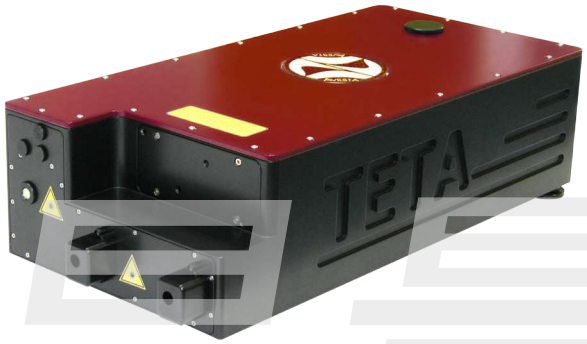
# TETA. Industrial Femtosecond Laser System

- **One of the smallest laser heads in its class**
- **More than 2 mJ pulse energy**
- **<260 fs typical pulse duration**
- **>20 W average power at 1030 nm**
- **High beam quality with typical M2 <1.1**
- 1030 / 515 / 343 / 248 nm possible outputs
- Monolithic thermally stabilized body
- Industrial and scientific application
- Excellent beam pointing and long term power stability
- Stand-alone operation and PC remote control software


*TETA-10 laser head*

## Product overview




*TETA system with integrated SH and FH units*

The TETA is an Yb solid-state laser system. The system comprises a built-in fiber seed oscillator, fiber pulse stretcher, Faraday isolator, CPA-based regenerative amplifier with direct diode pumping, additional pulse picker and pulse compressor. All components are integrated into a single thermostabilized box ensuring stability and true turn-key operation. The additional built-in Pockels cell offers instant output radiation shuttering as well as total user control of output repetition rate. Moreover, the cell features precise pulse picking with control over the number of fired pulses (burst mode) and temporal period of radiation.

The TETA system may be equipped with a SH, TH and FH generation units, as well as with the Compulse capillary compressor which allows to bring the pulse duration down to 30 fs with >50% energy conversion efficiency.

*TETA-10 control 19" rack unit with on-board closed-loop chiller unit*

**Applications:**

Time-Resolved Ultrafast Studies
- Pump-Probe Spectroscopy

Conversion of Laser Radiation
- Ultrafast OPA Pumping
- Second Harmonic Generation (SHG)
- Third Harmonic Generation (THG)
- Fourth Harmonic Generation (FHG)
- THz generation

Material and Biological Tissue Processing
- Ultrafast Micromachining
- Femtosecond Ablation
- Cold Ablation Techniques
- Photomask Repair Solutions

Laser Systems Design, Integration and Amplification
- OPG Pumping
- Front-End for TW- and PW-Class Aemtosecond Amplifiers
- OEM Integration

