

DYNA-MESS

PRÜFSYSTEME

 **DYNA-MESS**
PRÜFSYSTEME

JFM

Medical Testing Machine

DYNAdent 14801

: Testing machine for "Dynamic fatigue test for dental implants"
according to ISO 14801

Types



Details

- Designed for the fatigue test ISO 14801
- Complete range of accessories
 - Reservoir for test in a solution tempered to 37 °C
 - Sliding joint to eliminate the lateral forces
 - Positioning device
 - Special fixture
- Easy to install and operate
- Real-time display of measured values
- Data recording
- Comprehensive library of tests
- Cost efficient
- Compact design
- Electrically driven – no hydraulic system, no compressed air

Technical specifications

Force max. (with integrated cooling)	Dynamic up to 600N
Displacement	+/- 4 mm
Frequency	2 Hz and 15 Hz
Curve form	Sinus
Dimensions (LxWxD)	ca. 360 mm x 260 mm x 620 mm

Examples of application

Fatigue test

according to DIN EN ISO 14801

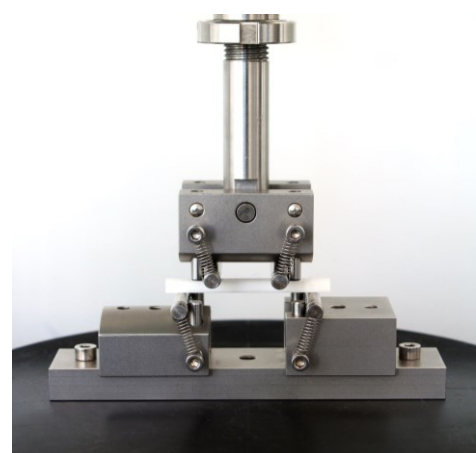
- Loading of the implant as specified in the standard
- Suitable for implants with synthetic resin embedded abutments
- Sliding joint for a loading free of lateral forces
- Clamping device to mount the implants at different angles
- Interchangeable fixtures



Bending test

according to DIN EN ISO 6872

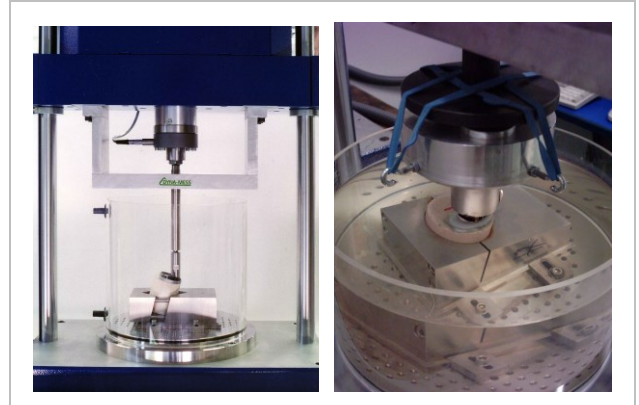
- Accessories especially adapted for this standard test procedure
- Suitable for high frequency loading
- Accessories made of stainless materials
- Support rollers can be easily replaced
- Automatic compensation of the angular displacement
- Specimen loaded with a pulsating load



