

Deaton Engineering Helps Dell Quality Test 450 Cooling Fans Simultaneously

The Client: Dell Computer Inc. / Tyrex Group

Dell Inc. designs, develops, manufactures, markets, sells and supports a wide range of computer systems and services customized to meet customer requirements. Dell's products include servers, storage components, workstations, networking products, notebooks, desktop computers, printers, imaging systems, software, peripherals, and support services.

TyRex Group is a complete manufacturing service and technology solutions provider specializing in the high-tech industry. The TyRex Group provides manufacturing services for cable connectivity, circuit board design, electronic components, hardware and software installation, testing, and other applications.

The Challenge: Design and Build An Automated Computer Fan Tester

Dell and TyRex engaged Deaton Engineering to develop an automated fixture capable of simultaneously controlling and testing up to 450 fans for use during qualification of new computer cooling fan models. The data acquisition and control system necessitated independent control and monitoring of fan speed and input power. Additionally, the controller was required to recognize and disable a failed fan during testing.

Multiple fan sizes and blowers needed to be fixtured and connected to the test system; a common, flexible mounting fixture was required to accommodate fans from 50mm to 92mm in diameter capable of providing power and signal distribution to each fan.

The Solution: Automated Fan Test Fixture

Deaton Engineering developed designs for the fixture's circuit boards, fan mounts, power management and cable assemblies. These components were used to create the test device, which was integrated with a standard thermal test chamber.

Performance testing included one week of continuous power cycling for all the fans at 70C. Parametric testing was performed at the end of the week, the fans were cycled through their range of speed, while monitoring the speed and power demand of each fan independently. This data was stored on the control computer and used to trend the performance of each of the fans in the test. This cycle of performance testing and parametric testing was repeated for 7 weeks.

The first article was built, installed and verified to demonstrate the final product met the design specifications. The designs, drawings, and procedures for building and installing the device were transferred to Tyrex for use with Dell components.

Engineering Highlights:

- Worked with Dell reliability engineers to develop fan tester requirements and specifications
- Designed custom test rack capable of handling signal and power requirements necessary to simultaneously control 450 multidimensional fans
- Created adjustable mounting bracket to accommodate multiple fan sizes/models without jeopardizing airflow
- Designed and developed power distribution which incorporated unique circuit protection, cable routing, and thermal considerations
- Assembled transfer documentation package for deployment to Asian manufacturers to meet client needs

