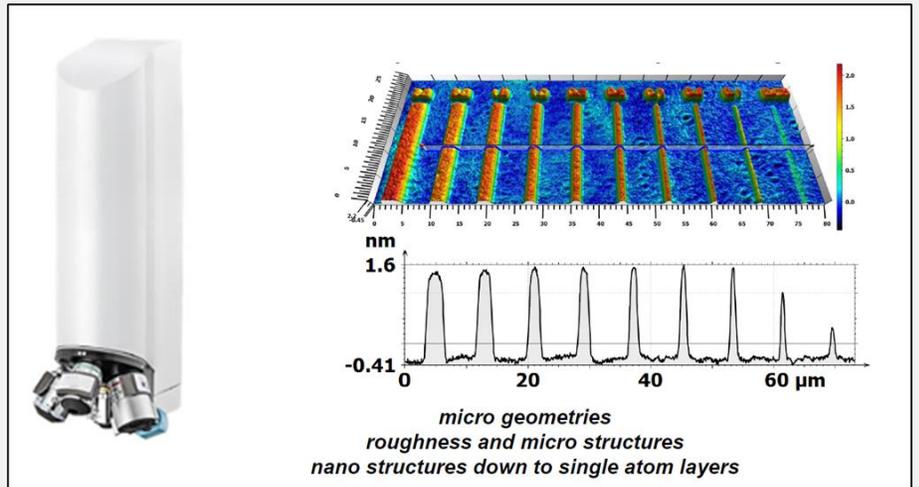
SURFACE/X70 NON CONTACT 3D PROFILOMETER

The surface X70 is a non-contact surface profiler (confocal) that can be used for 3D imaging of specimens in situ. It is a convenient way to create a 3d map to evaluate surface topology before and after tests.

