Prism 3

2022-06-14

stresstech

Measure for success

NOVA INSTRUMENTS

Prism 3

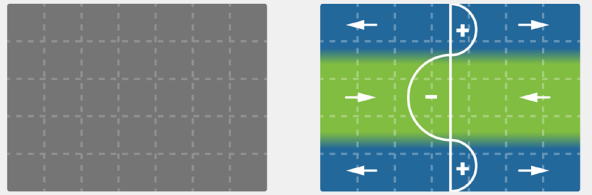
Manufacturing processes like **heat treatment, machining, welding, shot peening** and **grinding** generate residual stresses in manufactured components.

Hole drilling is a powerful method for **fast measuring** these stresses as a **stress depth profile** in **larger depths.**

Prism 3 is the state-of-the-art ESPI hole drilling system for residual stress measurement.

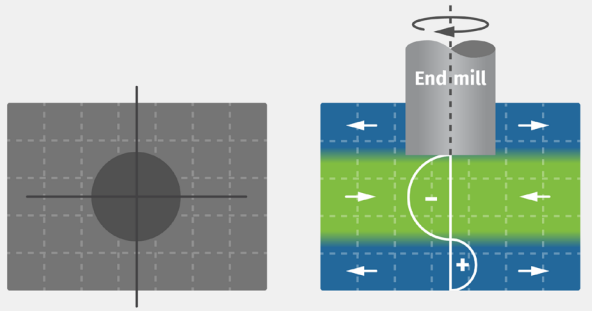
1

Stresses are balanced.



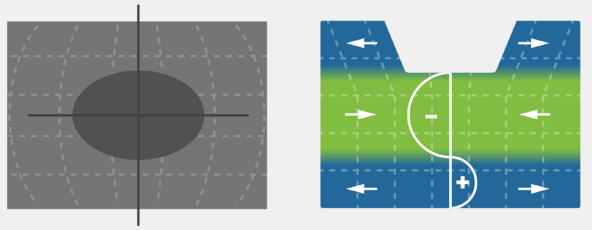
2

Material gets removed and stress balance changes.



3

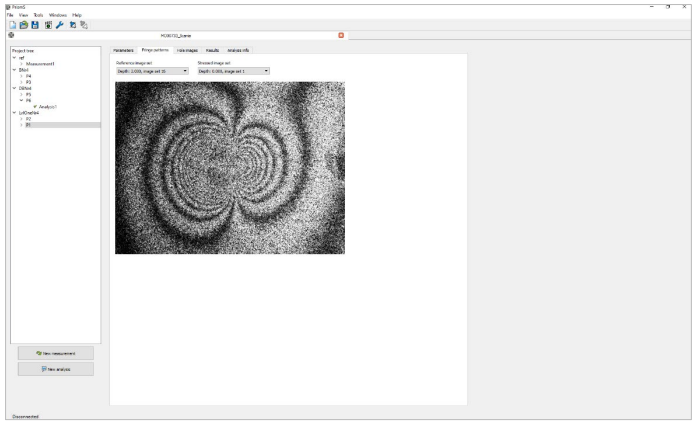
New stress balance and deformed geometry.