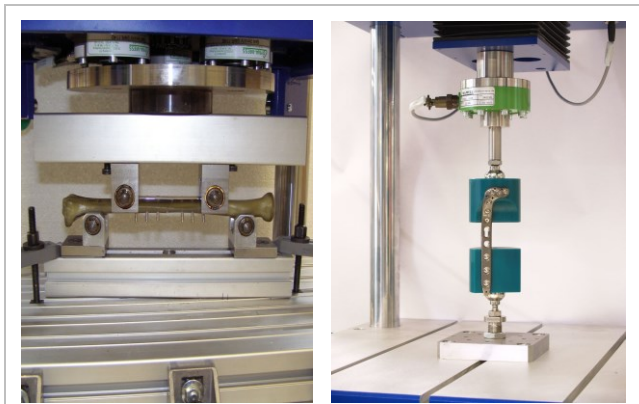
Medical Testing Machine



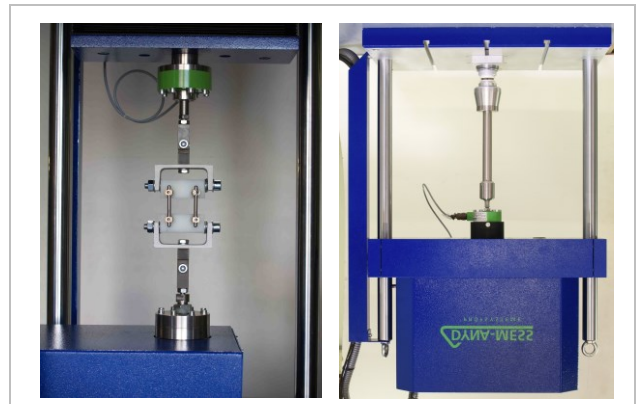
Hip



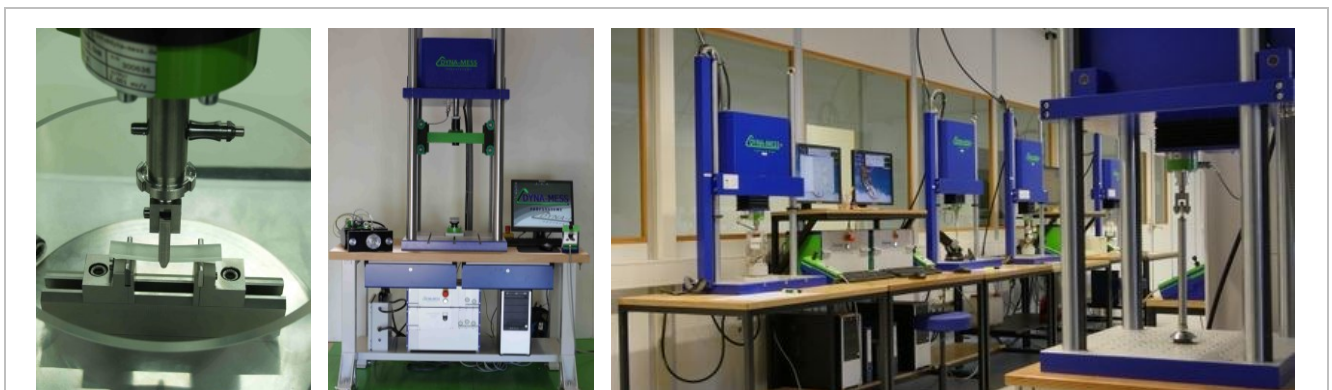
Knee



Osteosynthesis



Spine



Others

Servopneumatic Actuator

SPIAx/P

: ServoPositioned Integrated Actuator / Pneumatic

Types



SPIAx/P ... LCF

Piston type \Rightarrow long stroke, reduced frequency



SPIAx/P ... HF

Membrane type \Rightarrow short stroke, high frequency

Applications

- Used by customers to set up test rigs for component testing
 - Frame / set up / rig often designed and manufactured by customer himself
 - Dynamic and cyclic testing on components (fatigue testing)
 - Type LCF : max. 10 Hz
 - Type HF : max. 35 Hz
 - Dynamic amplitudes by request
(have to be calculated based on size of actuator and servovalve, testing force)
- Typical dynamic amplitudes
(has to be confirmed by DYNA-MESS after clarification of application because values depend on load and other parameters!):