High-Energy Research
- Free-Electron Laser (FEL) Seeding and Diagnostics

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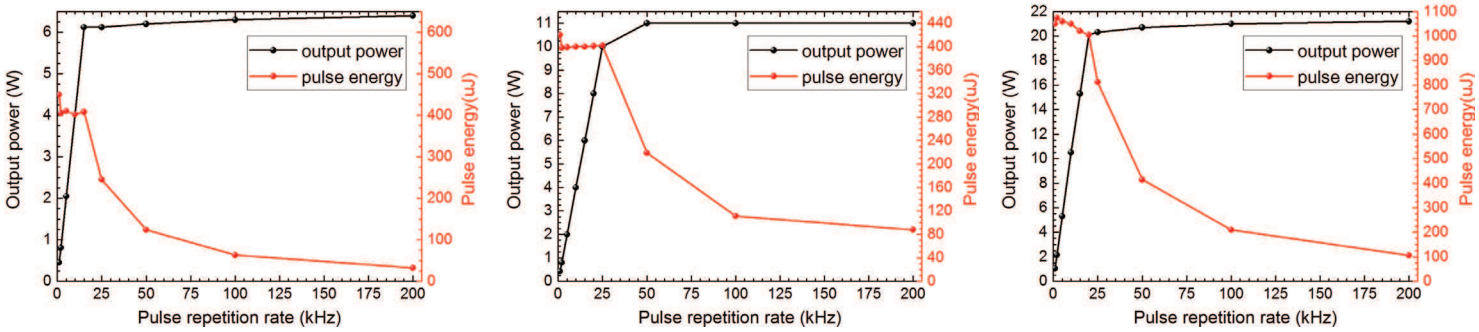
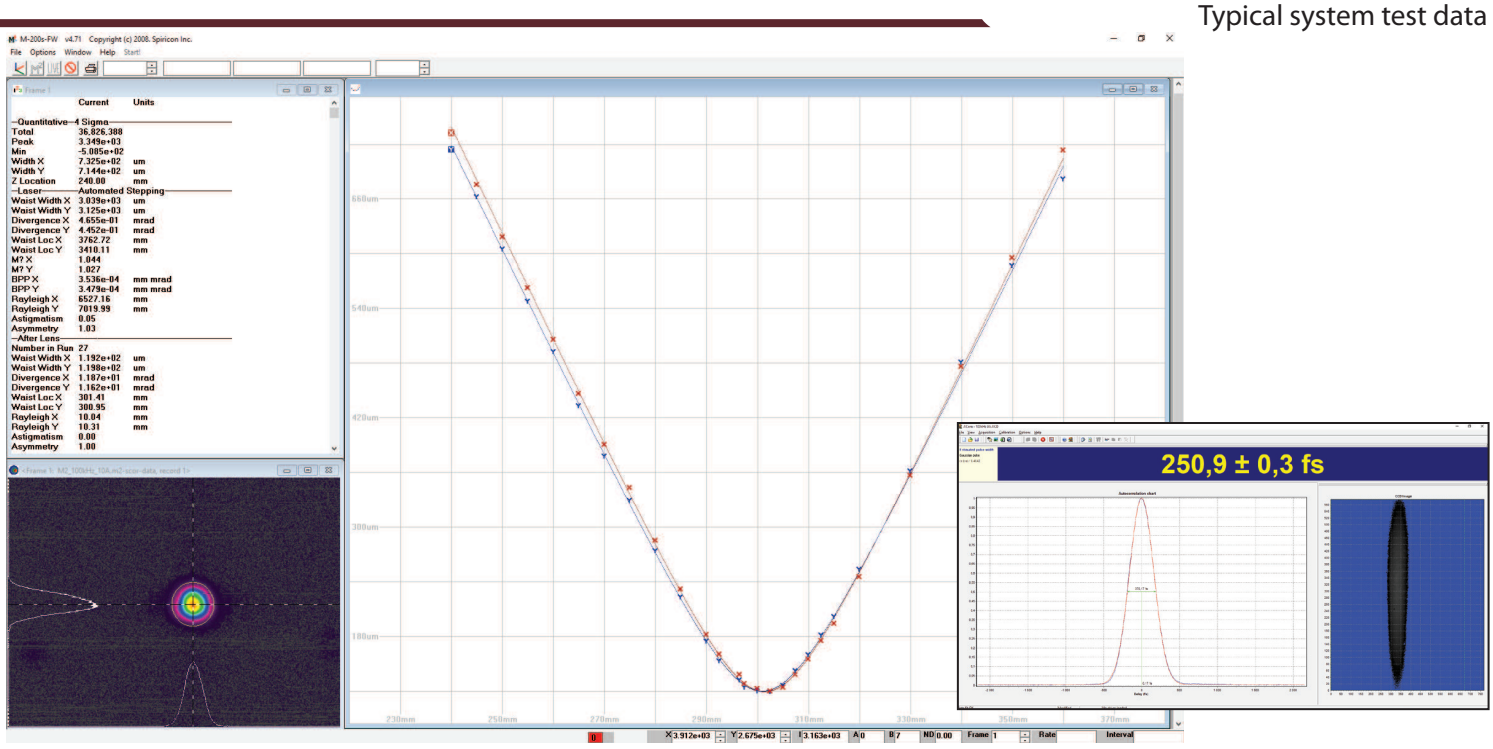
| | TETA-3-HE | TETA-6 | TETA-10 | TETA-20 |
|---|---|---|---|---|
| **Max. average output power** | 3 W | 6 W | 10 W | 20 W |
| **Maximum pulse energy** | >2 mJ | >400 uJ | | >1 mJ |
| **Min. pulse duration[1)]** | <270 fs | | | <350 fs |
| **Pulse duration tuning range[1)]** | <270 fs - 10 ps | | | <350 fs - 10 ps |
| **Central wavelength[2)] (fixed)** | 1033±3 nm | | | 1030±3 nm |
| **M^2** | <1.15 | | | <1.25 |
| **Beam diameter (at 1/e^2)** | 3±0.3 mm | | | 5±0.5 mm |
| **Pulse repetition rate (user-adjustable)** | single-shot…200 kHz (up to 1 MHz upon request) | | | |
| **Pre- and post-pulse contrast** | >5000:1 | | | |
| **Long-term output stability[3)]** | <0.5% rms over 48 h | | | |
| **Output polarization** | linear, vertical | | | |
| **Spatial mode** | TEM00 | | | |
| **Beam ellipticity[4)]** | <10% | | | |
| **Beam astigmatism[4)]** | <10% | | | |
| **Beam divergence (full angle)** | <0.6 mrad | | | |
| **Beam pointing stability** | <25 urad/°C | | | |
| **Cold start warm-up time (beam position, output power)** | <40 min | | | |
| **Environmental and utility specifications** | | | | |
| **Operating temperature** | 15-30 °C | | | |
| **Relative humidity** | <60%, non-condensing | | | |
| **Voltage** | single-phase; 100-240 VAC; 50/60 Hz | | | |
| **Power consumption** | <1.5 kW | | | <2 kW |
| **Physical dimensions** | | | | |
| **Laser head (LxWxH)** | 460x250x147 mm | | | 500x330x147 mm |
| **Control and power supply 19" rack (WxLxH)** | 553x600x663 mm | | | |
| **Umbilical length** | 3 m | | | |

