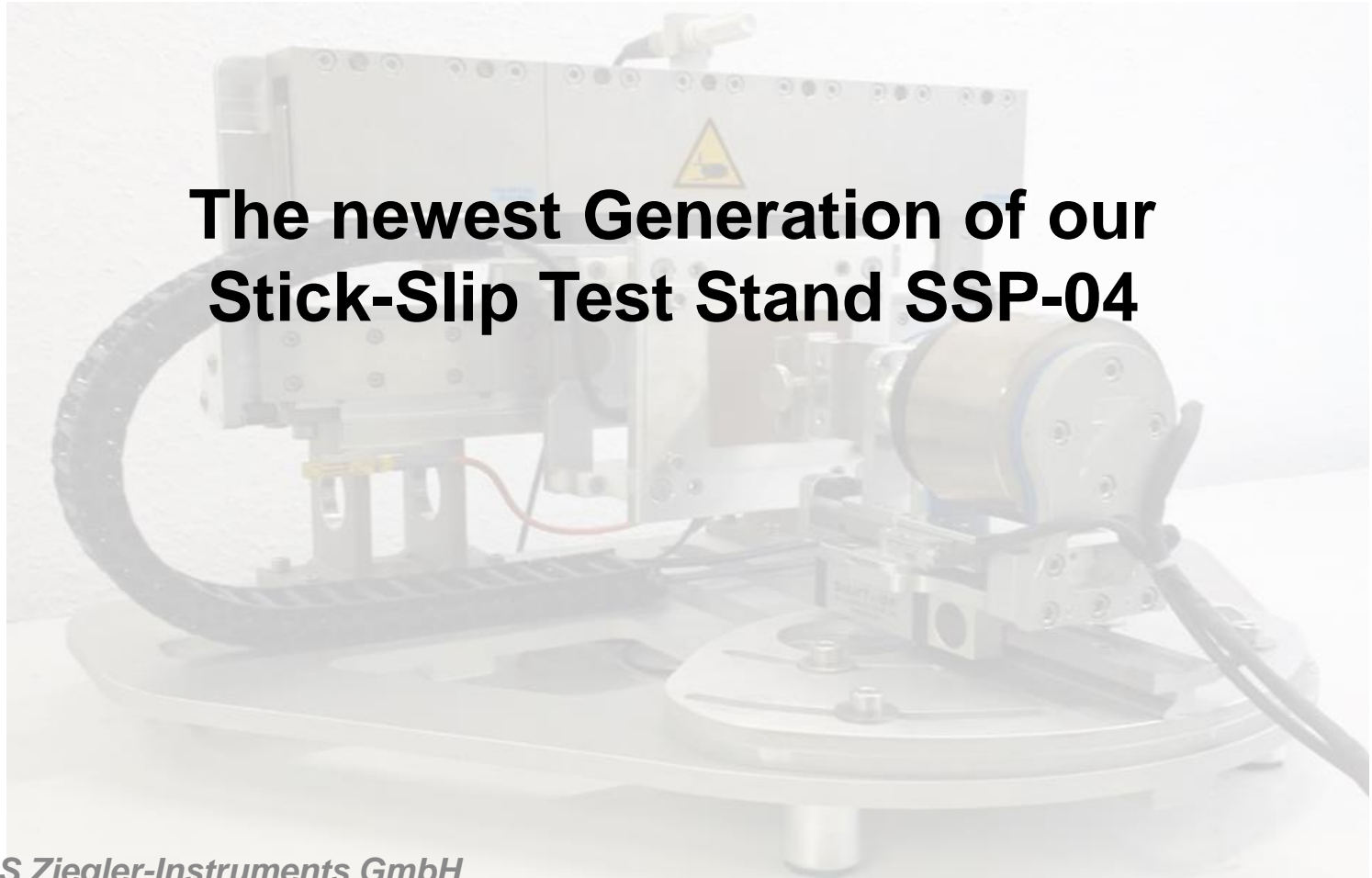


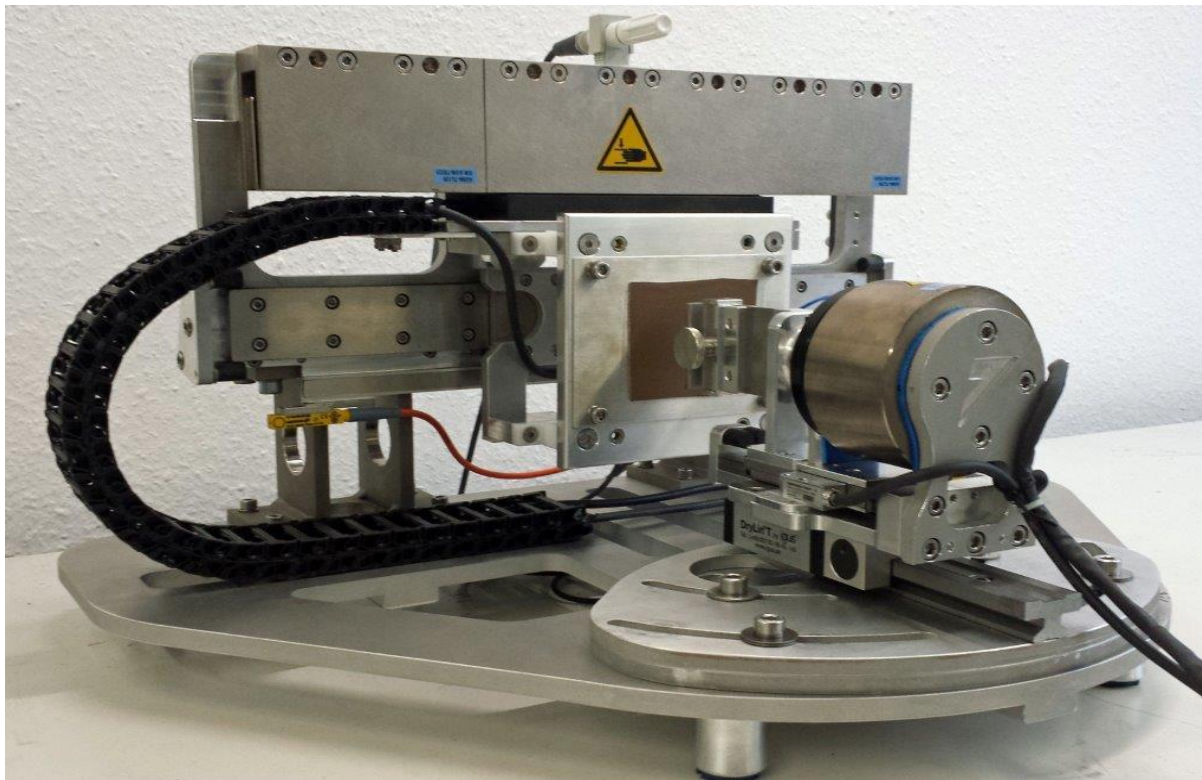
The newest Generation of our Stick-Slip Test Stand SSP-04



ZINS Ziegler-Instruments GmbH