SPIAx/P 1 LCF	± 50 mm @ 1 Hz, ± 20 mm @ 10 Hz
SPIAx/P 2,5 LCF	± 50 mm @ 1 Hz, ± 10 mm @ 10 Hz
SPIAx/P 4,5 LCF	± 50 mm @ 1 Hz, ± 5 mm @ 10 Hz
SPIAx/P 10 LCF	± 50 mm @ 1 Hz, ± 3 mm @ 10 Hz
SPIAx/P 20 LCF	± 5 mm @ 1 Hz, ± 0,5 mm @ 10 Hz
SPIAx/P 5 HF	± 10 mm @ 1 Hz, ± 5 mm @ 10 Hz, ± 0,15 mm @ 35 Hz
SPIAx/P 10 HF	On request

- Examples :
 - Seats (automotive, home furniture)
 - Foams
 - Lever for handbrake
 - Furnitures
 - Pedals
 - Plastics
 - Handlebars for bicycles
 - Steering wheels

Availability

Type	Nominal capacity (kN)	Stroke (mm)
SPIAx/P 1 LCF	1	200 (± 100)*
SPIAx/P 2,5 LCF	2,5	200 (± 100)*
SPIAx/P 4,5 LCF	4,5	200 (± 100)*
SPIAx/P 10 LCF	10	200 (± 100)*
SPIAx/P 20 LCF	20	200 (± 100)*
SPIAx/P 5 HF	5	12 (± 6)
SPIAx/P 10 HF	10	12 (± 6)

*alternative strokes 50 ... 300 mm on request

Unique points

- Comparison of drive technologies for dynamic machines

Type	Servo-pneumatic	Servo-electric	Servo-hydraulic
Max. force	20 kN	10 kN	10,000 kN
Max. frequency	10 / 35 Hz	50 / 100 Hz	10 / 100 / 500 Hz
Installation	+ -	+	- ... - -
Maintenance	+	++	--
Noise	+ -	+	--
Cleanliness	+	++	--
Price	Low	Normal	High

- For dynamic testing alternatives are
 - Servohydraulic ⇒ expensive, oily, noisy
 - Mechanical (e.g.excenter) ⇒ no closed loop control, no fence control
- Compared to hydraulics
 - Cheaper
 - More energy-efficient
 - Easier in maintenance
 - Clean
 - Easy to install (one pneumatic hose only. In hydraulics: pressure line, return line, leakage line in stiff hoses)
 - Lightweight ⇒ easy to mount in customer's set up
 - Pressure supply (compressed air) usually already given
⇒ no hydraulic power unit needed
- Compared to standard pneumatics:
 - Closed loop control with displacement control mode and force control mode
 - Waveforms(sinus, ...) possible
 - Setting of speed and load by servovalve (standard pneumatic has to set up pressure by pressure relief valve and speed by orifice)
 - Continuous monitoring of loads and displacements by software DYNA-TCC

Alternatives

<p>SPIAx/E</p> <p>Electric driven ⇒ slow motion, static, cyclic ramp</p>	
---	--

	SPIAx/E 0,5 LCF	SPIAx/E 1 LCF	SPIAx/E 1 HD	SPIAx/E 2,5 LCF	SPIAx/E 5 LCF	SPIAx/E 5 HF	SPIAx/E 10 LCF	SPIAx/E 10 HF
	SPIAx/E 0,5 HF	SPIAx/E 1 HF		SPIAx/E 2,5 HF				
Nominal power (kN)	0,5	1	1	2,5	5	5	10	10
Stroke (mm)	200	200	200	200	200	200	200	200
Max. speed (mm/s)	250 1000	250 1000	250	250 1000	250	1000	250	1000

<p>SPIAx/H</p> <p>Hydraulic driven ⇒ high frequency, high load, on request</p>

<p>Custom-tailored machine</p> <p>⇒ complete set up by DYNA-MESS</p>	
---	--

	HCF SPIAx/						LCF SPIAx/				
	H 5	H 10	H 20	H 50	H 100	H 200	H 20	H 50	H 100	H 200	H 500
Nominal power (kN)	5	10	20	50	100	200	20	50	100	200	500
Stroke (mm)	100 (± 50)	100 (± 50)	100 (± 50)	100 (± 50)	100 (± 50)	100 (± 50)	200 (± 100)	200 (± 100)	200 (± 100)	200 (± 100)	200 (± 100)