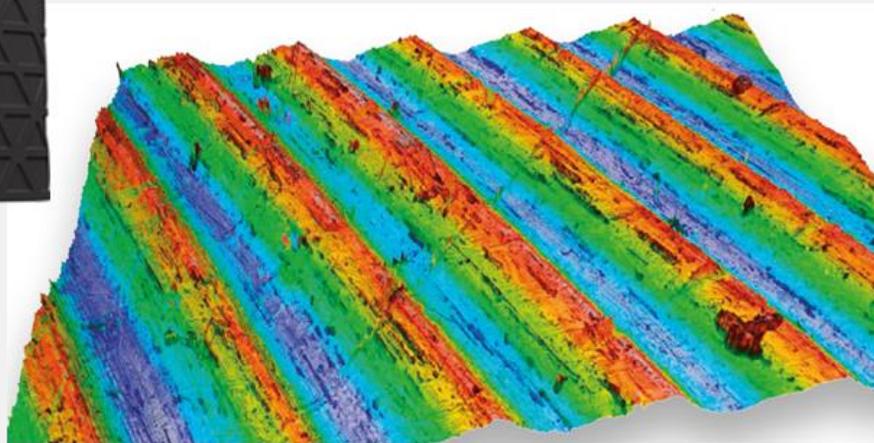


WHITE LIGHT INTERFEROMETER

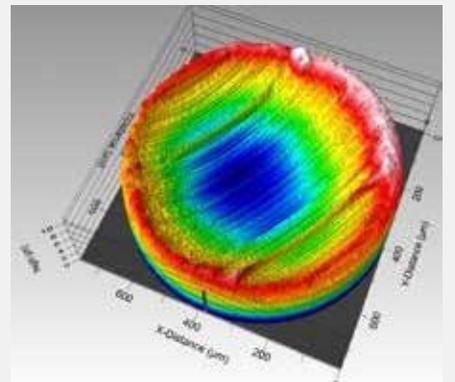
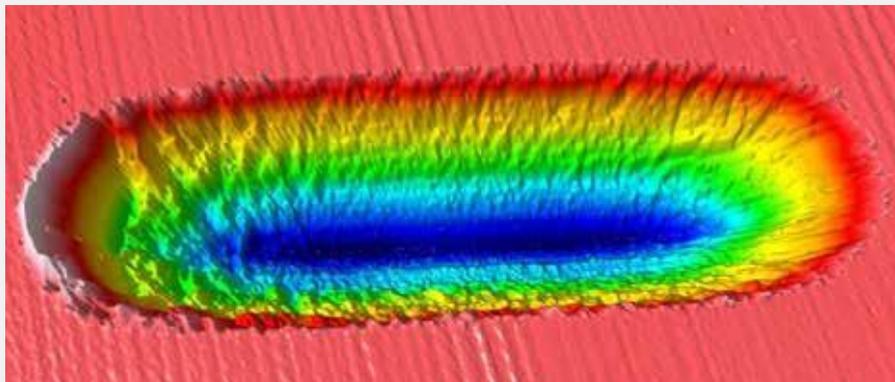
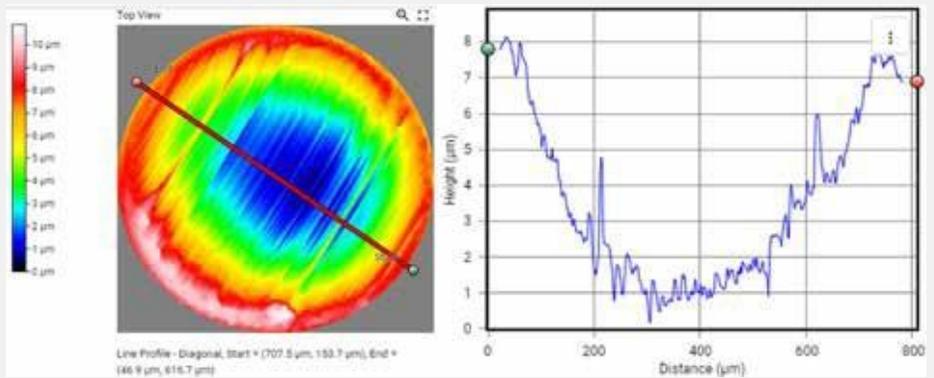
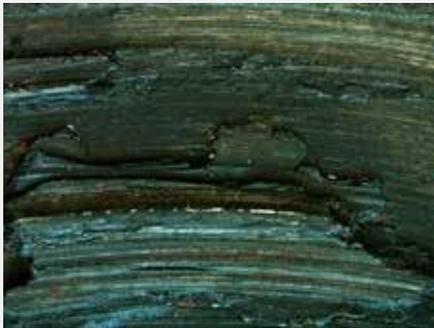
Universal lab measuring system with
up to 4 exchangeable objectives and
automated objective recognition.



White Light with Confocal



SURFACE EVALUATION MODULES



DATA ACQUISITION AND CONTROL SOFTWARE

INTUITIVE

Our easy-to-use software interface is designed for safe and convenient operation by users of varying degrees of familiarity and experience. Its guided workflow and built-in safety checks enhances operator and instrument safety. The data can be exported in .csv file format importing into other computers and software like Excel and MATLAB.

QUICK ACCESS

Preset test protocols for ASTM, ISO, DIN and other test standards for quick and easy selection of frequently used standards. Frequently used user defined test protocols can also be saved as custom quick access protocols.

FLEXIBLE

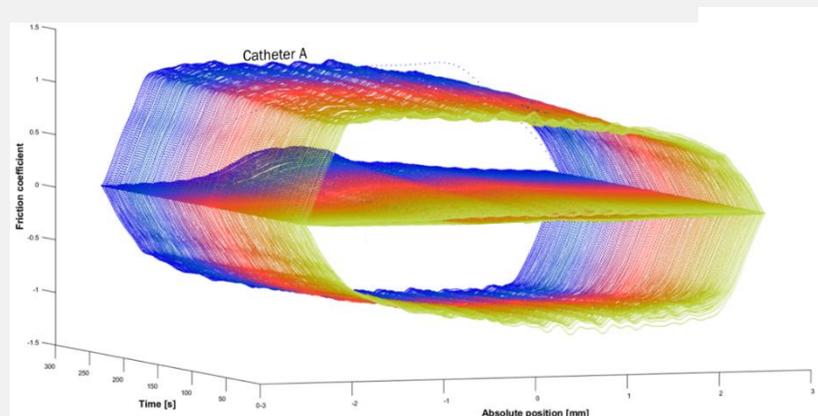
Custom tests can conveniently be set up within the UniTest software environment using the custom tests option to fully unlock all capabilities of the platform and its modules. Designed for experienced users, it offers the granularity desired by advanced users in setting up highly customized protocols and test sequences.

