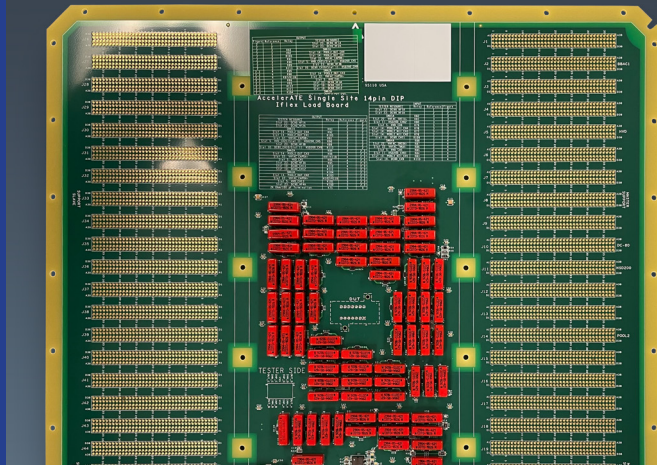




# Keeping up with Moore's Law

In order to support the testing demands of the wide variety of semiconductor devices in production, semiconductor chip and automated test equipment manufacturers depend on the design and fabrication of custom tester interface hardware from companies like Dynamic Test Solutions. Naprotek uses agile manufacturing techniques to support Dynamic Test Solutions in producing low-volume batches of highly complex assemblies.

DTS | TEST & INSTRUMENTATION



"We send our more challenging tester builds to Naprotek. DTS has plenty of suppliers who can handle our mid-range products but only a few can handle these kinds of builds. These testers are as complex as they get and few EMS providers are well-equipped for the complexity and the variety of our products."

James Stanley  
Vice President  
Dynamic Test Solutions

## CUSTOM SOLUTIONS FROM WAFER PROBE TO FINAL TEST

Dynamic Test Solutions, headquartered in Singapore, is a leader in semiconductor test design that provides custom high performance tester interface hardware to a broad range of semiconductor automated test equipment (ATE) and laboratory board manufacturers. DTS offers a global presence, comprehensive engineering knowledge of semiconductor applications, and a flexible business model that includes both custom and off-the-shelf, turn-key solutions. Whether it's benchtop testing for device development, wafer level product testing, or final testing of packaged integrated circuits, DTS develops testing solutions that span the semiconductor device life-cycle.

## RECOGNIZING THE PROBLEM

DTS designs and provides testing solutions for the ATE market including device interface boards (DIB), probe interface boards (PIB), and characterization and development boards. Each of these fixture boards, called a device-under-test (DUT) or loadboard, serves as the transition between sophisticated testing platforms and a wide variety of semiconductor integrated circuits (IC) including microprocessors, microcontrollers, transceivers, memory devices, mixed-signal devices and many more.

One of the challenges facing ATE manufacturers today is addressing the plethora of semiconductor devices that need to be validated both on-wafer and packaged for final test while optimizing throughput, real-estate, and cost. The resulting solutions are versatile platforms with common slots and contactors and unique loadboards with common sockets and connectors that ensure compatibility, portability, and signal integrity. As semiconductor manufacturers continue to move towards denser, high-speed digital designs, devices are evolving with higher pin and site counts, finer detail, and increasing data speeds.

## DEVELOPING THE SOLUTION:

While it may not seem obvious, loadboards are complex, accommodating large pin-counts, high parallelism, and fast scan clock rates. Printed circuit boards (PCB) often have many layers, including those for signal, power, and ground, and are carefully designed to maintain signal integrity while meeting mechanical, power, and thermal requirements. In addition to the PCB designs, brand specific sockets and connectors, unique stiffeners, high-speed digital I/O interconnects, or high voltage requirements can further differentiate a loadboard's design. For the end-user, a true plug-and-play solution stems from a knowledgeable designer and a vast database of tester and handler specifications. Due to the high-complexity and batch production nature of these assemblies, unique manufacturing configurations and capabilities are needed to deliver reliable products, on-schedule.

The demand in the semiconductor device testing market is driven by competing forces such as the volatile global demand for ICs and rapidly evolving technologies. With an unpredictable market, it can be advantageous to partner with an EMS provider that emphasizes rapid prototyping and batch production to provide the flexibility to meet intermittent production schedules and short lead times. Naprotek has been an important manufacturing partner for DTS for both new product introduction (NPI) and repeat orders. With factories purpose-built for the batch production of complex electronic assemblies, Naprotek excels in high-mix, low-volume builds that require real-time production feedback, flexible sourcing models, and adaptable production schedules.

Part of Naprotek's adaptation for batch production is the use of agile manufacturing techniques. The speed and agility of agile manufacturing come from highly trained staff, thoughtfully designed process control systems, and flexibility in production capacity. This methodology includes cell-based manufacturing, which emphasizes one-piece production flow instead of batch-and-queue, which means that the production line is designed so assemblies are produced "first in, first out." Operators are cross-trained to manage workflows that operate continuously across several processes and not at a single station or machine.

Due to the continuous nature of production, Naprotek employs additional inspection over conventional manufacturing, typically following every transformation process. This practice has the benefit of increasing final yield and ensuring system reliability by catching process errors or defects early in the assembly workflow. These inspection processes include manual and automatic optical inspection, flying probe, in-circuit test, and X-ray.

## ADDRESSING THE NEED

The only constant in the world is change and that principle holds as true for semiconductor devices as it does for anything else. Through new technology advancements and trends like cloud computing, artificial intelligence, and high-performance mobile, Moore's Law is still giving manufacturers challenges to overcome. So long as semiconductor devices continue to become denser, faster, and more complex so too will tester interface boards. Naprotek is staying at the leading edge of electronics assembly by continuing to invest in state-of-the-art surface mount technology process equipment, microelectronics, RF technologies, and highly-skilled engineering and manufacturing experts.



*Operators manually inspect assemblies in addition to machine-driven inspections such as automated optical inspection (AOI), X-Ray, and flying probe in-circuit testing.*



Learn more at:  
[naprotek.com/dts](http://naprotek.com/dts)