*alternative capacity on request

Table-top testing machine

Servopneumatic

TP

: Table-top Pneumatic

Types



TP ... LCF : Piston type cylinder inside \Rightarrow long stroke, reduced frequency
TP ... HF : membrane type cylinder inside \Rightarrow short stroke, high frequency

Details

- Testing machine for static and dynamic testing
- Driven by servopneumatics
- Stiff frame with actuator on top
- 1 ... 5 kN : 2 column frame / 10...20 kN : 4 column frame
- Crosshead moveable to adapt to specimen's dimensions
- Displacement sensor integrated
- Load cell integrated
- DYNA-MESS electronics for closed loop control
- DYNA-MESS testing software DYNA-TCC
- Safety housing available
- Tables with integrated electronics available
- Pressure supply 6 (7) bar necessary for nominal force

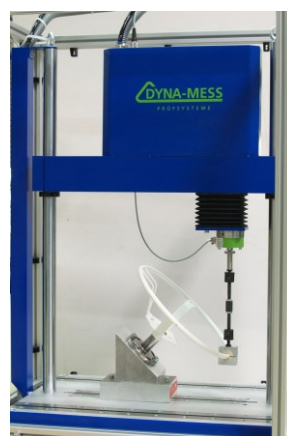
Applications

- Static and dynamic testing
- Materials testing : tension / compression / bending
- Component testing : cyclic testing

- Dynamic and cyclic testing (fatigue testing)
 - Type LCF : max. 10 Hz
 - Type HF : max. 35 Hz
 - Dynamic amplitudes by request
(have to be calculated based on size of actuator and servovalve, testing force)
 - Typical dynamic amplitudes
(has to be confirmed by DYNA-MESS after clarification of application because values depend on load and other parameters!) :

TP 1 LCF	± 50 mm @ 1 Hz, ± 20 mm @ 10 Hz
TP 2,5 LCF	± 35 mm @ 1 Hz, ± 5 mm @ 10 Hz
TP 20 LCF	± 5 mm @ 1 Hz, ± 0,5 mm @ 10 Hz
TP 5 HF	± 2,5 mm @ 10 Hz, ± 0,3 mm @ 35 Hz
TP 20 HF	± 1,4 mm @ 10 Hz, ± 0,6 mm @ 25 Hz

- Examples :
 - Materials testing on metal and non-metal specimen
 - Fatigue testing, stress cycle testing, woehler diagram
 - Springs
 - Rubber
 - Hydro bears, hydraulic rubber mounts
 - Steering wheels
 - Implants
 - foams
 - Plastics



Availability

Type	Nominal capacity (kN)**	Stroke (mm)
TP 1 LCF	1	100 (± 50)*
TP 2,5 LCF	2,5	100 (± 50)*
TP 5 LCF	5	100 (± 50)*
TP 10 LCF	10	300 (± 150)*
TP 20 LCF	20	300 (± 150)*
TP 5 HF	5	12 (± 6)
TP 10 HF	10	12 (± 6)
TP 20 HF	20	12 (± 6)

*alternative strokes 50 ... 300 mm on request

Unique points

- For dynamic testing alternatives are
 - Servohydraulic ⇒ expensive, oily, noisy
 - Mechanical (e.g.excenter) ⇒ no closed loop control, no fence control
- Compared to hydraulics
 - Cheaper
 - More energy-efficient
 - Easier in maintenance
 - Clean
 - Easy to install (one pneumatic hose only. In hydraulics: pressure line, return line, leakage line in stiff hoses)
 - Pressure supply (compressed air) usually already given
⇒ no hydraulic power unit needed
- Compared to standard pneumatics:
 - Closed loop control with displacement control mode and force control mode
 - Waveforms(sinus, ...) possible
 - Setting of speed and load by servovalve (standard pneumatic has to set up pressure by pressure relief valve and speed by orifice)
 - Continuous monitoring of loads and displacements by software DYNA-TCC