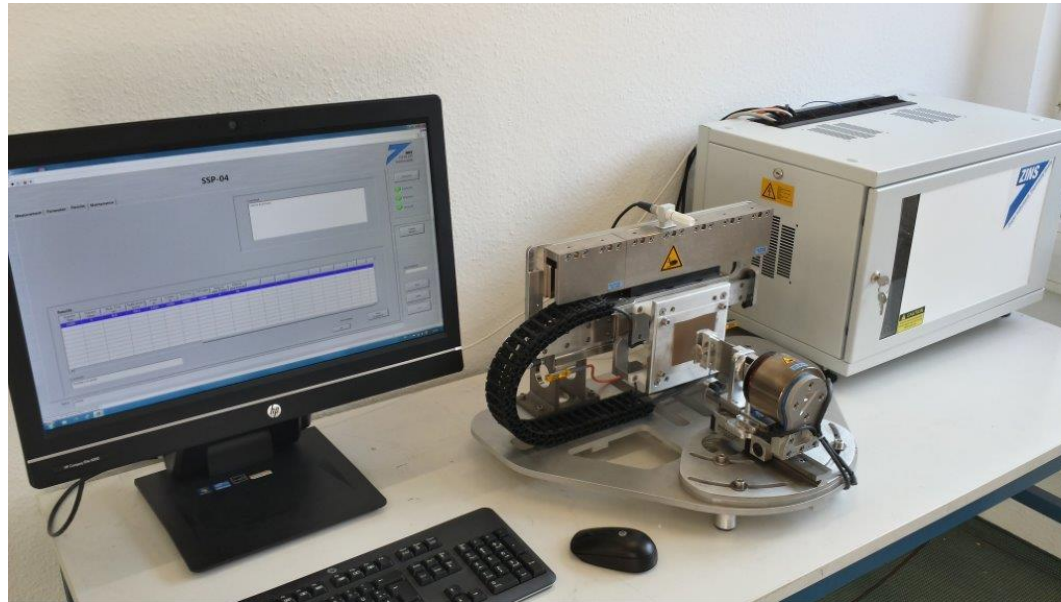
SSP-04

Our newest Tribological Test Stand to examine material combinations and especially to measure Stick-Slip phenomena