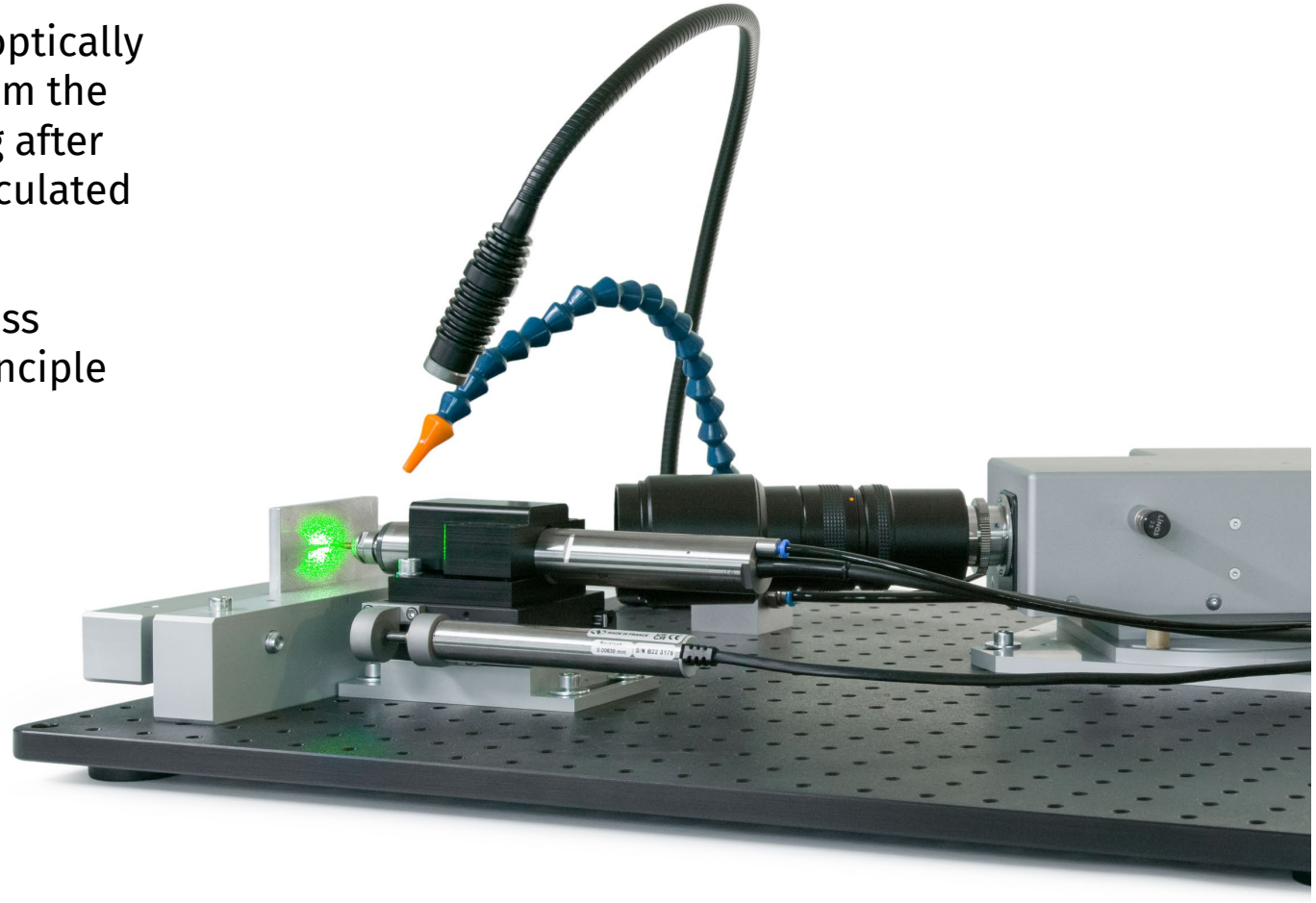


Prism 3

Prism 3 system measures surface distortion optically using laser light that is diffusely reflected from the sample surface. Surface distortions occurring after each drill increment will be analyzed and calculated for residual stress determination.

The system utilizes the laser-based contactless electronic speckle pattern interferometry principle (ESPI) to determine surface displacements.

