

STACIS[®] 2100

Active Piezoelectric Vibration Cancellation System

STACIS[®] is the world's most advanced active vibration cancellation system. Employing advanced inertial vibration sensors and state-of-the-art piezoelectric actuators, STACIS cancels vibration in real time by sensing floor vibration, then expanding and contracting piezoelectric actuators to filter out floor motion.

Primarily designed to isolate precision microlithography, metrology, and inspection equipment in advanced semiconductor factories, STACIS is now the industry standard solution for the most sensitive instruments in noisy environments.

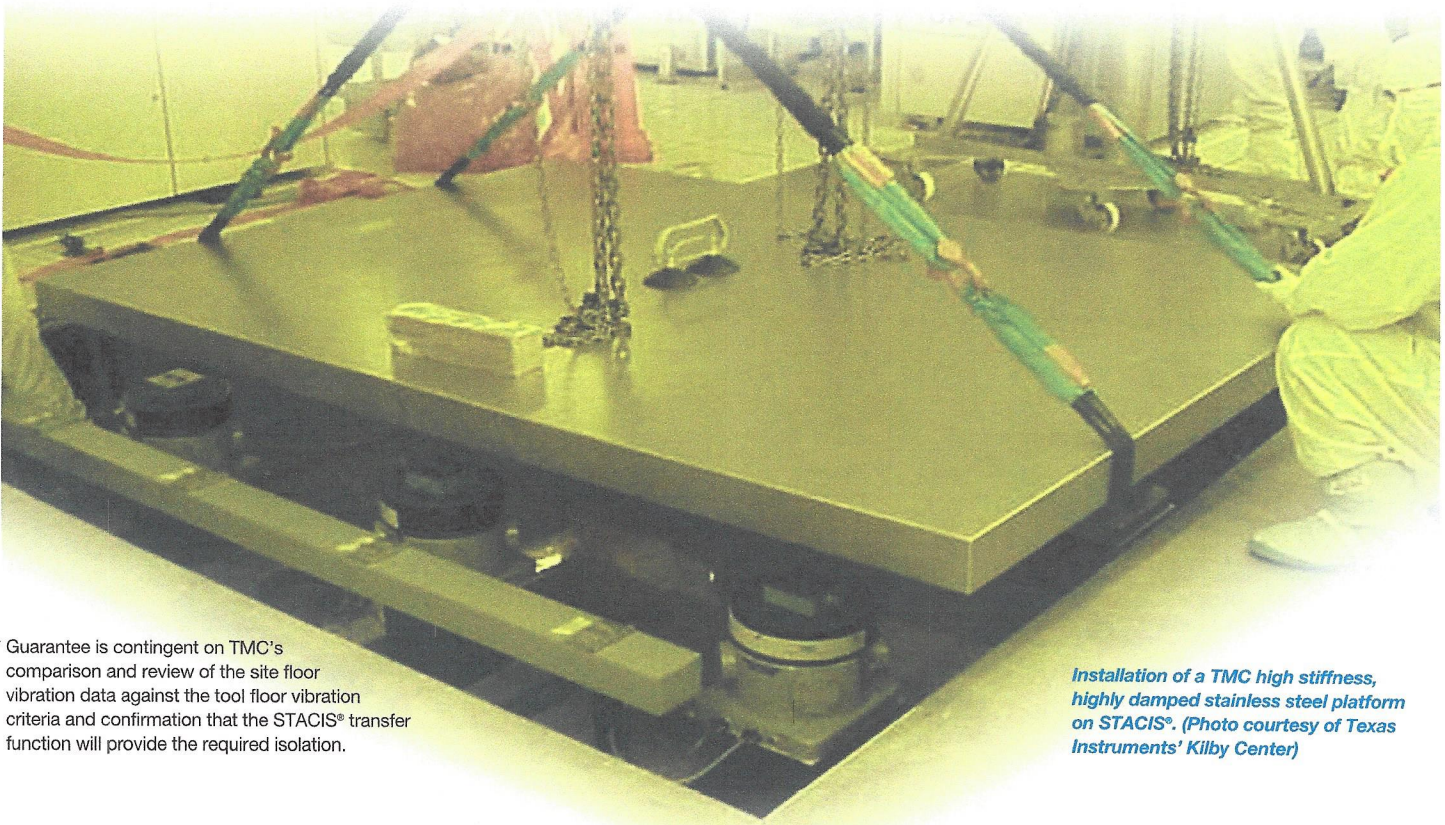


Hundreds of times stiffer than air isolators, STACIS suffers from none of the limitations of air systems. There is no "soft" suspension and, unlike active air systems, STACIS can be "stacked" (placed beneath a tool with an internal active air isolation system).

In addition to facilitating optimal tool performance and resolution in noisy fabs,

STACIS is guaranteed to meet the floor vibration specifications of wafer inspection, metrology and microlithography tools.*

With many hundreds of successful installations worldwide, STACIS is the ideal vibration isolation system for the most vibration-sensitive instruments.