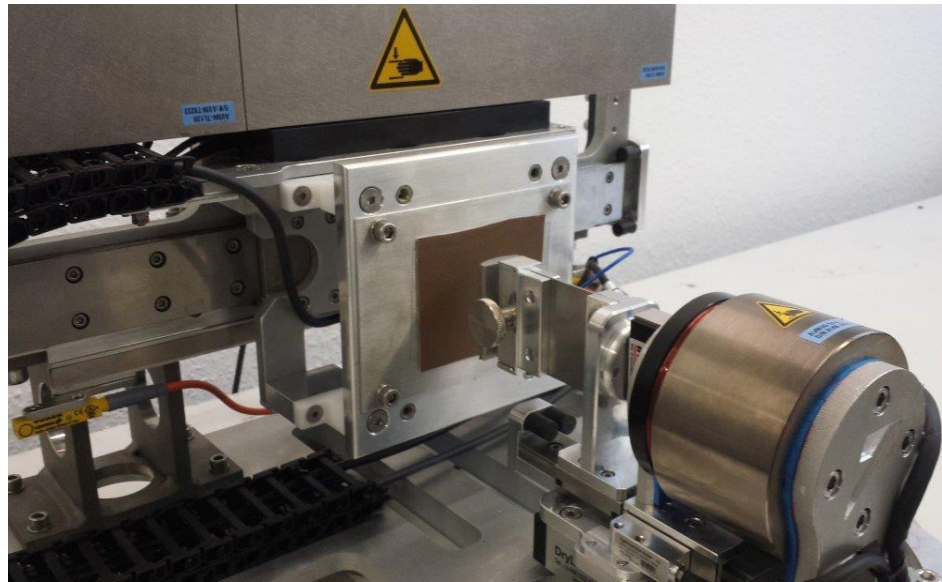
Key features

- Serves to capture Stick-Slip phenomena
- Determining the coefficient of static and dynamic friction
- Wear and Abrasion
- Application for the examination of leather, artificial leather, thermoplastics, coatings and metals



Ease of use

- Simplicity and user friendliness was the main focus when developing
- The input parameters are normal force and relative velocity, as well as position and number of cycles
- The infeed occurs over a coil drive with a force and displacement sensor.
- A variable infeed velocity, as well as an exact force and velocity displacement regulation are realizable



Technical Specification

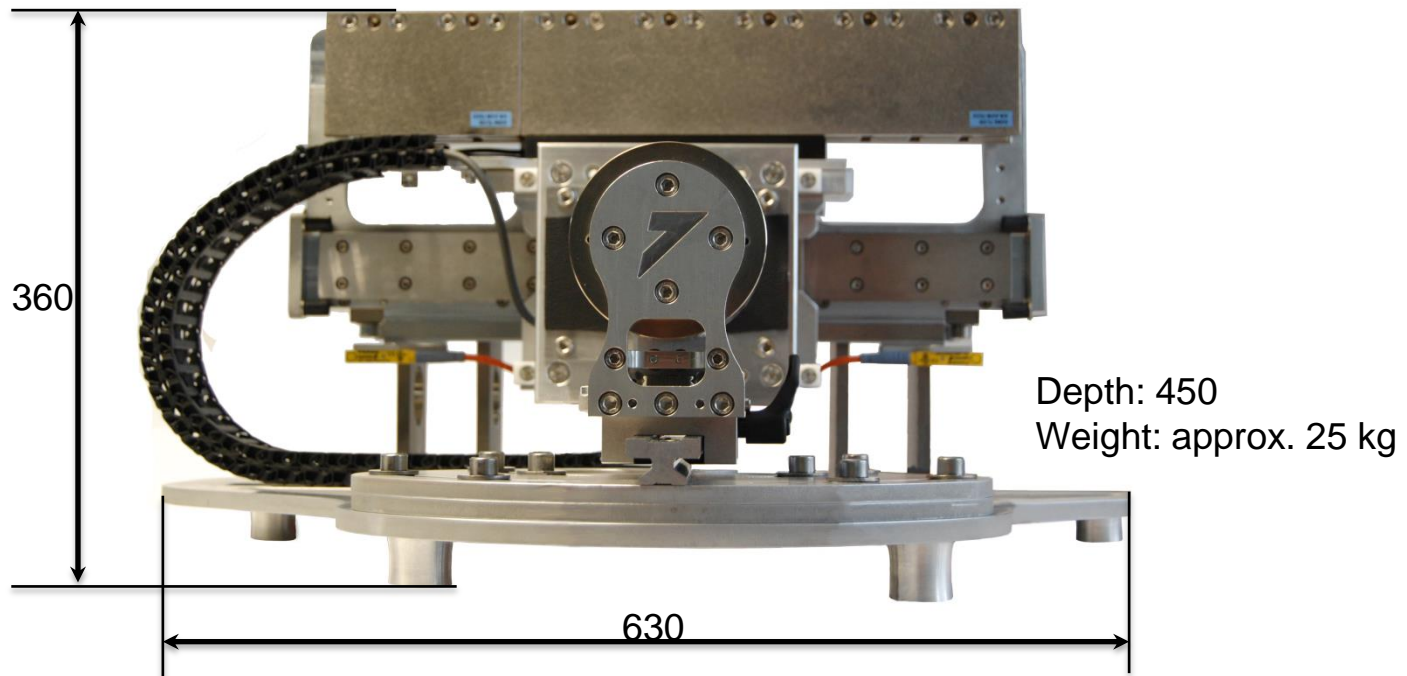
- Relative velocity of the linear motor: 1-200 mm/s
- Travel distance: 100 mm, Accuracy of the Displacement sensor 0,8µm
- Normal force: 2-80 N
- Accuracy force controlled feed <1% of the measurement range
- Suitable temperature range of -40° to 85° Celsius
- Measurement range for static and dynamic friction force 0 to 35 N
- Accuracy of the eddy current sensor: 0,225% of the measurement range
- Measurement of the Acceleration: 0-25g
- Feed mode: force controlled and displacement controlled
- Pressing Speed and stability time are adjustable
- Accuracy of displacement controlled feed $\pm 0,1$ mm