DATA ACQUISITION

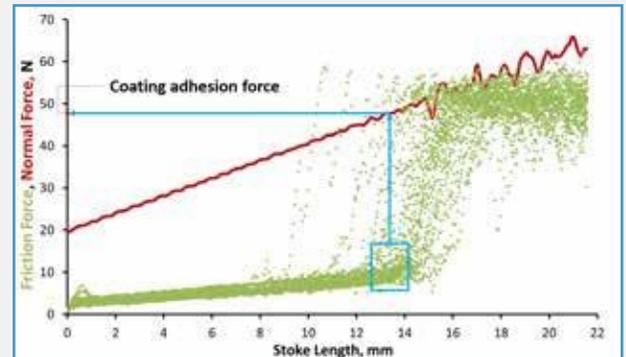
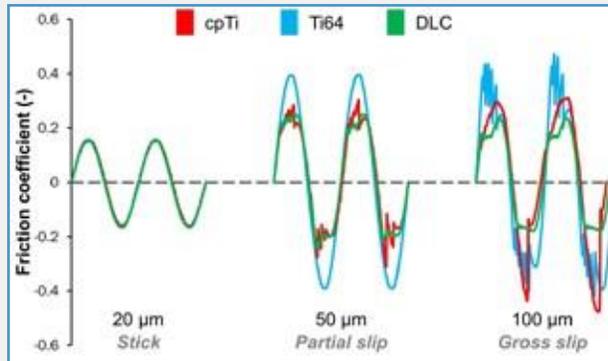
High frequency data acquisition system coupled with low noise electronics gives users an excellent signal to noise ratio. Strong fundamental design and robust electronics ensure that peripheral attributes like resonance, interference and thermal drift that influence test results are greatly minimized

ISOLATION

Physically isolated power electronics and signal processing helps with high quality data with minimal aberrations. FCS electronics keeps electronics noise low and free of interferences.



DATA ACQUISITION AND CONTROL SOFTWARE



QUICK CALCULATOR

Quick Calculator is a digital plugin that contains several frequently used calculators and converters for tribology all in one place.

MOOHA - DIGITAL LAB ASSISTANT

MOOHA is a digital lab assistant with powerful features that can help with keeping your tester in excellent health and your test data secure and easily accessible. Its automatic logging and reporting functions keep data tamper proof and reliable.

MOOHA 4.0

Dashboard
User management
Device management
Dataset history
Analysis & Ranking
AI Ranking
Materials
Sensors
Archive
Spareparts

Performance Analytics

Productivity

Machine hours	100
Number of datasets	100
Sensor errors	2
Reports created	1
Number of users	2

Occupancy (30 days)

77% Online 23% Offline

Number of Machines Online: 3

Machine Hours

Sensor Errors

Quick Access to Data Sets

2023-11-16 10:54 AM	FFB1016	21.03.23
PTP Demo (Demo_23M0021)	FFB1017	21.03.23
Valvoline 80W90_75 rep	FFB1018	21.03.23
Valvoline 80W90_75 rep	FFB1019	21.03.23
Valvoline 80W90_75	FFB1014	21.03.23
Demo 80W90	FFB1015	21.03.23
Valvoline Gear Oil 80W90_75 rep	FFB1010	21.03.23
Valvoline Gear Oil 80W90_75	FFB1011	21.03.23

MOOHA 4.0

Dashboard
User management
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Spareparts

Device management

Type	Search	Search			
HF88	Status: Healthy	BiTriboometer	Status: Now	BiTriboometer	Status: Warning
MDN6704225	SN: HFR81817	MDN6704225	SN: BT1937	MDN6704223	SN: BT1935

MOOHA 4.0

Dashboard
User management
Device management
Dataset history
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Spareparts