*1) - measured with Avesta's AA-10DD-12PS interferometric autocorrelator using Gaussian fitting; motorized tunable pulse duration with PC control up to 10 ps is also installed by default; the Compulse-1030 external hollow-fiber pulse compressor with output pulse duration down to 30 fs is also available as an option;*
*2) - external second, third and fourth harmonic generators are available upon request; certain built-in combinations are also available; Raman shifters to 1530 nm and 1890 nm are also available;*
*3) - measured under stable environmental conditions;*
*4) - measured at maximum average power and 100 kHz output repetition rate.*

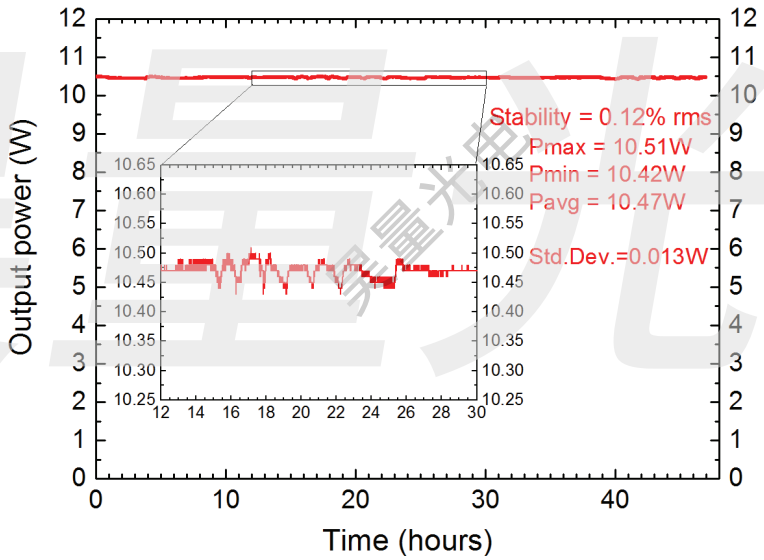



*TETA-6* *TETA-10* *TETA-20*

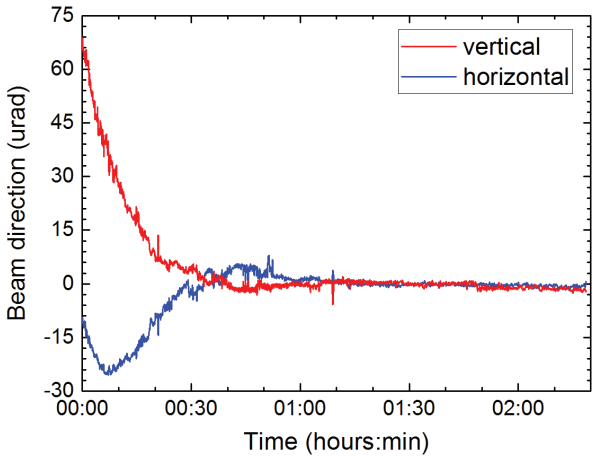
*TETA output power and pulse energy vs. output repetition rate*



