CINCINNATI TEST SYSTEMS

SINGLE STATION WHEEL RIM TEST SYSTEM

Helium Mass Spec Leak Test System

System Description

Cincinnati Test Systems designed and built this single station turnkey leak test system to test wheel rims for cracks and porosity. The testing process incorporates vacuum decay and helium mass spectrometry to determine gross leaks, medium leaks, fine leaks, and accepted parts. This single station test system was designed for both manual and robotic loading and unloading.

Wheel rims are pressurized and tested in the same manner as when they have tire air pressure applied to them. After a part is loaded the machines telescoping chamber moves down around the wheel rim sealing on the hub OD. The chamber seal utilizes interchangeable seal plates to incorporate wheel rims from 13” to 20” diameter and 4” to 10” width. Upon seal completion, the system pulls vacuum on both sides of the wheel rim. The pressure side is isolated and pressurized with 100% Helium while the hub remains under full vacuum. A gross leak test is conducted on the hub side vacuum source prior to the helium mass spec leak test. This multiple stage test process is utilized to reduce test cycle times when a large leak is detected in the rim. This process also saves helium background cleanup which can slow production testing with excessive helium released into the mass spectrometer.

Upon passing the gross leak test the helium mass spectrometer is used to measure helium fine leaks within the wheel rim. The fine leak rates range from 5 x 10^{-4} to 1 x 10^{-5} scc/sec. Upon completion of the test. Helium is evacuated from the pressure side to a CTS helium reclaim system. The whole test circuit is then open to atmospheric pressure. This test cycle occurs in under 20 seconds, the wheel is unclamped and the robot automatically unloads the tested wheel rim and loads the next.

Single Station Test System designed to test various size Wheel Rims

Features and Benefits

- Robotically or manually loaded test system
  - Automatic operation continuous operation
  - Manual operation modes for flexibility
- Interchangeable seal plates for part size flexibility
  - Compatibility for family of rim sizes
- Light curtain protection with finger start buttons
- Detects leaks as small as 1 x 10^{-5} scc/sec
- Production rates:
  - 20 sec leak test
  - 30 to 40 sec complete cycle time with load/unload
  - 90 to 100 parts/hour (approximately)

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