Table-top testing machine

Servoelectric

TE

: Table-top Electric

Types



TE ... HCF : servo-electric cylinder inside \Rightarrow long stroke, high frequency

Details

- Testing machine for static and dynamic testing
- Driven by servoelectric
- Stiff frame with actuator on top
- 2,5 kN : 2 column frame / 7 kN : 4 column frame / 10 kN : 4 column frame
- Crosshead moveable to adapt to specimen's dimensions
- Displacement sensor integrated
- Load cell integrated
- DYNA-MESS electronics for closed loop control
- DYNA-MESS testing software DYNA-TCC
- Safety housing available
- Tables with integrated electronics available

Applications

- Static and dynamic testing
- Materials testing : tension / compression / bending
- Component testing : cyclic testing
- Dynamic and cyclic testing (fatigue testing)
 - Type HCF : max. 50 Hz (2,5 / 7 kN), 100Hz (10 kN)
 - Dynamic amplitudes by request
(have to be calculated based on size of actuator and servovalve, testing force)
 - Typical dynamic amplitudes
(has to be confirmed by DYNA-MESS after clarification of application because values depend on load and other parameters!)

TE 2,5 HCF	± 50 mm @ 1 Hz, ± 20 mm @ 100 Hz
TE 7 HCF	± 35 mm @ 1 Hz, ± 5 mm @ 100 Hz
TE 10 HCF	-

- Examples :
 - Materials testing on metal and non-metal specimen
 - Fatigue testing, stress cycle testing, woehler diagram
 - Springs
 - Rubber
 - Hydro bears, hydraulic rubber mounts
 - Steering wheels
 - Implants
 - foams
 - Plastics

Availability

Type	Nominal capacity (kN)**	Stroke (mm)
TE 2,5 HCF	2,5	100 (± 50)*
TE 7 HCF	7	150 (± 75)*
TE 10 HCF	10	300 (± 150)*

*alternative strokes 100 ... 150 mm on request

Unique points

- For dynamic testing alternatives are
 - Servohydraulic ⇒ expensive, oily, noisy
 - Mechanical (e.g.excenter) ⇒ no closed loop control, no fence control
- Compared to hydraulics
 - Cheaper
 - More energy-efficient
 - Easier in maintenance
 - Clean
 - Easy to install (one pneumatic hose only. In hydraulics: pressure line, return line, leakage line in stiff hoses)
 - Pressure supply (compressed air) usually already given
⇒ no hydraulic power unit needed
- Compared to standard pnerumatics:
 - Closed loop control with displacement control mode and force control mode
 - Waveforms(sinus, ...) possible
 - Setting of speed and load by servovalve (standard pneumatic has to set up pressure by pressure relief valve and speed by orifice)
 - Continuous monitoring of loads and displacements by software DYNA-TCC

Vertical testing machine

Servohydraulic

VH

: Vertical Hydraulic

Types



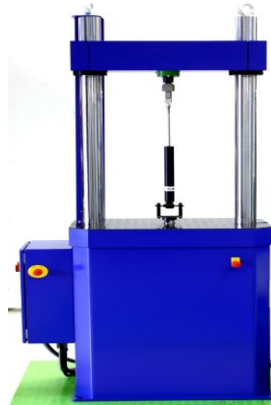
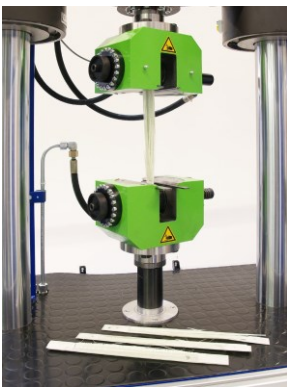
- V2H ...** : 2 column frame, cylinder in base frame
- V4H ...** : 4 column frame, cylinder on top
- V ... H ... LCF** : Servo cylinder inside \Rightarrow reduced frequency
- V ... H ... HCF** : Hydrostatic cylinder inside \Rightarrow high frequency
- V ... H ... STAT** : For quasi-static testing only
- V2H 10 HCF+** : Hydrostatic cylinder inside \Rightarrow enhanced frequency