Dataset history

Data Set ID	Devices	Serial Number	Description	Wear	Sample	Duration	Date-time	Operator	Complete
7451	Four Ball Tester FBT-3	FFB1016	23.03.21-10:55:54 AM	106	2 min	2021-03-23 @ 10:10	8		
7450	HF88	HFR81817	PTP	587	13 min	2021-03-23 @ 09:35	13		
7447	Four Ball Tester FBT-3	FFB1016	Valvoline 80W90_75 rep	135	1 min	2021-03-23 @ 08:30	8		
7446	Four Ball Tester FBT-3	FFB1016	Valvoline 80W90_75 rep	131	1 min	2021-03-23 @ 08:15	8		
7437	Four Ball Tester FBT-3	FFB1016	Valvoline 80W90_75	124	1 min	2021-03-23 @ 13:00	8		
7428	Four Ball Tester FBT-3	FFB1016	Demo 80W90	143	2 min	2021-03-23 @ 09:25	8		
7426	Four Ball Tester FBT-3	FFB1016	Valvoline Gear Oil 80W90_75 rep	139	1 min	2021-03-23 @ 08:10	8		
7425	Four Ball Tester FBT-3	FFB1016	Valvoline Gear Oil 80W90_75 rep	150	1 min	2021-03-23 @ 08:10	8		
7395	HF88	HFR81817	DA21_Batch M0021_75	3317	75 min	2021-03-18 @ 14:05	8		
7394	HF88	HFR81817	DA21_Batch M0021_75	60429.030	3666	75 min	2021-03-18 @ 12:35	8	
7377	Four Ball Tester FBT-3	FFB1016	Demo 15MM8	196	4 min	2021-03-18 @ 09:40	8		
7356	PND 4.0	POD1658A	D5-DNAM Young RT-T2	2460	47 min	2021-03-16 @ 13:00	89		

PLATFORM SPECIFICATIONS

MOTION ENVELOPE

- X, Y Displacement..... 50 mm (Includes up to 150 mm in X, up to 250 mm in Y)
- X Displacement Speed..... 6 mm/s
- Y Displacement Speed 50 mm/s
- Z Axis Travel..... Up to 150 mm (0.1 μ m Resolution)
- Z Axis Accuracy..... 5 μ m

STRUCTURAL SPECIFICATIONS - ROTARY

- Normal Force..... 12000 N
- Primary Loading..... Servo controlled tandem dual drive (programmable test load)
- Speed..... 3000 rpm (Includes up to 5000 rpm)
- Torque..... 5 Nm (Includes up to 10 Nm)
- Construction..... Hybrid

STRUCTURAL SPECIFICATIONS - LINEAR

- Normal Force 5000 N
- Primary Loading..... Servo controlled tandem dual drive (programmable test load)
- Stroke Length..... 30 mm (Includes 0.04 to 10 mm for fretting)
- Frequency..... 0.1 to 80 Hz (Includes up to 200 Hz)
- Resolution.....1 μ m
- Construction..... Hybrid

FORCE SENSORS (STRAIN GAUGE TYPE)

- High Loads..... Up to 2000 N (Includes up to 12500 N)
- High Loads Resolution3 mN (up to 5000 N; least count is 1% of max. value)
- Low Loads Up to 100 N (Includes up to 5000 N)
- Low Loads Resolution 3 mN

FORCE SENSORS (PIEZOELECTRIC TYPE)

- High Frequency Reciprocating Tests Up to 45 N (0.45 mN Resolution)

TEMPERATURE CHAMBERS (INTERCHANGEABLES)

- Rotary/Linear Tests..... Up to 1000 °C (computer controlled)
- High Frequency Tests- 30 to +180 °C (computer controlled)
- Heat Exchanger (Chiller).....- 50 to 200 °C (computer controlled)

TEMPERATURE SENSOR (K-TYPE THERMOCOUPLE)

- Low Temperatures..... Down to – 250 °C
- High Temperatures Up to 1250 °C

ACOUSTIC EMISSION SENSOR

- Response Frequency..... Up to 5 MHz



Heat Exchanger (Chiller)

ELECTRONICS SPECIFICATIONS

- DAQ rate.....16-bit DAS up to 200 kHz
- Signal channels.....8 data channels (expandable to 16 channels)

SOFTWARE AND COMPUTER

- PC.....Included
- DAQ Software.....WinDucom (10 licenses, perpetual)
- MOOHA - Digital Assistant.....Included (10 licenses, perpetual)

UTILITIES REQUIRED

- Power.....1 PH, 120 VAC
3 PH, 220 VAC
other power specs on request

Here we described the full capabilities of Ducom UniTest. These capabilities might exceed the tender requirements. In that case, please refer to the tender specifications submitted.



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UNITEST

Module Information Sheet

UT-750-DR/LD-MA

Single Axis Stage

Linear Movement

UT-750-DR/LD-MA

STANDARD LINEAR DRIVE

The Standard Linear Drive is a fully integrated motion module capable of generating precise short and long stroke movements at low to mid-range frequencies. It can be used for single pass tests, multi-pass tests and for positioning applications.