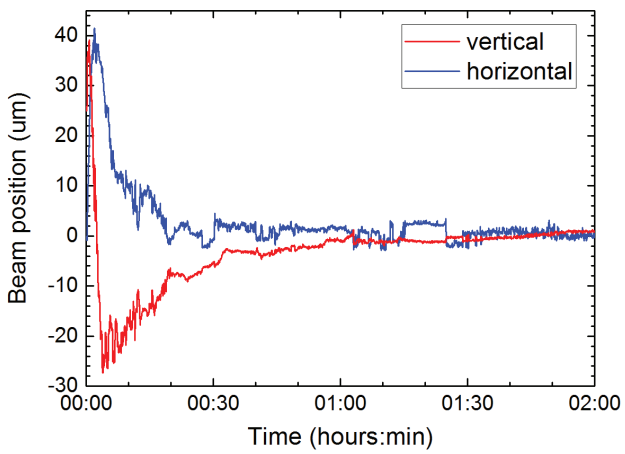

*TETA typical M2 data and typical AC trace*




*TETA-10 long-term power stability 48-hour run (0.12% rms)*




*TETA beam direction after cold start*




*TETA beam position after cold start*

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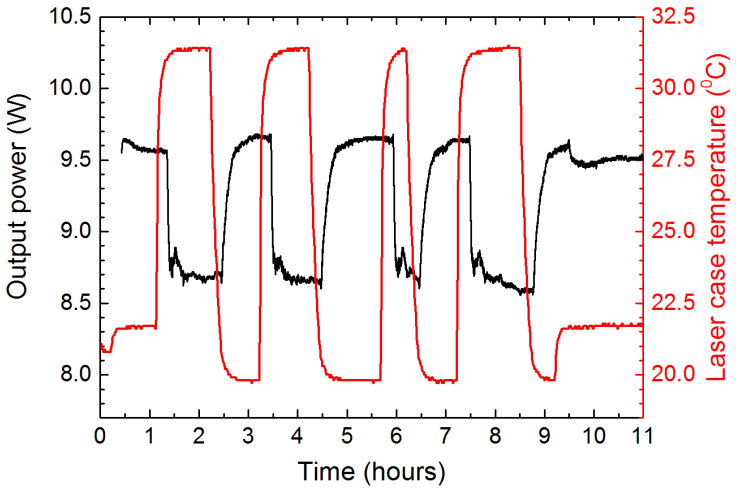
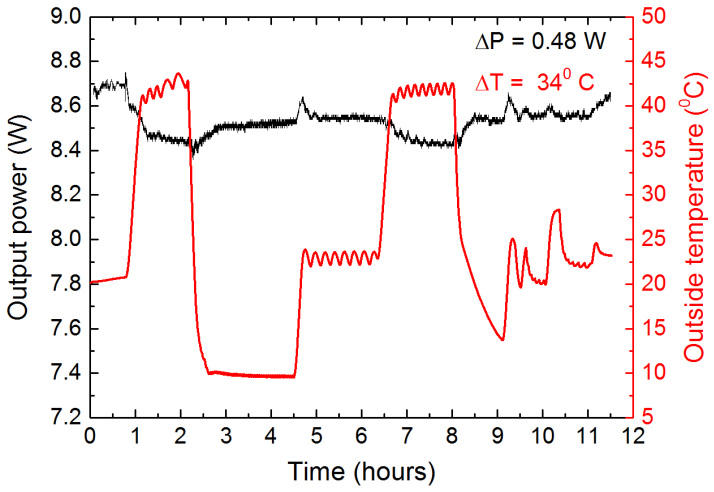
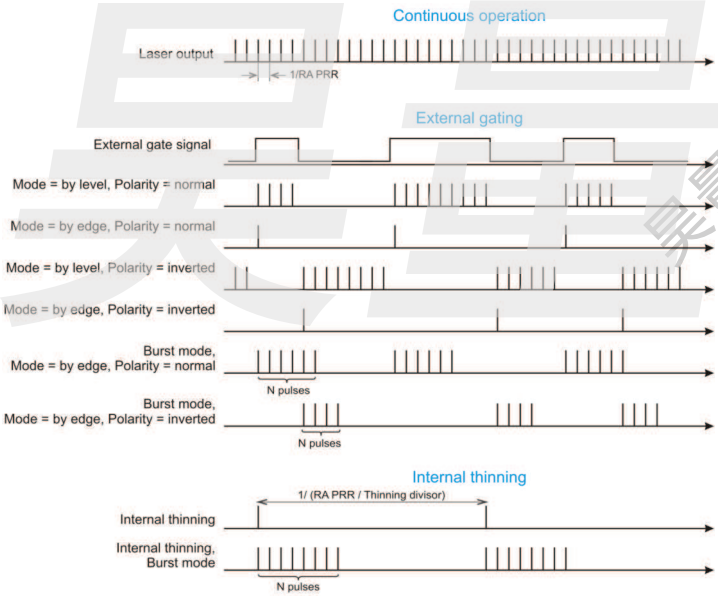