* Guarantee is contingent on TMC's comparison and review of the site floor vibration data against the tool floor vibration criteria and confirmation that the STACIS[®] transfer function will provide the required isolation.

Installation of a TMC high stiffness, highly damped stainless steel platform on STACIS[®]. (Photo courtesy of Texas Instruments' Kilby Center)

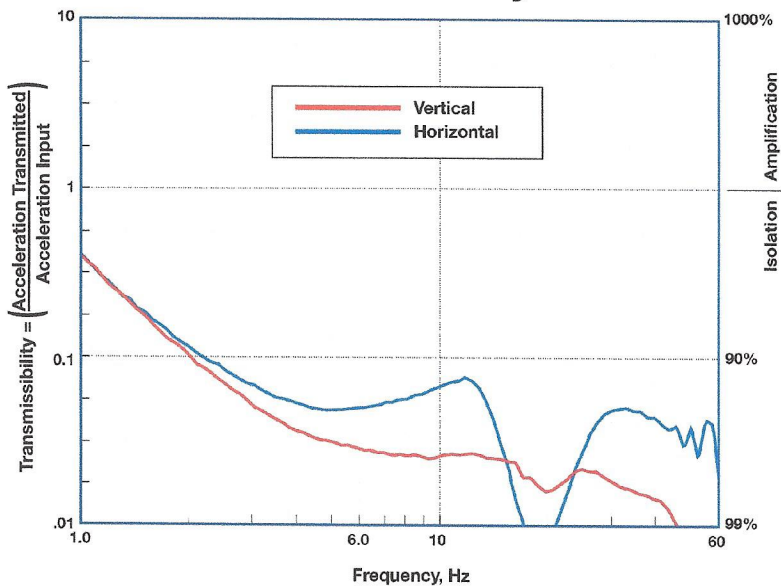
Features & Benefits

- Vibration isolation starts at 0.6 Hz, with 40% to 70% isolation at 1 Hz
- Provides greater than 90% isolation at frequencies 2 Hz and higher, vertical and horizontal
- Reduces fab floor construction costs, allows tools to be installed in higher vibration environments
- Active bandwidth, 0.6 Hz to 150 Hz
- Recommended by many tool manufacturers
- 6 degree-of-freedom active hard mount design, no soft air suspension
- Installs easily, robust control system requires minimal or no on-site compensation
- A point-of-use solution that is compatible with all internal tool vibration isolation systems
- Ensures tool vibration criteria will be met as vibration levels increase over time
- Uses TMC's patented STACIS® technology to cancel vibration using piezoelectric actuators
- Enables older and noisier floors to accommodate state-of-the-art tools
- Compatible with various floor heights and sub-floor geometries in fabs
- Increases throughput, quality and yield

STACIS® Ordering Chart

Catalog Number	Description
21-301-01	STACIS, 3-mount, low capacity
21-301-02	STACIS, 3-mount, medium capacity
21-301-03	STACIS, 3-mount, high capacity
21-401-01	STACIS, 4-mount, low capacity
21-401-02	STACIS, 4-mount, medium capacity
21-401-03	STACIS, 4-mount, high capacity

Transmissibility



STACIS® 2100 on a "riser" installed under a TMC platform in a 36" tall raised floor

General Specification (may vary depending on configuration)

DC-2000 Digital Controller

Analog inputs/outputs	16 channels (16/14 bit)
Digital inputs/outputs	16
Sampling rate	6.5 KHz nominal
Front panel	Two-line LCD with soft menu keys BNC input and output for signal monitoring Two RS-232 communication ports (second port on rear) Tri-color system status lamp
Physical	Single RETMA rack unit height x 15 in. deep
Power	90-240 VAC, 50-60 Hz, 600 watts max.
Other	Power connector for support of external devices

Performance Specifications

Active degrees of freedom	6
Active bandwidth	0.6 to 150 Hz
Natural frequency	Passive elastomer: 18 Hz Effective active resonant frequency: 0.5 Hz
Isolation at 1.0 Hz	40% - 70%
Isolation at 2.0 Hz and above	90% or better
Settling time after a 10 lb (4.5 kg) step input (10:1 reduction)	0.3 sec
Internal noise	<0.1 nm RMS
Operating load range per isolator (different passive mounts required) Isolator overload safety factor	400 - 4,500 lb (182 - 2,045 kg) > 2:1
Number of isolators	3 or 4 typical
Stiffness (1,000 lb/454 kg mass) (typical middle capacity isolator)	40,000 lb/in. (73 x 10 ⁶ N/m)
Magnetic field emitted	< 0.02 micro-gauss broadband RMS