Details

- Testing machine for static and dynamic testing
- Driven by servohydraulics
- Stiff frame with actuator in base frame (V2H) or on top (V4H)
- Crosshead moveable to adapt to specimen's dimensions
- Displacement sensor and load cell integrated
- Hydraulic power unit integrated in base frame or separately
- DYNA-MESS electronics for closed loop control
- DYNA-MESS testing software DYNA-TCC
- Safety housing available

Applications

- Static and dynamic testing
- Materials testing : tension / compression / bending
- Component testing : cyclic testing
- Dynamic and cyclic testing (fatigue testing)
 - Type V 2/4 H ... LCF : max. 10 Hz
 - Type V 2/4 H ... HCF : max. 100 ... 200 Hz
 - Type V2H 10 HCF+ : max. 400 ... 500 Hz
 - Dynamic amplitudes by request
(Depend on size of hydraulic power unit. Size of hydraulic power unit will be customized.)
- Examples :
 - Materials testing on metal and non-metal specimen
 - Fatigue testing, stress cycle testing
 - Springs
 - Implants
 - Rubber
 - Shock absorber
 - Hydro bears, hydraulic rubber mounts
 - ...



Availability

Type	Nominal capacity (kN)**	Stroke (mm)
V2H 20 LCF, V4H 20 LCF***	20	200 (± 100)*
V2H 50 LCF, V4H 50 LCF***	50	200 (± 100)*
V2H 100 LCF, V4H 100 LCF***	100	200 (± 100)*
V2H 200 LCF, V4H 200 LCF***	200	200 (± 100)*
V2H 500 LCF, V4H 500 LCF***	500	300 (± 150)*
V2H 1000 LCF, V4H 1000 LCF***	1000	300 (± 150)*
:	:	:
V2H 10000 LCF, V4H 10000 LCF***	10000	300 (± 150)*
V2H 5 HCF, V4H 5 HCF	5	100 (± 50)
V2H 10 HCF, V4H 10 HCF	10	100 (± 50)
V2H 20 HCF, V4H 20 HCF	20	100 (± 50)
V2H 50 HCF, V4H 50 HCF	50	100 (± 50)
V2H 100 HCF, V4H 100 HCF	100	100 (± 50)
V2H 200 HCF, V4H 200 HCF	250	100 (± 50)
V2H 10 HCF+	10	20 (± 10)

*alternative strokes 50 ... 300 mm on request

**alternative capacities on request

***also available for static testing only (type V...H...STAT)

Unique points

- For dynamic testing alternatives are
 - Servohydraulic ⇒ limited in capacity and frequency
 - Mechanical ⇒ no closed loop control, no fence control
- V4H : 4 column frame with cylinder on top
⇒ T-slot table for flexible fixing of specimen (component, ...)

Torsion Testing Machine

Tors/H 2000 HCF

: Testing machine for cyclic testing on materials and components

Types



Tors/H 2000 HCF

Technical specifications

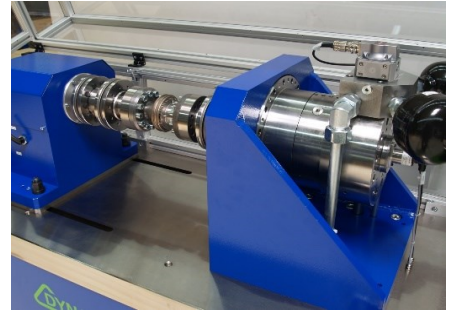
Max. torque (static torque)	2000 Nm
Max. torque (dynamic torque)	+/- 1400 Nm
Max. angle of rotary (dynamic stroke @ 0 Hz)	+/- 60 °
Max. test frequency	400 Hz
Max. amplitude @ 400Hz	+/- 0,1 °

Details

Load fram and actuator

Very stiff setup with horizontally placed rotary actuator and base frame.

