NDT: Powder Metal: Sinter Braze Integrity

Problem: Testing the structural integrity of complex powder metal parts joined via sinter braze is a critical step in ensuring the part will perform as designed. Incomplete braze infiltration, improper braze alloy, damaged or even missing braze pellets can be difficult or impossible to detect via visual inspection or traditional methods of nondestructive testing.

Fig 1. Sinter braze powder metal components

Solution: Resonant Acoustic Method NDT (NDT-RAM) provides an extremely fast, whole body indication of braze integrity on 100% of parts produced. Resonant frequency shifts caused by the structural weakness of poor sinter brazing are readily detected. In addition, the system acts as a process monitor – if the failure rate increases beyond the norm, the process can be halted, investigated and root cause determined sooner, saving time and money on scrapped parts.

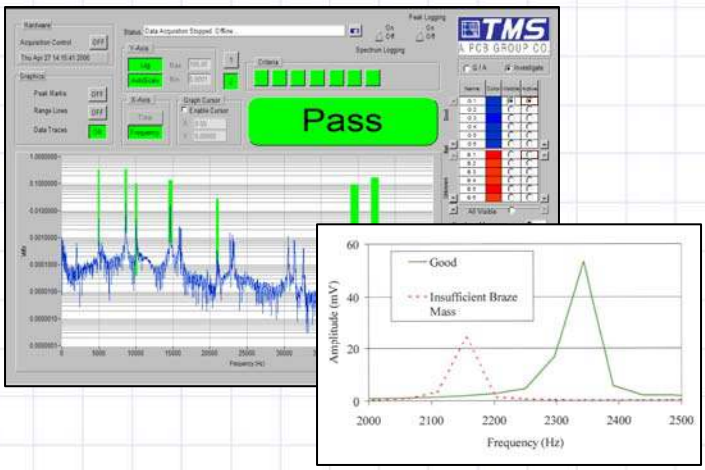

Fig 2. Resonant frequency shift due to insufficient braze mass (i.e. chipped pellet), ~7.5% from approx. 2325 Hz to 2150 Hz.

Benefit: By comparing the resonant frequency shifts to visual and destructive separation pull force evaluations, NDT-RAM can easily, objectively and reliably detect poor sinter brazed joints. The capability of automating NDT-RAM makes it superior to subjective visual or inefficient separation-force testing.

Part Characterization Induced Defect	Separation Force, Lbs	(N)
Good parts	26,118	(116,180)
(1) Missing braze pellet	13,360	(59,430)
(2) Missing braze pellets	8,121	(36,124)
(3) Missing braze pellets	4,288	(19,074)
Misaligned subcomponents	8,129	(36,160)
Small braze pellet	8,812	(39,198)
Poor sinter	5,995	(26,670)

Fig 3. Defect correlation to separation-force testing

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