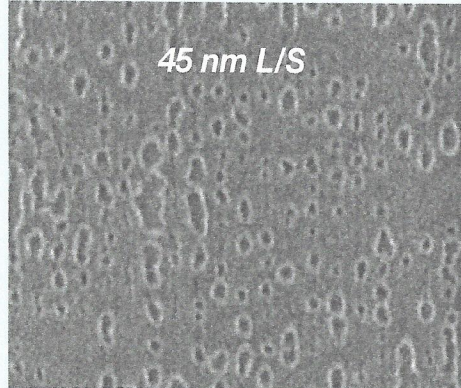
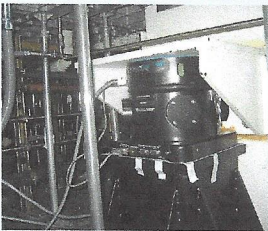
Dimensions, Environmental & Utility Requirements

Isolator size	11.75 in. (w) x 12.5 in. (d) x 10.8 in. (h) (300 x 320 x 275 mm)
Isolator weight	75 lb (34 kg)
Controller size	19 in. (w) x 15 in. (d) x 1.75 in. (h) (483 x 381 x 44 mm)
Temp., operating	50° to +90°F (10 to 32°C)
Temp., storage	-40° to 255°F (-40 to 125°C)
Humidity, operating	30 - 60%
Power required	100, 120, 230 or 240 volts; 50/60 Hz; < 600 watts, CE compliant
Floor displacement	< 480 μ in. (12 μm) below 10 Hz
Options: TMC laminated, stainless steel platforms, frames, and "risers," leveling devices, earthquake restraints, and lithoods	

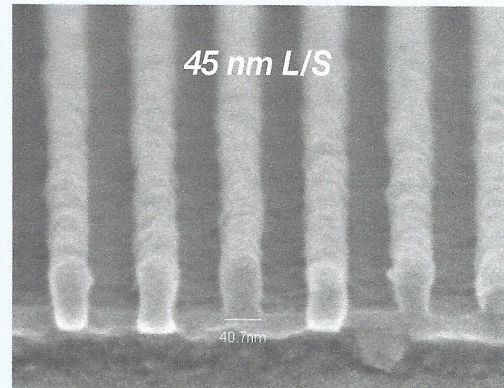
APPLICATION NOTE
Impact of Vibration on Advanced Immersion Lithography
(actual customer supplied data)



The 45 nanometer line-width test patterns shown were produced with an advanced Immersion Lithography System manufactured by Amphibian Systems and installed at SEMATECH in Austin, Texas. Variation between the images is due to the effect of seismic vibration on the photolithography process. The images shown were obtained using a scanning electron microscope.



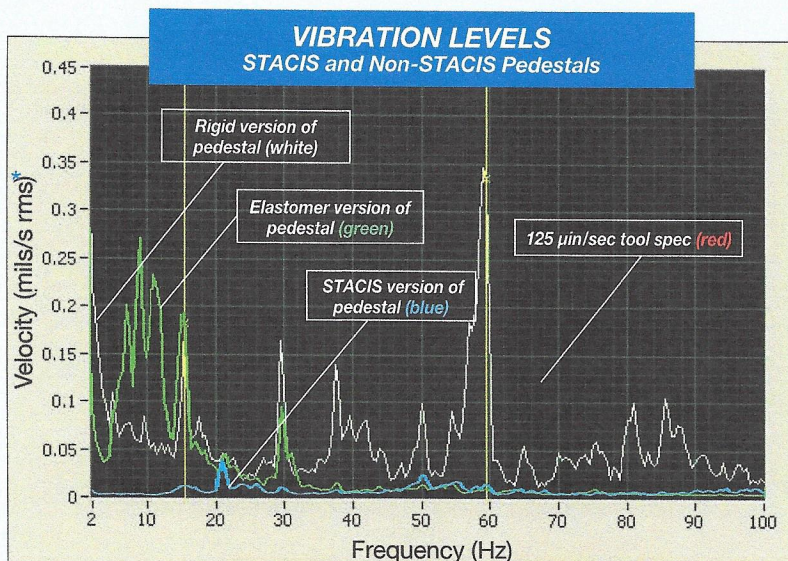
Without STACIS®...
Best pattern obtained on either the elastomer or rigid version of original pedestal.



With STACIS®...
Pattern achieved with STACIS active vibration isolation.

The tool was initially installed on a steel and concrete plinth with a steel support structure which incorporated commercial elastomer vibration isolation pads. This pedestal did not achieve the tool's specified vibration criteria and pattern quality was poor.

In an attempt to reduce vibration, the elastomer pads were effectively shorted out with metal shims leading to a more rigid, non-resonant structure but this resulted in little improvement. The vibration criteria were not met with either version of the pedestal and pattern quality remained poor.



*Vertical Axis Data shown

The plinth support structure was removed and retrofitted with a STACIS® Active Piezoelectric Vibration Cancellation System. The STACIS mounts were placed directly beneath the existing plinth. Supporting the tool on STACIS resulted in a dramatic reduction of overall seismic vibration levels and achievement of the manufacturer's floor vibration specification. More importantly, STACIS provided a dramatic improvement in pattern quality.

Photos, images, and vibration data courtesy of SEMATECH.