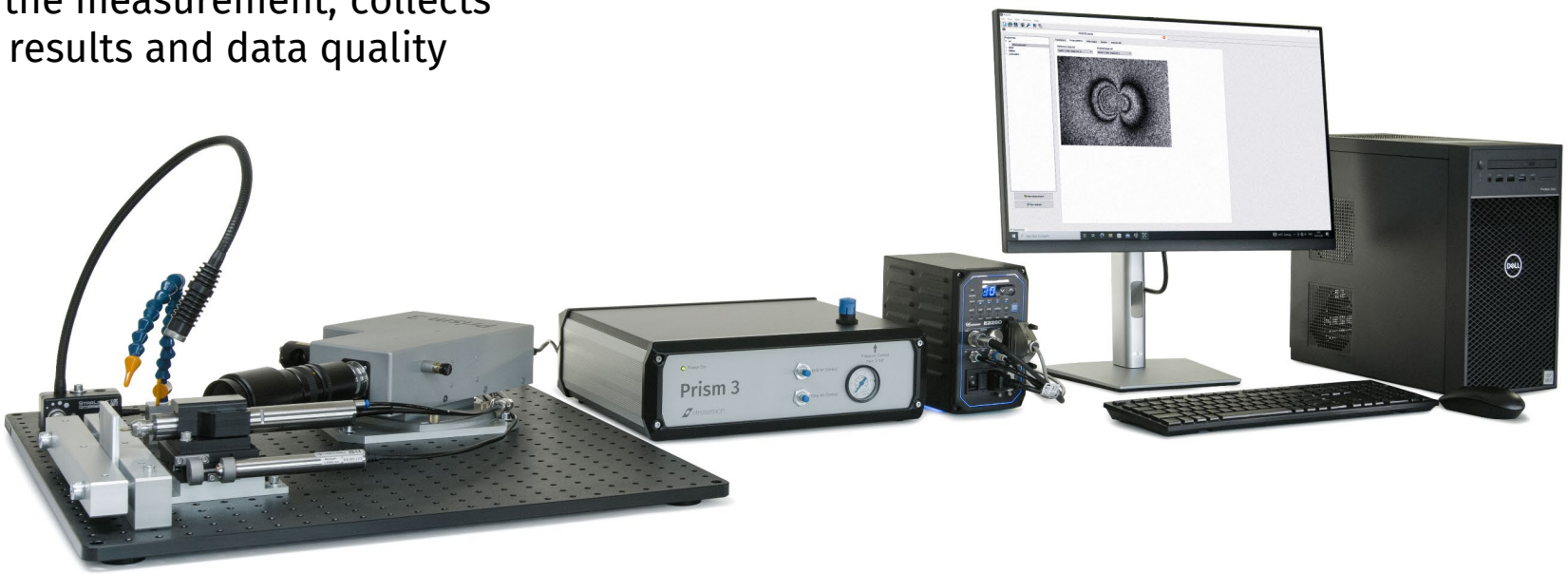




Prism 3

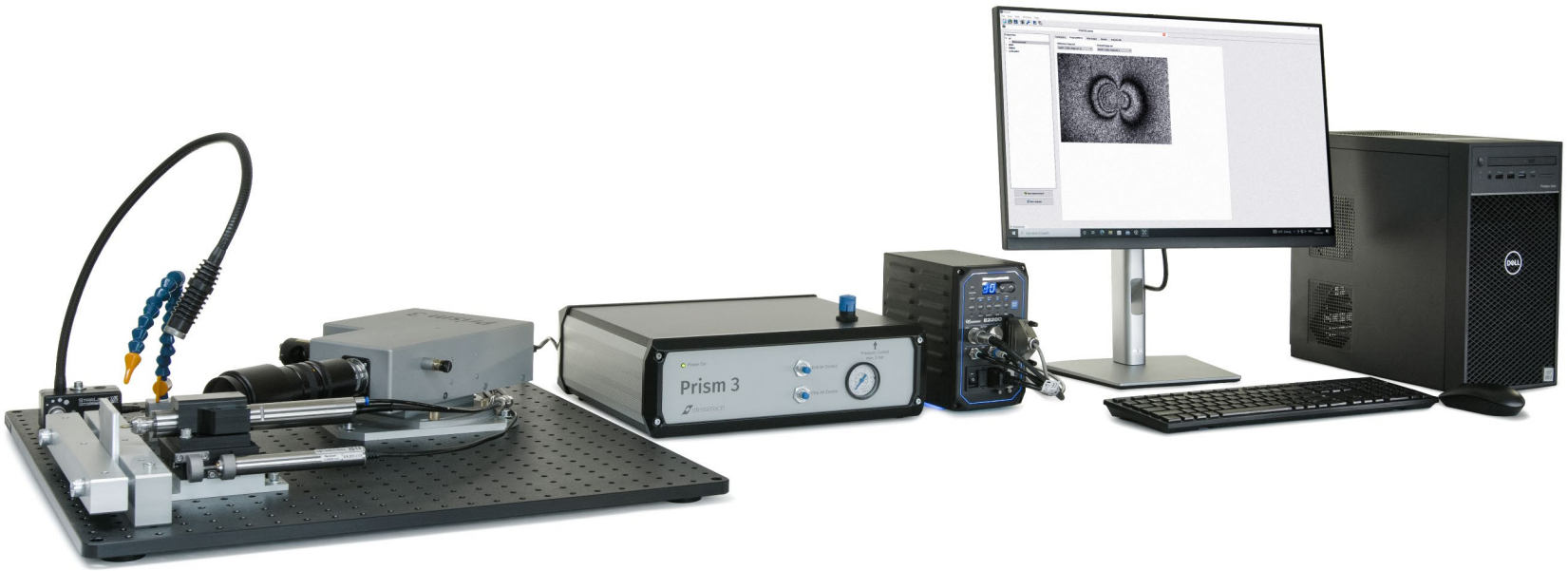
Residual stress measurement with Prism 3

- ✓ Semi-automated generation of stress depth profiles
- ✓ No strain gage glueing and sample preparation
- ✓ User adjustable area of strain analysis
- ✓ PrismS software manages the measurement, collects the data and analyses the results and data quality



Prism 3

Prism 3 standard system	Item 100289
Main module Prism 3	100290
Drill module Prism 3	100292
Illumination module Prism 3	100293
PC module Prism 3	100291