New Development

- The higher relative velocity allows the simulation of new applications:
 - Window regulators
 - Sliding Roofs
 - Individual Test Scenarios
 - Measurements with real road profiles
- Lifetime testing
- Elastic-plastic behavior of soft materials (e.g. Seals)

New Development

- The smaller overall size of the Test Stand allows to place the Test Stand inside a climatic chamber
- The All-in-One Computer decreases the size of the control cabinet, which saves space and weight



At a glance

Advantages

- Measurement of the Stick-Slip Phenomena and converting the results into a Risk-Priority-Number
- Reproducibility of the measurement results due to a variation of the test parameters and ease of use
- Suitable Temperature range of -40°C to 85°C

Features

- Adjustment of different situations by using real test scenarios: variable Test parameters and sample holders geometries
- Automated preparation of a comprehensive test report
- The Risk-Priority-Number evaluates the Stick-Slip Risk of material pairs

Applications

- Development and Design: Evaluation of Stick-Slip Risk to select uncritical material pairs
- Testing: Lifetime testing, Abrasion and changes in the surface and material properties
- Quality Management: Proof to provide Stick-Slip optimized products

Difference between SSP-02 and SSP-04

| | SSP-02 | SSP-04 |
|--------------------------------------|--|---|
| Relative velocity | 1 – 10 mm/s | 1 – 200 mm/s |
| Normal force | 5 – 80 N | 2 – 80 N |
| Climate range | -30°C – 80°C | -40°C – 85°C |
| Infeed | Pneumatic | Coil drive |
| Simulation of different applications | Elastic behavior of materials (e.g. seals) | Road profiles, window regulator, sliding roof, individual test scenarios, lifetime testing, elastic-plastic behavior of materials |

Test Mode

Realization of the standard test according to the different test mode:

- VDA 230-206 part 2 for leather
- VDA 230-206 part 3 for artificial leather
- BMW PR315
- BMW TL 9169300
- VW/Audi/Porsche TL 52064
- Ford L400

By default is the Test Stand equipped with individual definable Test mode where the test parameters can be configurable freely

Equipment of the SSP-04

The basic Test Stand consists of a control cabinet, the test rig and a stationary Computer.

The control cabinet includes:

- All-in-One PC, data acquisition, power supply, servo controls for the linear axis and the infeed actuators

The test rig consists of the following components:

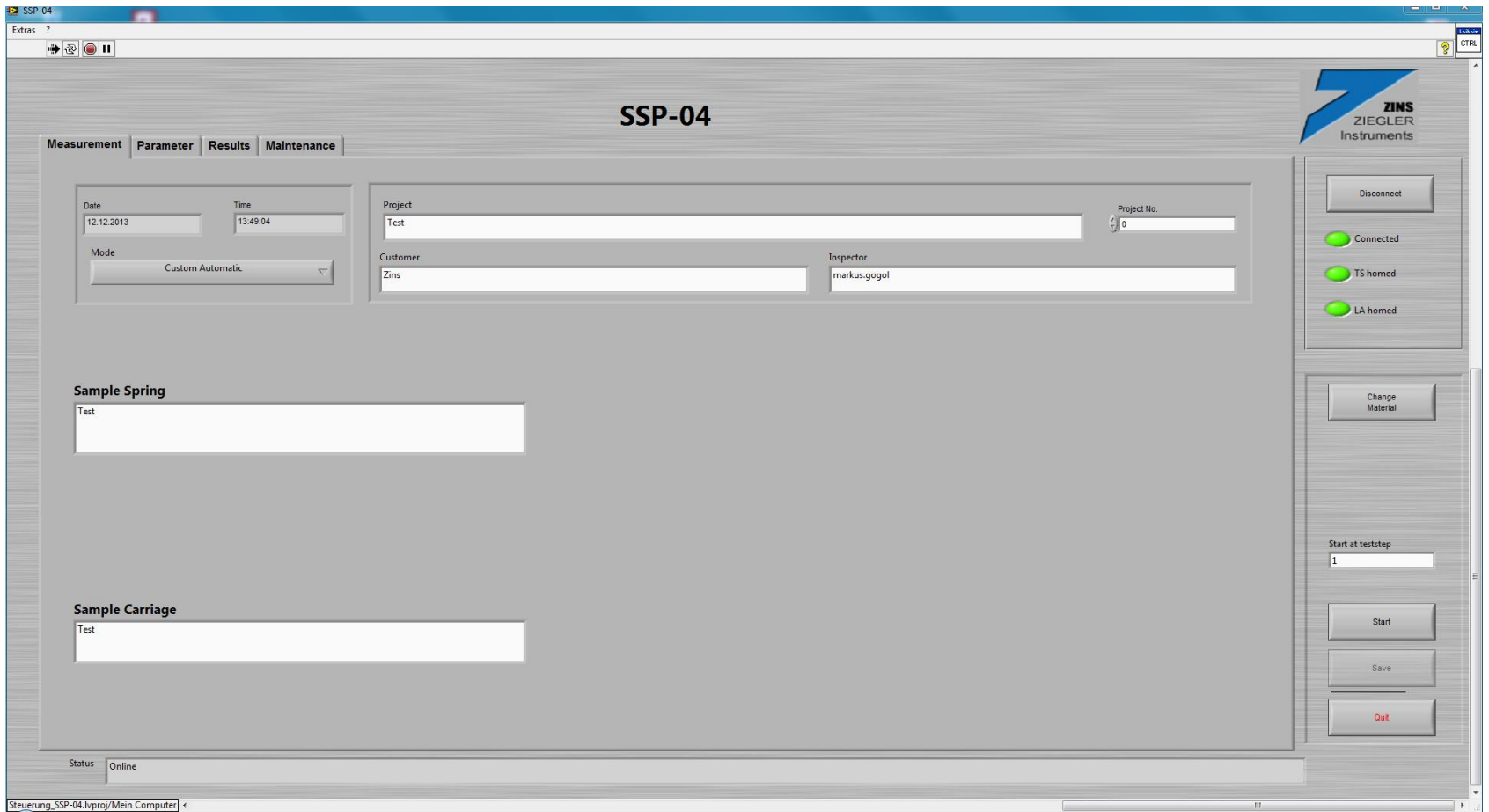
- Linear table to mount one of the material samples that is equipped with a linear drive to create the relative motion

The feed unit consists of :

- A coil drive with a mounting for the second material pair, which will be brought in contact with the linear table
- A spring unit which is equipped with sensors for the friction and acceleration

The test rig is fitted with a sensor to measure environmental temperature and air humidity.

Software of the SSP-04



Software of the SSP-04

SSP-04

Extras ?

Measurement Parameter Results Maintenance

Movement Axis Infeed Axis Climate

Position (mm) Move

Displacement (mm)

Velocity [mm/s]

Abrasion Move Profile Linear Frequency 0,15 Hz

Cycles

End position wait time (s) Timer (s)

Measurement Process

| Pos (mm) | Disp (mm) | Vel (mm/s) | Normal Force (N) | Motion Profile | Trig Temp (°C) | Trig Hum (%) | Timer (s) | Cycles | Direction | Abrasion | Delay (s) | foamed | Infeed Position [mm] |
|----------|-----------|------------|------------------|----------------|----------------|--------------|-----------|--------|-----------|----------|-----------|--------|----------------------|
| 0 | 20 | 6,0 | 10,0 | Linear | none | none | 10 | 3 | Right | Off | 0 | 3 | |
| 0 | 20 | 6,0 | 10,0 | Linear | none | none | 10 | 3 | Right | Off | 0 | 3 | |
| 0 | 20 | 6,0 | 10,0 | Linear | none | none | 10 | 3 | Right | Off | 0 | 3 | |
| 0 | 20 | 6,0 | 10,0 | Linear | none | none | 10 | 3 | Right | Off | 0 | 3 | |
| 0 | 20 | 6,0 | 10,0 | Linear | none | none | 10 | 3 | Right | Off | 0 | 3 | |
| 0 | 20 | 6,0 | 10,0 | Linear | none | none | 10 | 3 | Right | Off | 0 | 3 | |
| 0 | 20 | 6,0 | 10,0 | Linear | none | none | 10 | 3 | Right | Off | 0 | 3 | |
| 0 | 20 | 6,0 | 10,0 | Linear | none | none | 10 | 3 | Right | Off | 0 | 3 | |
| 0 | 20 | 6,0 | 10,0 | Linear | none | none | 10 | 3 | Right | Off | 0 | 3 | |
| 0 | 20 | 6,0 | 10,0 | Linear | none | none | 10 | 3 | Right | Off | 0 | 3 | |