*TETA-10 thermal cycling with large delta T beyond operating temperature limits*

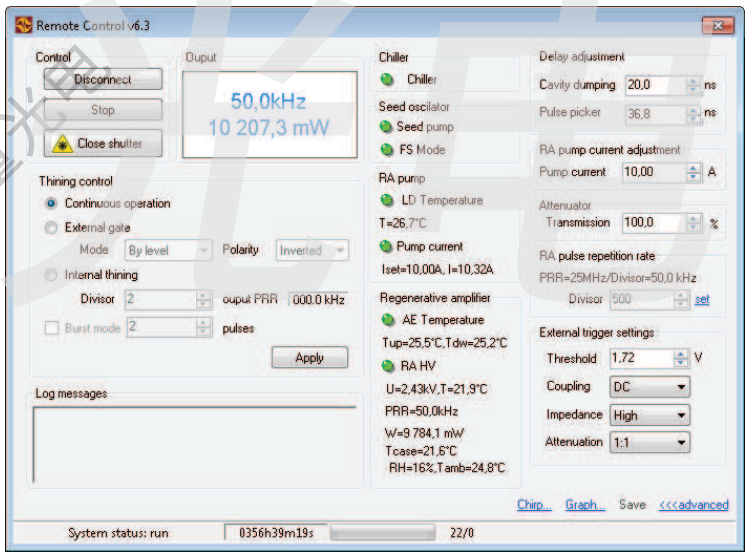



*TETA-10 thermal stressing with chiller stabilization turned OFF. The test is used to show the rigidity of the TETA mechanical design and repeatability of output parameters after transportation or long off -duty periods*