Prism 3

Main module	Item 100290
Control Module Prism 3 (CMP3)	100309
Optical Module Prism 3 (OMP3)	100310
Drill feed actuator setup	100311
Chip air set	100312
Measurement accessories	
✓ Sample holder (sample clamp)	126020070
✓ Optical breadboard plate 600 mm x 600 mm	300201941
✓ Prism 3 tool set	100308
✓ Laser protection goggles	100320
✓ Aluminium bar sample PL6 75 mm x 75 mm	100138
Cable and hose set for Prism 3	100318
Software and documentation	
✓ PrismS installation media and Prism 3 system documentation	100322 000002
✓ Documentation in English	
Transport package	
✓ Prism 3 package	100319

Drill module	Item 100292
Drill motor	300201046
Drill spindle	300201047
Drill motor controller	300201048
Drill accessories	N/A
End mill set	
✓ End mill 874-T-0031 2FL SE STD CARB EM 1/32" TiN	306201094
✓ End mill 874-T-0062 2FL SE STD CARB EM 1/16" TiN	306201011

Illumination module	Item 100293
Light source	N/A

PC module	Item 100291
Desktop PC	N/A

Prism 3

Options for hardware	Item
Optical table 2000 mm x 1000 mm x 210 mm, Metric	300201477
End mill 874-T-0125 2FL SE STD CARB EM 1/8" TiN	306201012

Prism 3

General features

Main module

Controller Module Prism 3 (CMP3)
CMP3 contains both pneumatic and electrical control of the entire system
- ✓ Drill cooling air and chip air control, max. 5 bar (73 psi) inside
- ✓ Drill module control on/off
- ✓ Drill feed actuator control
- ✓ Illumination LED light control
- ✓ RJ45 connector for communication

Optical Module Prism 3 (OMP3)
OMP3 with laser and video head integrated to one enclosure:
- ✓ Class 3B laser inside, laser output <5 mW (class 3R)
- ✓ Camera with adjustable camera lens
- ✓ RJ45 connector for communication
- ✓ Power supply connector (15 VDC)

Drill feed actuator setup
A linear stage that is driven by an actuator for positioning the drill:
- ✓ Base with linear stage
- ✓ Stage actuator
- ✓ Drill holder

Chip air set
Adjustable hose with nozzle for focusing the air stream to remove the chips from the drilling:
- ✓ Chip air hose and nozzle
- ✓ Base block

Main module

Measurement accessories
- ✓ Prism 3 tool set
  - Allen key set
- ✓ Laser protection goggles
- ✓ Aluminium sample PL6 75 mm x 75 mm
  - Sample bar is used for system test and verification measurements
- ✓ Sample holder (sample clamp)
- ✓ Optical table 600 mm x 600 mm

Cable and hose set for Prism 3
- ✓ Communication cable set
- ✓ Pneumatic hoses
- ✓ Set of power cables

Transport package
Transport package for system delivery and storage

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Prism 3

General features

Drill module

The precision drill recommended by Stresstech is an air-cooled electric drill that is capable of high rotational speeds. It is custom mounted onto Drill feed actuator setup (included in Main module), which can position the drill with an accuracy better than 2 µm. Recommended drill consists of:

Drill motor
- Brushless motor
- 50 000 rpm

Drill spindle
- Ceramic bearings
- 50 000 rpm
- High precision
- Ø3.175 mm (1/8 inch) collet

Drill motor controller
- 1 000-50 000 rpm
- External input/output control signal
- Air control

Cable set
- Cable set of the drill components and connecting it to Main module

If you want to use other drill with the system, please contact Stresstech.

End mill set
- ✓ End mill 874-T-0031 2FL SE STD CARB EM 1/32" TiN
- ✓ End mill 874-T-0062 2FL SE STD CARB EM 1/16" TiN

Illumination module

Light source
The light source recommended by Stresstech is equipped with flexible arm. It helps in focusing the sample surface image and when making the define hole image:
- ✓ Adjustable LED light
- ✓ Connection cable

If you want to use other light with the system, please contact Stresstech.

PC module

Desktop PC
The desktop PC recommended by Stresstech is chosen according to the needs of Prism 3 system.
- ✓ Desktop PC, monitor, keyboard and mouse
- ✓ MS Windows operating system and PrismS software installed
- ✓ Network cables
- ✓ Three ethernet ports (two for Prism 3 communication and one for company network)

If you want to use other PC with the system, please contact Stresstech.

