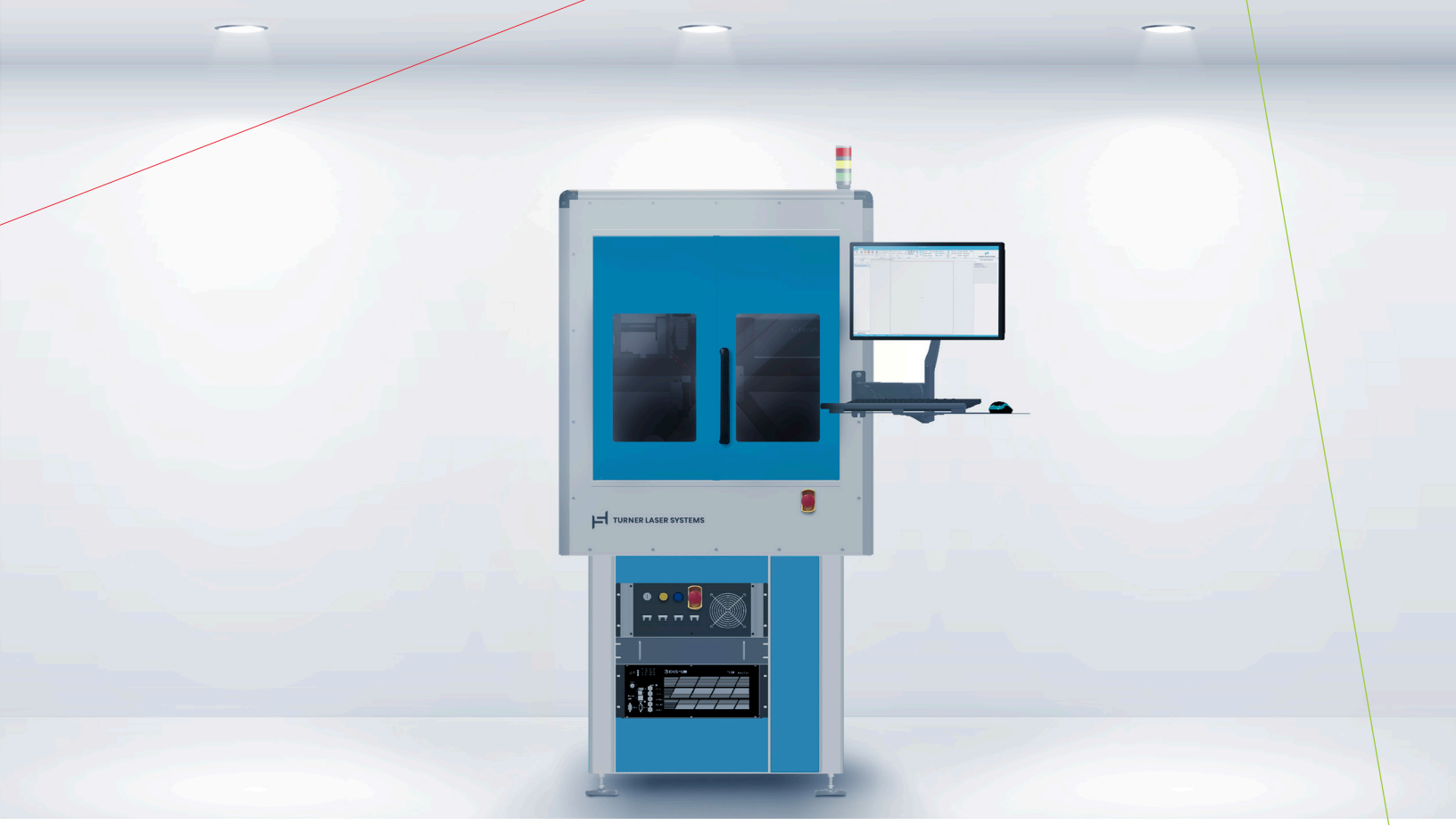


TLS Wallaby

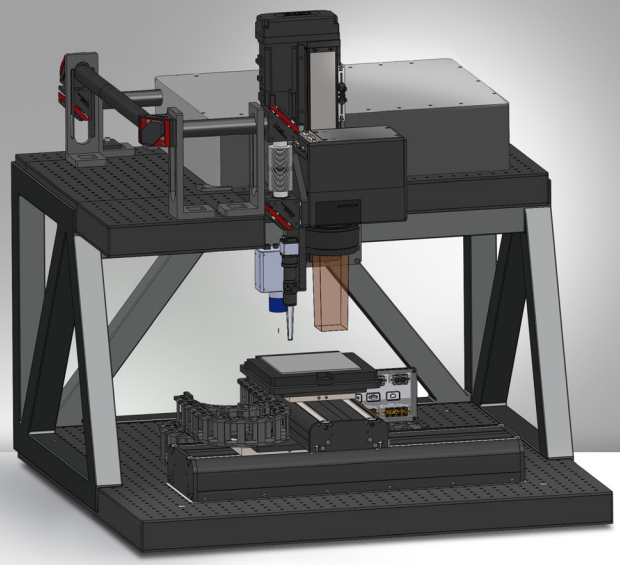
Compact Laser Micromachining Platform for Industrial Manufacturing, Product Development and R&D

Modularity to be versatile: The TLS Wallaby is a compact and versatile micromachining system with galvo-based beam delivery that can be configured to fit the right laser, optics, and fixtures. This versatile machine can support process development, product development and industrial manufacturing. Configuration upgrades (page 2) include advanced metrology for part alignment, 3D galvo and more.