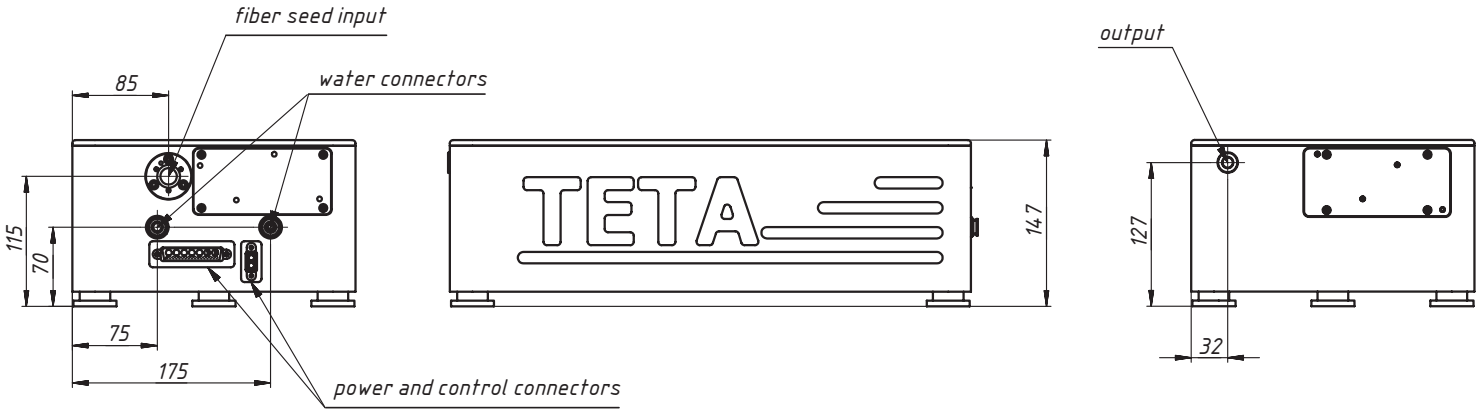
## System controls



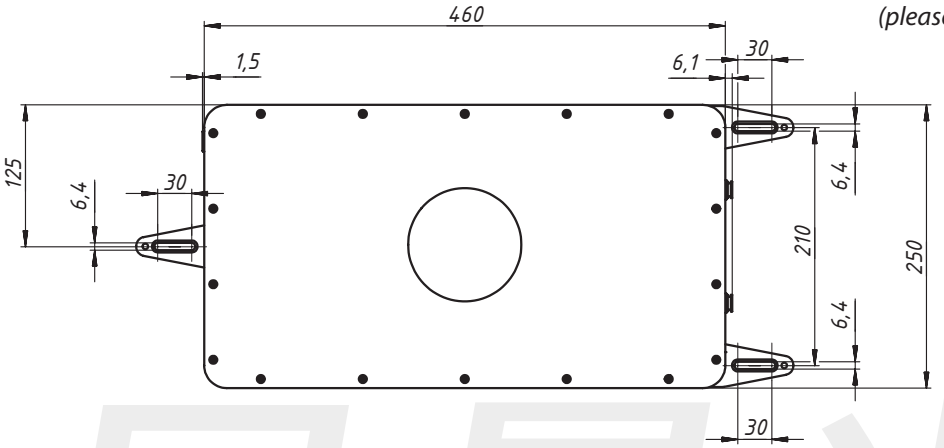

*TETA output control modes overview*




*TETA remote control PC software*




*TETA-6 and TETA-10 laser head dimensions in mm*
*(please enquire for the TETA-20 dimensional drawing)*

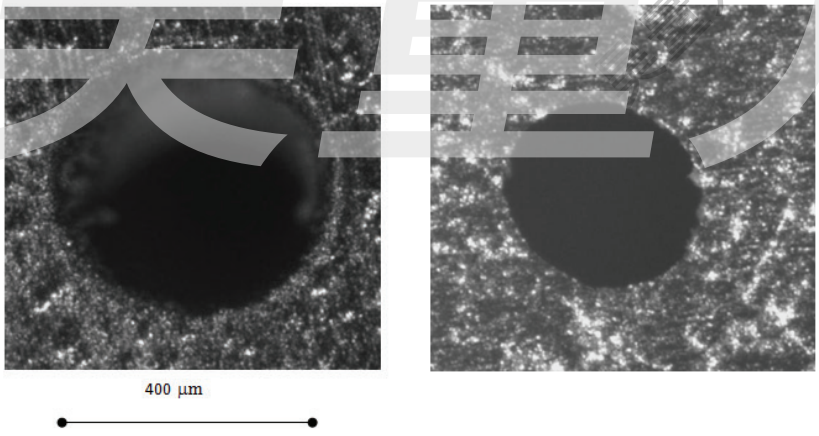



## Applications

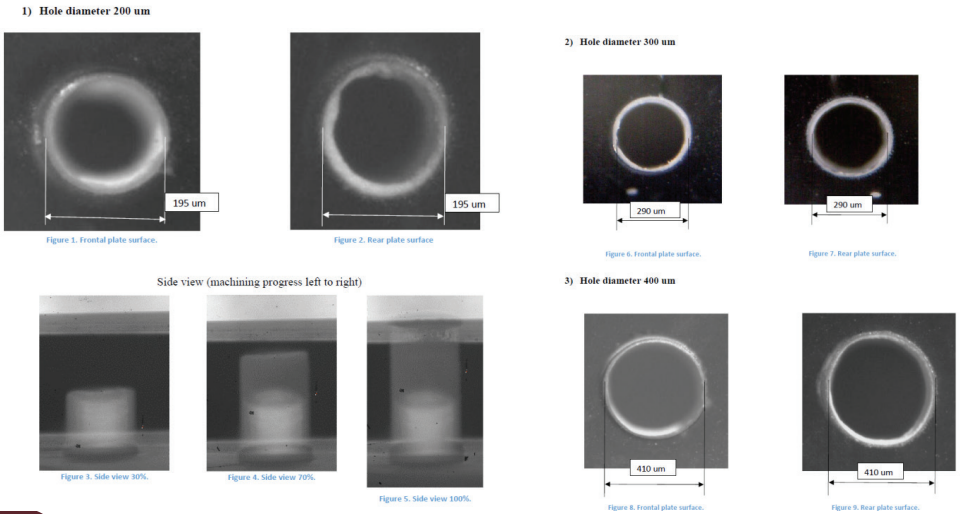
**Material:** Titanium alloy, thickness 2.5 mm.

**Front surface:**

**Rear surface:**




*400-um hole drilling in 2.5 mm thick Ti alloy*
*by TETA system*




*Sapphire hole drilling in 440 um thick*
*sapphire wafer by the TETA system*