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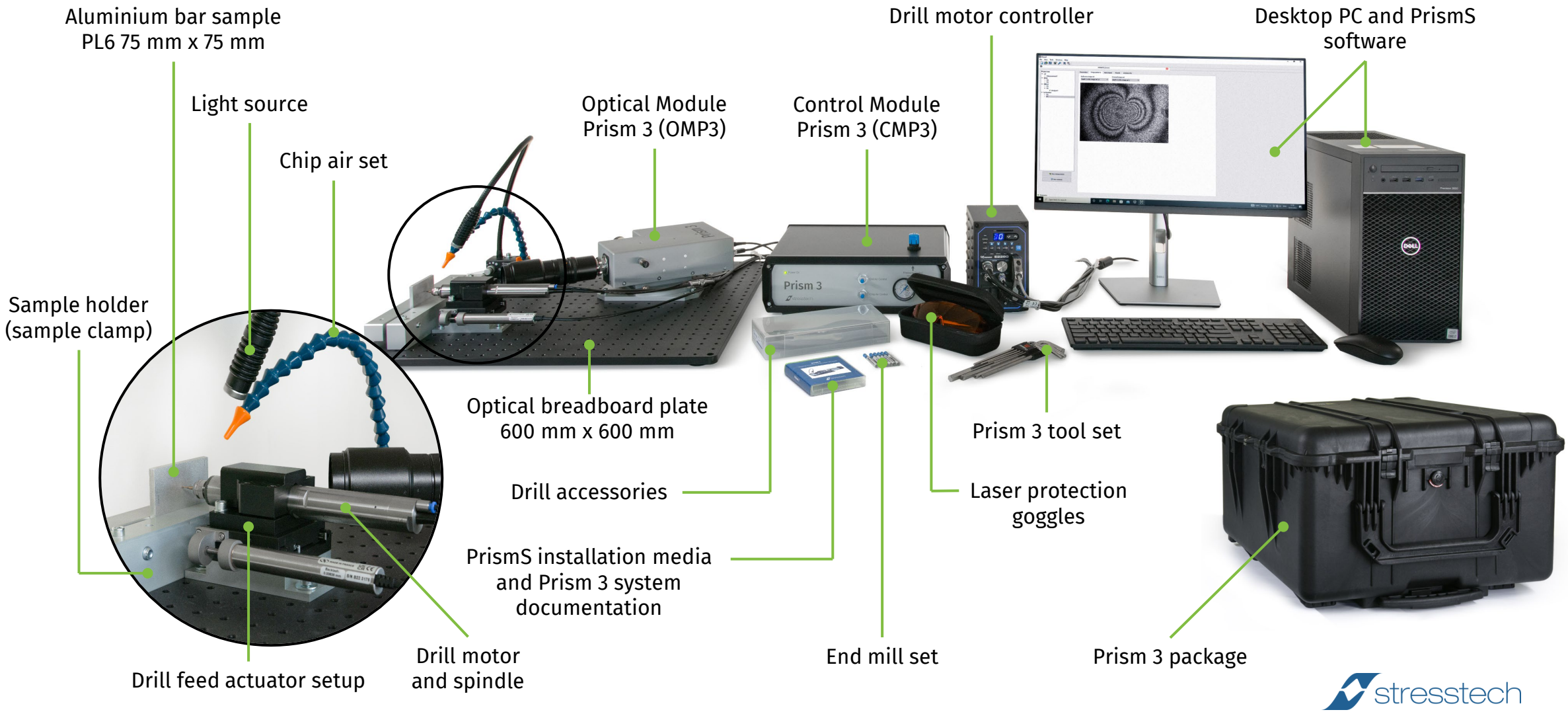
Prism 3