↑ ↓

New Update Delete Load Save

Disconnect

Connected TS homed LA homed

Change Material

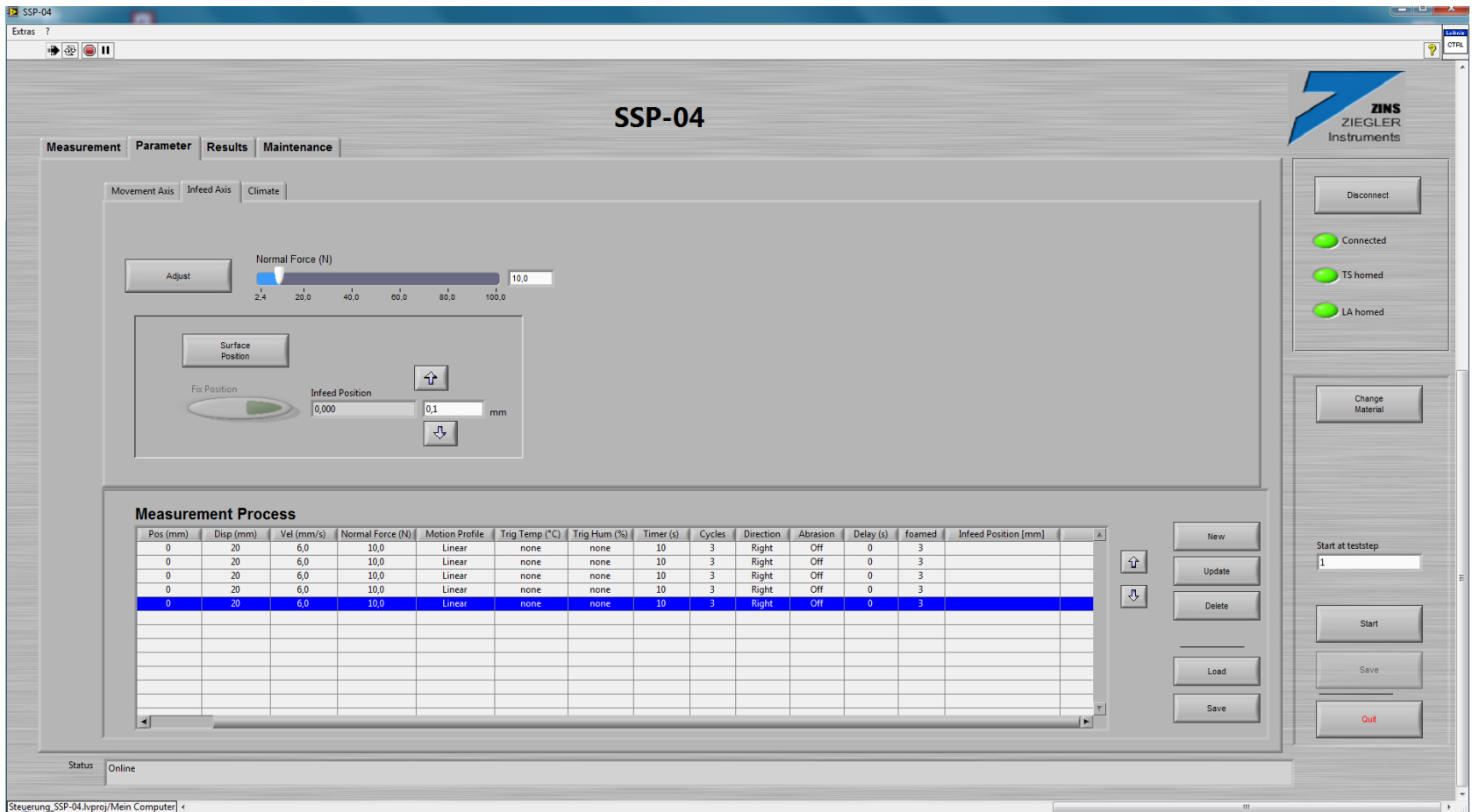
Start at teststep

Start Save Quit

Status Online

Steuerung_SSP-04.lvproj/Mein Computer

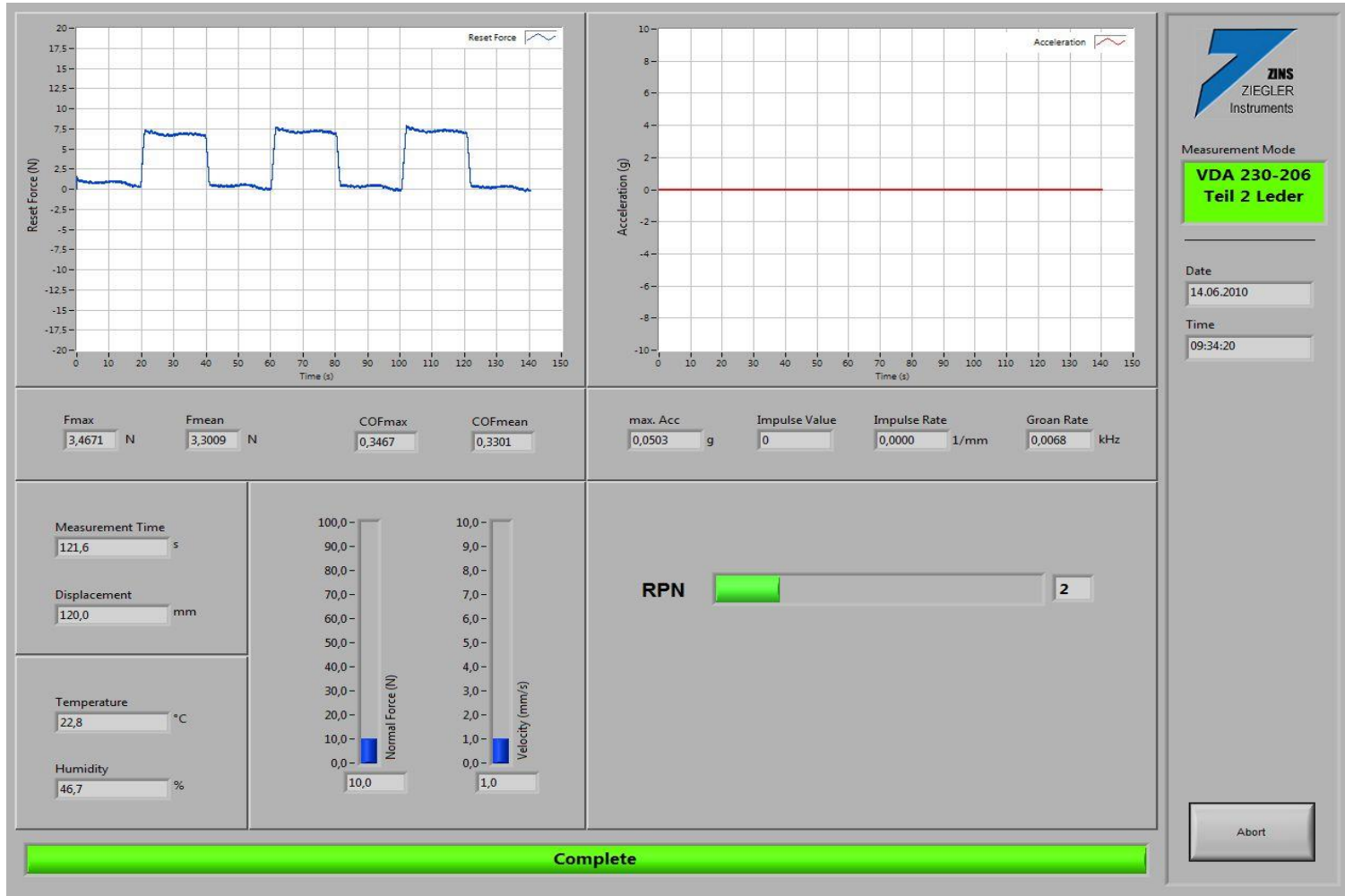
Software of the SSP-04



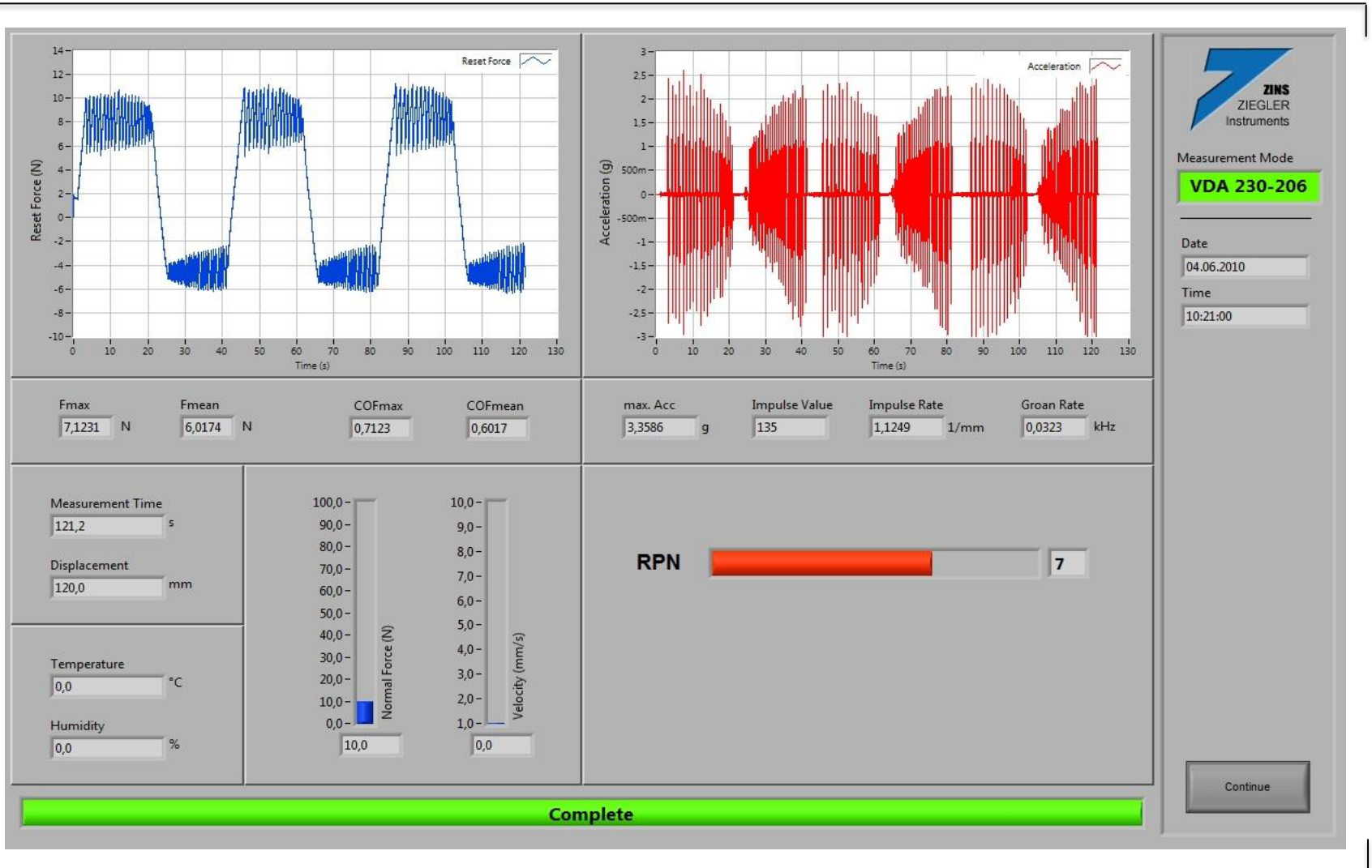
The screenshot displays the SSP-04 software interface. At the top, there are tabs for 'Measurement', 'Parameter', 'Results', and 'Maintenance'. Below these, there are sub-tabs for 'Movement Axis', 'Infeed Axis', and 'Climate'. The main area features a 'Normal Force (N)' slider set to 10.0, with an 'Adjust' button. Below the slider is a 'Surface Position' button and a 'Fix Position' diagram. To the right, there is an 'Infeed Position' input field set to 0.1 mm, with up and down arrow buttons. On the far right, there is a status panel with 'Disconnect', 'Connected', 'TS homed', and 'LA