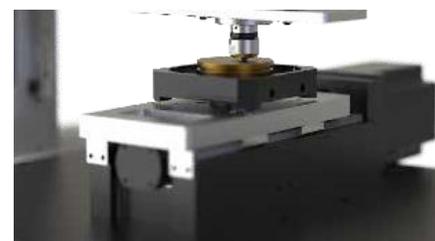
It is easily replaceable with other motion modules and can be coupled with a variety of sample holders and environment modules.

SPECIFICATIONS

Travel.....0.1 to 30 mm (Includes 0.04 to 10 mm for fretting)
Frequency.....0.1 to 80 Hz (Includes up to 200 Hz for fretting)
Resolution..... 1 μ m
Sample holder type..... Universal (Upper and bottom specimens)
Sample sizes (ball/pin)..... 9.5 mm dia (Includes diameters up to 12.7 mm)
Sample sizes (disk/plate)..40x50 mm (Includes sizes up to 60x60 mm)
Customized holders on request

ENVIRONMENT COMPATIBILITY

- Humidity
- Spill resistant lubrication cup
- TriboCorrosion
- High Temp (up to 1000 °C)



Standard Linear Drive mounted on the UniTest together with a sample holder and an indenter for scratch testing.

FEATURES

- Quick interchange adapter for easy swapping of motion drives.
- Motion module storage box for safekeeping of drive.
- Specialized design for high service life and high load capability.



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UNITEST

Module Information Sheet

UT-750-DR/LD-CX

Multi Axis Stage

Fully user programmable motion profiles

UT-750-DR/LD-CX

MULTI AXIS DRIVE

The Multi Axis Drive is a fully user programmable motion module capable of generating precise movements useful for sample positioning and testing. It is especially useful for generating complex movement profiles frequently used in testing biomaterials.

It is easily replaceable with other motion modules and can be coupled with a variety of sample holders and environment modules.

SPECIFICATIONS

X Axis Travel.....50 mm (Includes 150 mm)
X Axis Speed (Max).....6 mm/s
Y Axis Travel.....50 mm (Includes 250 mm)
Y Axis Speed (Max).....50 mm/s
Resolution.....1 μ m



Multi Axis Drive mounted for sample positioning and for biomaterials testing

FEATURES

- Quick interchange adapter for easy swapping of motion drives.
- Motion module storage box for safekeeping of drive.
- Specialized design for high service life and high load capability.



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UNITEST

Module Information Sheet

UT-750-DR/RO-VD

Rotary Drive - Vertical

Clockwise

Counterclockwise

Angular oscillation

UT-750-DR/RO-VD

ROTARY DRIVE - VERTICAL

The Rotary Drive - Vertical is a fully integrated motion module capable of generating precise clockwise, counterclockwise, and angular reciprocating movements. It can be used for single pass tests, multi-pass tests and for positioning applications.

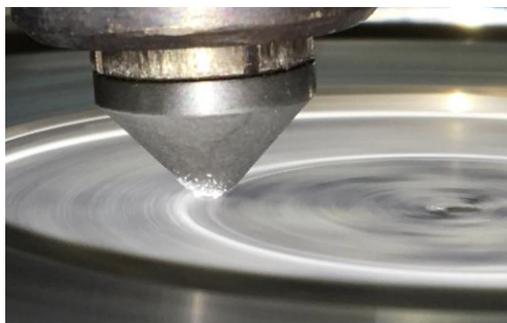
It is easily replaceable with other motion modules and can be coupled with a variety of sample holders and environment modules.

SPECIFICATIONS

Min Speed.....0.1 rpm
Max Speed.....3000 rpm (Includes up to 5000 rpm)
Peak torque.....5 Nm (Includes up to 10 Nm)
Sample holder type.....Universal (Upper and bottom specimens)
Sample sizes (ball/pin).....9.5 mm dia (Includes diameters up to 12.7 mm)
Sample sizes (disk/plate)..50 mm dia (Includes diameters up to 60 mm)
Customized holders on request

ENVIRONMENT COMPATIBILITY

- Humidity
- Spill resistant lubrication cup
- TriboCorrosion
- High Temp (up to 1000 °C)



Rotary Drive - Vertical mounted on the UniTest together with a sample holder.

FEATURES

- Quick interchange adapter for easy swapping of motion drives.
- Motion module storage box for safekeeping of drive.

DUCOM
MATERIAL CHARACTERIZATION SYSTEMS

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