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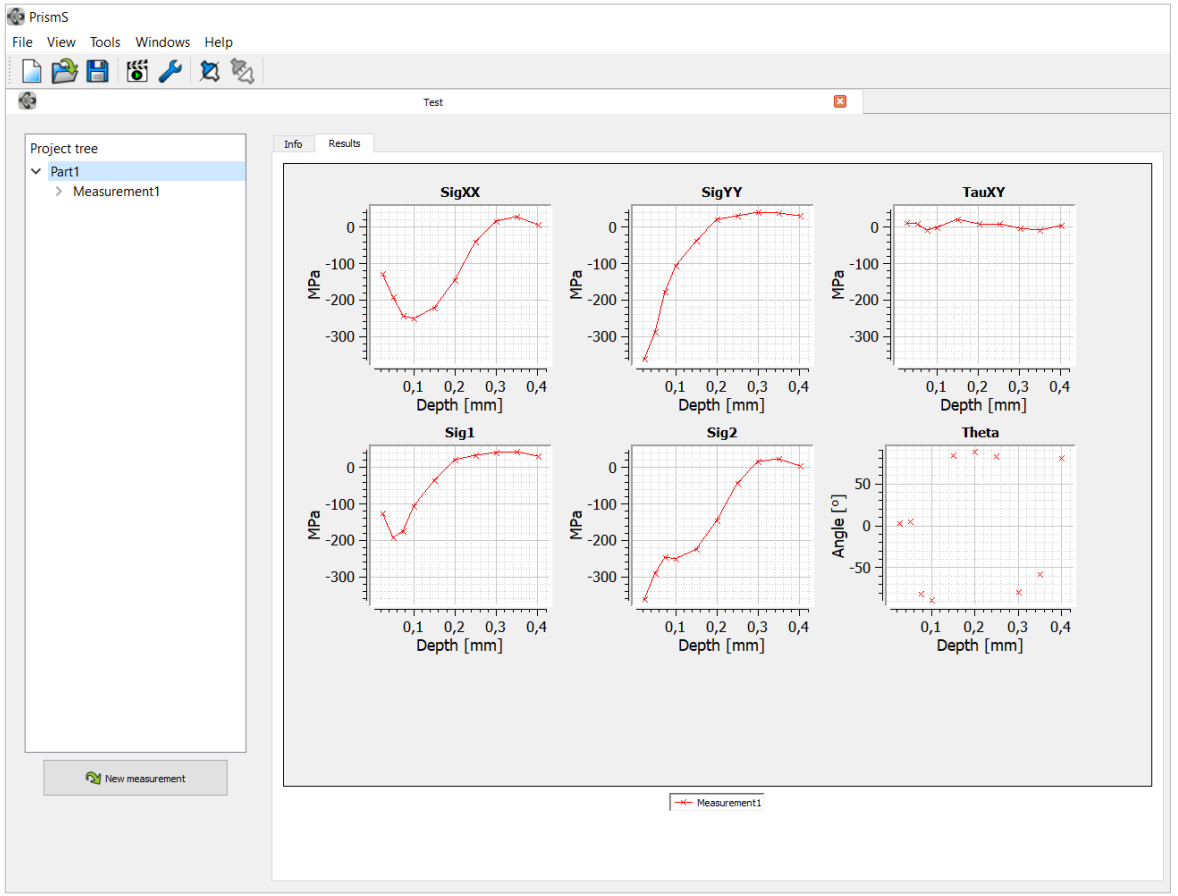
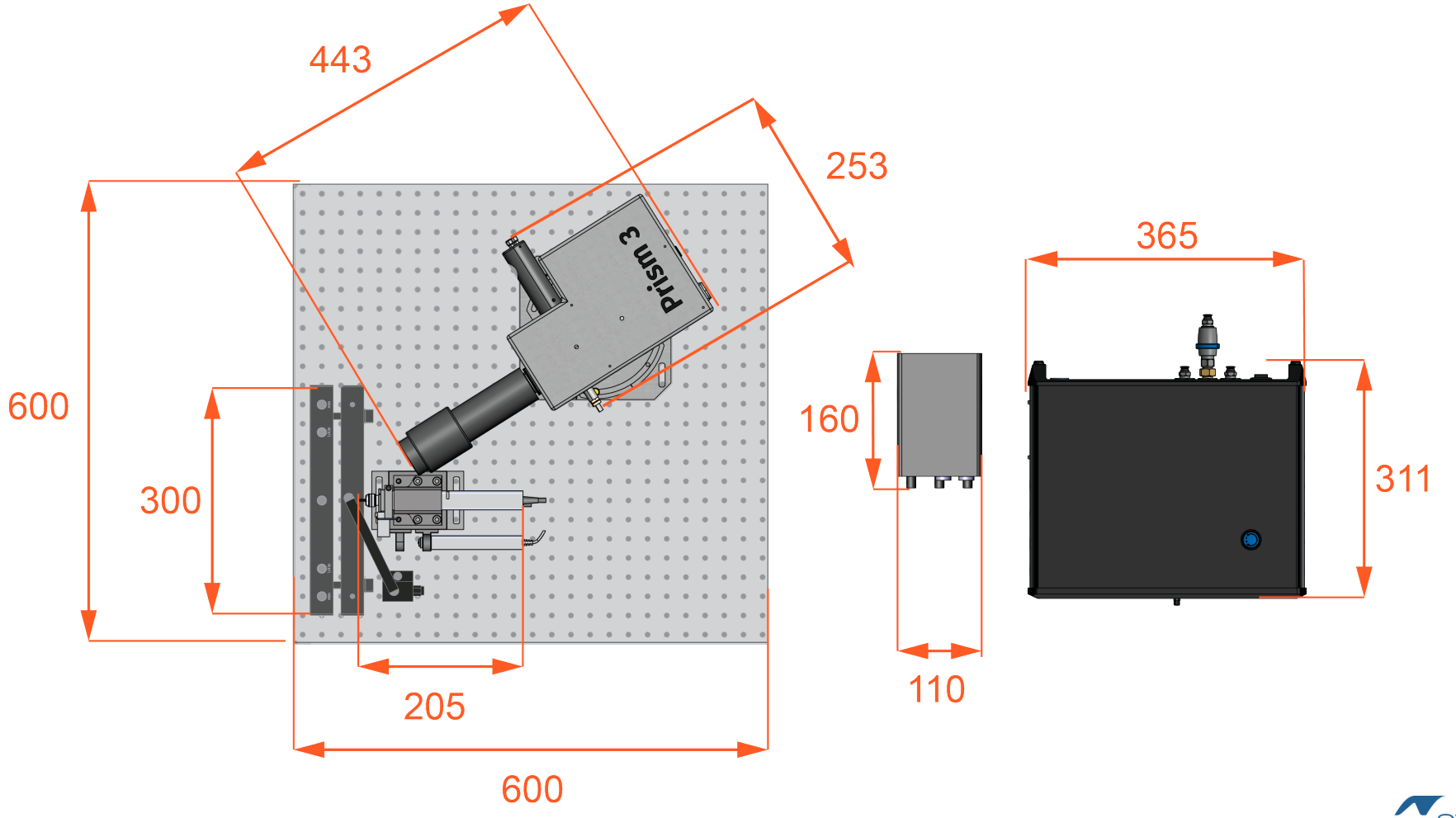
PrismS software