homed' indicators, a 'Change Material' button, and a 'Start at teststep' input field set to 1. Below the main controls is a 'Measurement Process' table with columns for various parameters and a 'Start' button. The status bar at the bottom indicates 'Status Online' and the file path 'Steuerung_SSP-04.lvproj/Mein Computer'.

| Pos (mm) | Disp (mm) | Vel (mm/s) | Normal Force (N) | Motion Profile | Trig Temp (°C) | Trig Hum (%) | Timer (s) | Cycles | Direction | Abrasion | Delay (s) | foamed | Infeed Position [mm] |
|----------|-----------|------------|------------------|----------------|----------------|--------------|-----------|--------|-----------|----------|-----------|--------|----------------------|
| 0 | 20 | 6,0 | 10,0 | Linear | none | none | 10 | 3 | Right | Off | 0 | 3 | |
| 0 | 20 | 6,0 | 10,0 | Linear | none | none | 10 | 3 | Right | Off | 0 | 3 | |
| 0 | 20 | 6,0 | 10,0 | Linear | none | none | 10 | 3 | Right | Off | 0 | 3 | |
| 0 | 20 | 6,0 | 10,0 | Linear | none | none | 10 | 3 | Right | Off | 0 | 3 | |
| 0 | 20 | 6,0 | 10,0 | Linear | none | none | 10 | 3 | Right | Off | 0 | 3 | |

Good Results



Bad Results



RPN – Risk-Priority-Number

| RPN | Evaluation | Meaning |
|-----|------------|---|
| 1 | OK | The material match is in order. Audible noise caused by stick-slip is not expected. |
| 2 | OK | |
| 3 | OK | |
| 4 | OKwR | The material match is a borderline case. Audible noise caused by stick-slip cannot be excluded. |
| 5 | OKwR | |
| 6 | NOK | The material match is critical. Audible noise caused by stick-slip should be expected. |
| 7 | NOK | |
| 8 | NOK | |
| 9 | NOK | |
| 10 | NOK | |

OK: Okay

OKwR: okay with some reservation

NOK: not okay



ZINS Ziegler-Instruments GmbH

Engineering Quality

sales@ziegler-instruments.de

Tel: +49-(0)2166-1898-500

Nobelstraße 3-5

D-41189 Mönchengladbach

www.ziegler-instruments.de