Specifications

Model	TLS Wallaby
Dimensions (WxDxH)	1.1 m x 1.1 m x 2.0 m
Weight	500 kg (approx)
Laser source	Various laser options including femtosecond, picosecond, nanosecond and CO2 lasers
Scanner	Variety of 2D and 3D galvo scanners with various field-of-views and focal spot sizes Standard lenses: include f = 50, 63, 80, 100, 163, 255 mm Other lenses: available upon request Repeatability: typically <1um depending on model chosen Galvo speeds: >10 m/s possible for certain models
Software	TLS Proprietary CAD/CAM - laser control
Stage travel	300 x 200 x 100 mm | other motion options available
Max Workpiece size	Up to 200 mm wafers, 300 x 200 mm sheets
XY Stage repeatability	+/– 3 µm (ISO 230-2) on linear XY stages.
Stage error mapping	Optional calibration upgrade. TLS proprietary method using SEMI-grade wafer. Accuracy typically +/– 6 µm (3-sigma) for XY stack.
Chiller	Model depends on the laser. Rack and standalone units available.
Debris handling	Optional Ionized air knife. Ducting for connection to facility exhaust.
Vision	Capable of sub-micron precision, 0.4 µm to 2.2 µm resolution options

TURNER LASER SYSTEMS



Configuration example shown on the left contains optional height sensor add-on.

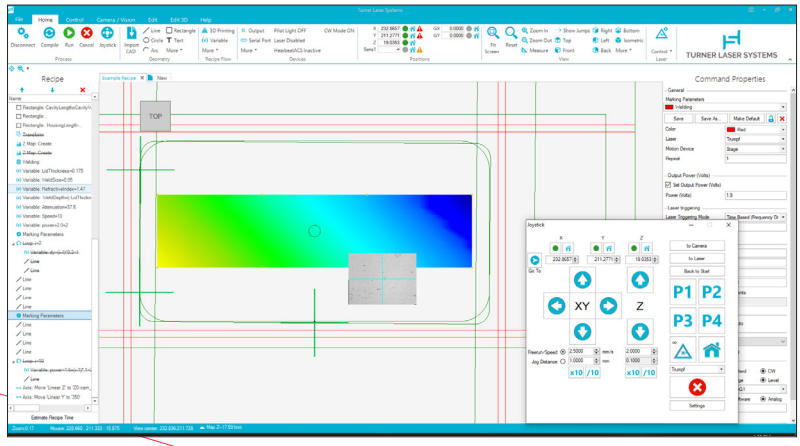
TLS Micromachining Software

Flexibility, precision, and control meet ease of use

Our turn-key software provides the user control of the laser, motion system, galvo scanner, sensors, vision and other devices in a single graphical interface.

Features include:

- CAD file import (e.g. dxf, dwg, gerber, STL)
- CAM features such as lead in/out
- Recipe library and process development tools
- Multi-level user-access
- Automatic vision alignment
- 3D part mapping
- Data logging and import
- Math & logic features for advanced tool control



Our standard platform includes:

- Customized laser engine and beam delivery (configurable to application)
- High precision XYZ motion
- **TLS Micromachining Software** for 2D and 3D CAD CAM, recipe development, automation and full tool control
- Class 1 laser safety enclosure (CDRH compliance)
- Internal ducting for connection to facility exhaust for debris control
- Ergonomic HMI with adjustable position and angle
- Electrical & pneumatic sub-systems (NFPA79)

Configuration upgrades

Selected based on specific applications:

- Laser options: we support a variety of lasers including:
  - femtosecond, picosecond and nanosecond laser sources
  - IR (1030-1080nm), GREEN (515-540nm), UV (343-355nm) and CO2 (10.6) wavelengths
  - low, mid and high power options
- Beam delivery options:
  - Galvo scanner premium
  - Galvo scanner standard
  - 3D galvo
- Precision vision system for part alignment:
  - Automatic part position and angle correction
  - Algorithms for part scale and skew correction
- 3D height sensor for auto focusing
- Off the shelf and custom fixtures and chucks
- Various additional rotary stages
- Ionized air knife for debris management
- Semi-automated multi-tool offset calibration

And many other custom upgrades available.

TECHNOLOGY 360 Mastery BUSINESS MANUFACTURING

The low-risk path to the right tool solution

Choosing the right tool for the job when there are endless options (such as choosing the right laser) can be daunting. Our **360-Mastery Methodology**, a process unique to TLS, was built to help you choose a hardware configuration that's optimal for your application.

By thoroughly understanding your needs, providing a technology roadmap including systematic design-of-experiments crafted for your needs, our experts can take you from research, through experimentation to manufacturing success — avoiding development-pitfalls and saving you business time and resources.

For more information: contact@turnerlasersystems.com

Turner Laser Systems • 47427 Fremont Blvd., Fremont, CA 94538 • 510.580.0128 • www.turnerlasersystems.com

TURNER LASER SYSTEMS