- The software automatically generates multiple graphs for comparison of different calculations and measurements. The user can run individual drilling increments manually or switch to fully automatic measurement at any time. The drilling process can be customized with several parameters to address challenges different materials pose for drilling.



Prism 3

Dimensions



Prism 3

OMP3		
Depth	450 mm	17.72 in
Width	255 mm	10.04 in
Height	69 mm	2.72 in
Weight	4 kg	8.82 lbs

OMP3 power demands	
Voltage	15 V DC
Power	15 W

Power supply of OMP3 power demands	
Voltage	100–240 V AC
Frequency	50–60 Hz
Power	Max. 50 W

Optical Module Prism 3 (OMP3)
100310

Prism 3

CMP3		
Depth	392 mm	15.43 in
Width	365 mm	14.37 in
Height	145 mm	5.71 in
Weight	3.8 kg	8.38 lbs

CMP3 power demands	
Voltage	100–240 V AC
Frequency	50–60 Hz
Power	Max. 50 W
Pneumatics	Max. 5 bar (max. 73 psi)

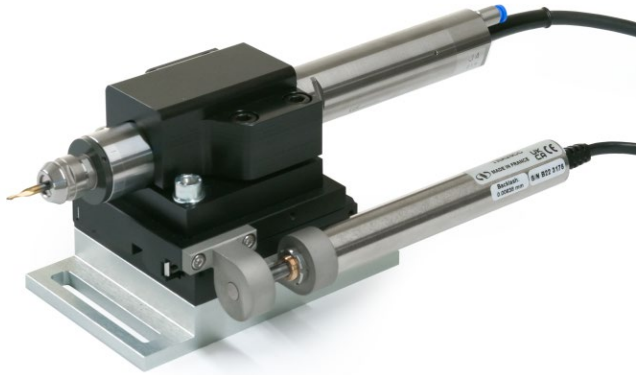
Control Module Prism 3 (CMP3)
100309

Prism 3

Drill motor and spindle with Drill feed actuator setup		
Depth	87 mm	3.43 in
Width	80 mm	3.15 in
Height	225 mm	8.86 in
Weight	2.1 kg	4.63 lbs

Drill controller		
Depth	180 mm	7.09 in
Width	110 mm	4.33 in
Height	175 mm	6.89 in
Weight	3.5 kg	7.72 lbs