- Dimensions(WxDxH)
: Approx. 2900 x 1000 x 1600 mm
- Horizontally placed rotaty actuator and counter bearing
- Slideable in T-slot table
- Totary drive with hydrostatic bearing in radial and axial direction for dynamic operation



Hydraulic power supply

For digital servo control (hydraulic)

- Flow of pump : 40 l/min (40 lpm)
- Pressure : 280 bar (28 Mpa)
- Flow rate
: 40 l/min @ 280 bar (40lpm at 28 Mpa)
- Reservoir : 300 l
- Hosing for HPU
- Electric control 30 kW



Sensors

- Torque measurement
 - sensor 2 kNm (torque transducer)
- Angle measurement
 - Contactless angle sensor (angle transducer)
- Acceleration measurement
 - Accelarerometer (Accelaration transducer)
- Additional measuring channels
 - 4 additional measuring channels (without amplifirer)
 - Integration in testing software DYNA-TCC

Testing software DYNA-TCC

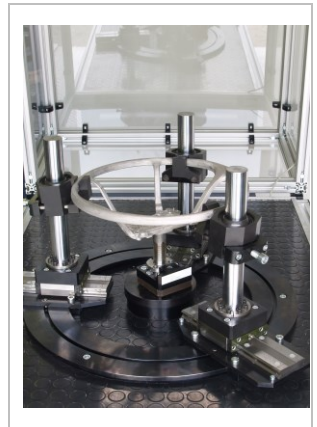
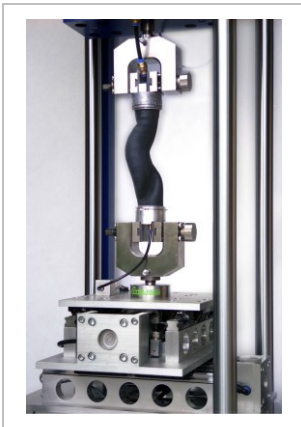
Testing modules

- Manual testing
 - quasi-static loading in angle control with constant speed by using the joystick on the remote control
- Multistep cyclic testing
 - tests dynamic mode in torque/angle control up to 10 blocks
 - waveform : sine, triangle, square, customized
- Sweep testing
 - evaluation of dynamic values using variation of frequency or amplitude
 - dynamic testing in stepped sine mode including calculation of characteristic dynamic values (loss angle, dynamic stiffness, loss energy damping, tandleta,..)
- Elastomer testing
 - characterization on viscoelastic components
 - static testing including analysis of curve (static stiffness, points of interest)
 - the dynamic characterization application measures:
(Phase angle, Stiffness, loss energy, Damping, Tan Delata)

Software-AddOn

- Equation editor
 - calculation of up to 3 time-based values based on sensor data
*optional more than 3
 - visualization and storage of calculated time-based results
- Cycle-based values
 - for cyclic testing and multistep cyclic testing
 - visualization and storage of dynamic values
(dynamic stiffness, loss angle, loss energy, Damping, Tan Delata)
- Testing parameters online
 - for cyclic testing and multistep cyclic testing
 - online set up of frequency, amplitude, pre-load resp. middle-position
 - parameterizable rate for changing of parameter
 - Iterativ Amplitude- and Middel-Position/Load control (Peak Value Control)

Special Machines



 **DYNA-MESS**
PRÜFSYSTEME

JFM



Leimberg 19, D - 52222 Aachen/Stolberg
T. +49 (0) 24 02/76 68 10
F. +49 (0) 24 02/76 68 160
info@dyna-mess.de



서울시 구로구 디지털로 26 길 123, 1604 호
T. 02-598-6112
F. 02-598-6113
jfm@jfm.co.kr