Drill controller power demands	
Voltage	100–240 V AC
Frequency	50–60 Hz

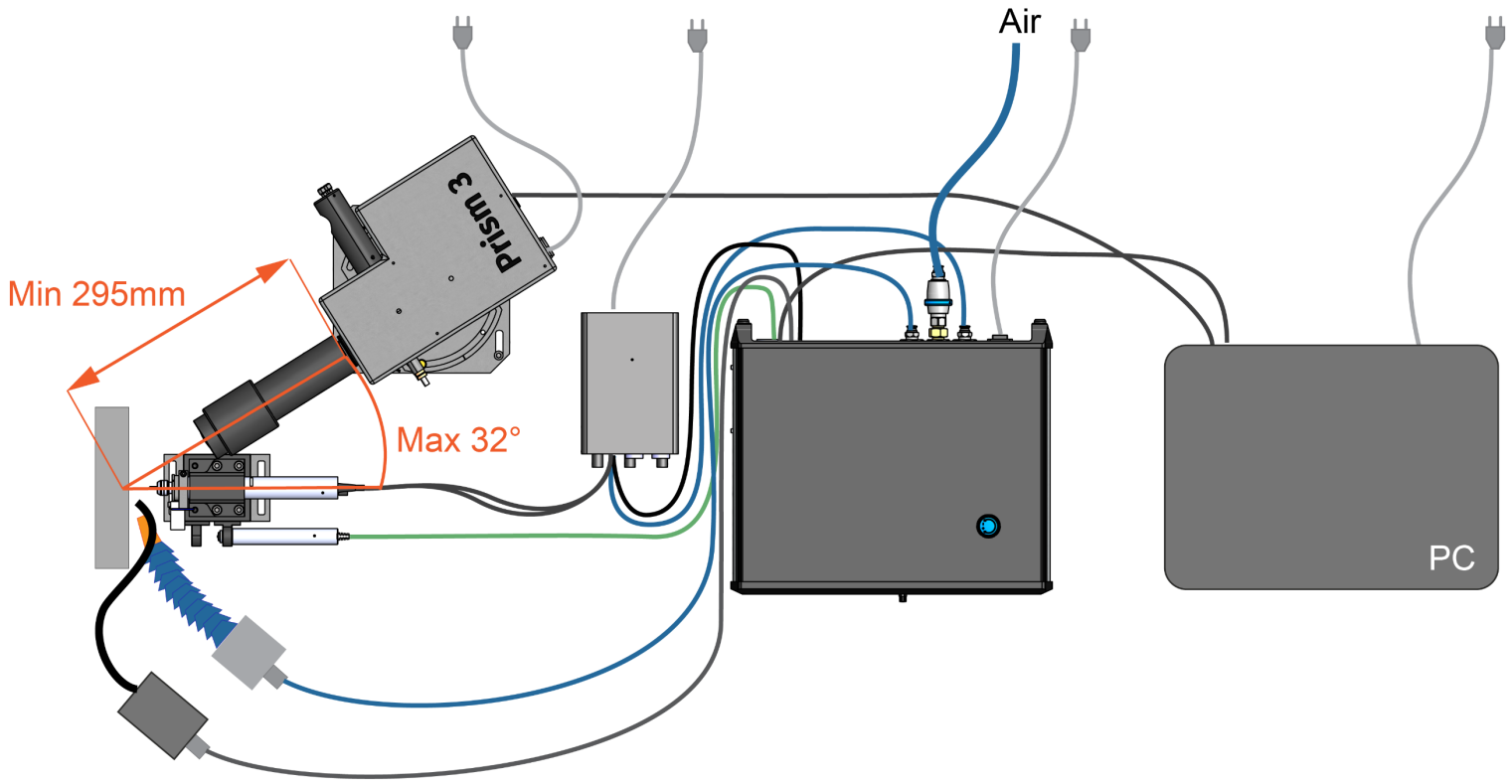


Drill motor
300201046
and Drill spindle
300201047
with Drill feed actuator setup
100311

Drill motor controller
300201048

Prism 3

Limitations and connections



Prism 3

Prism 3 package dimensions*		
Depth	699 mm	27.5 in
Width	691 mm	27.2 in
Height	414 mm	16.3 in
Weight with standard system	54 kg	119 lbs

*PC is delivered in a separate package.

Prism 3 package
100319

Prism 3

Safety

Read and observe the safety warnings and procedures described in the manual.

Laser safety

- Laser light poses a special safety hazard. Avoid direct exposure of your eyes to the laser beam. All users and everyone working near the system should be made aware of the potential hazard. Please review all pertinent laser safety laws and regulations in your country and prepare safe work procedures as required or deemed prudent. You may need approval by your facility's laser safety officer before you can operate this instrument.
- Laser protection goggles are provided with the system and using them is recommended.
- The OMP3 is equipped with a DPSS Nd:YAG laser. The laser beam is being split and diverged additionally by an optical lense (f= - 20mm) before the beam leaves the OMP3. Thus, the laser class of OMP3 is limited to 3R, even though the integrated laser itself is classified as 3B.
- Class 3R laser product <5 mW, 532 nm.
    - According to IEC 60825-1 Class 3R laser is considered low risk if handled carefully, with restricted beam viewing. Accidental eye exposure to direct or reflected beam has a low risk of injury.

Drill safety

- The drill can pose a safety hazard due to its high rotational speed. Make sure that end mills are properly installed and not damaged before use. Beware of chips and other particles that may be accelerated to high speeds.
- The hole drilling process can generate a variety of noises depending on materials and drilling parameters. Prolonged exposure to certain noise may affect your hearing ability.
- Using eye and hearing protection is recommended.