

Tuesday 3/11/14 10:00am

If one was good, two must be better! Poster Sessions that is! We had so many qualified submissions this year, we divided them in to two Poster sessions offering a variety of relevant topics to augment what you'll learn sitting in the Podium sessions.

Poster Sessions are a great way to network through interaction with the poster presenters and other curious bystanders, multitask during a break and stretch your legs after a long session.

In-Situ Debug Techniques of SATA Connectors In Storage Servers - and Connector Degradation Phenomena

Trent Johnson—Cleversafe, Inc.

Investigation of Micro Spring Performance Jiachun (Frank) Zhou, Hui Liu—Smiths Connectors - IDI



This Poster

Testing Elastomer for HTOL

Ila Pal, Meghann Fedde, Sultan Faiz, Ranjit Patil—Ironwood Electronics, Inc.

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smiths connectors



Investigation of Micro Spring Performance

Jiachun (Frank) Zhou, Hui Liu
 Smiths Connectors - IDI

Why Perform An Extensive Study on Micro Springs?

- The micro spring component (~0.05mm wire diameter & <0.4mm spring OD) determines spring probe performance.
- Spring performance is affected by design, temperature, material, moisture, etc.
- Very limited study and technical references available on micro spring performance.

Test Set Up:

- Spring probe samples: 3 materials (music wire, stainless 1 & 2), 2 spring designs.
- Springs compressed at working deflection in an oven for several hours.
- Compression cycle springs in hot / cold cycling machine, Fig. 1.
- Spring force & spring free length measured as performance criteria , Fig. 2
- Cycle springs at low temperature, <0°C, then leave on tester for 24 hours, checking spring, Fig. 1.

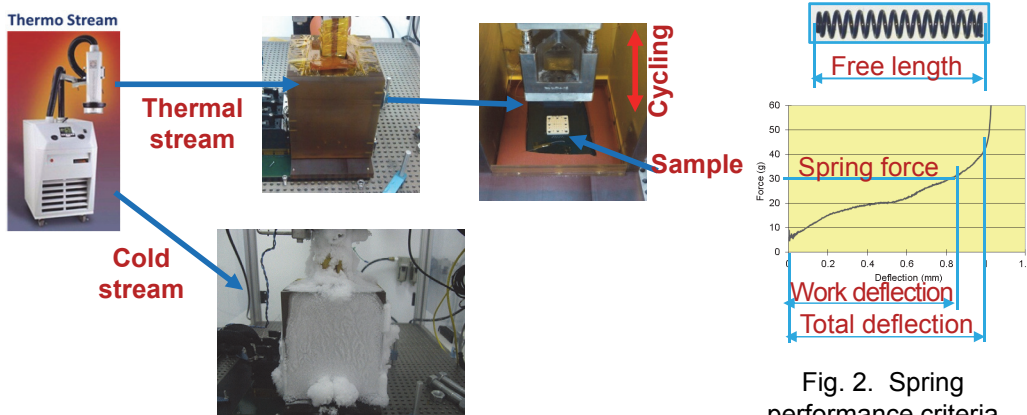
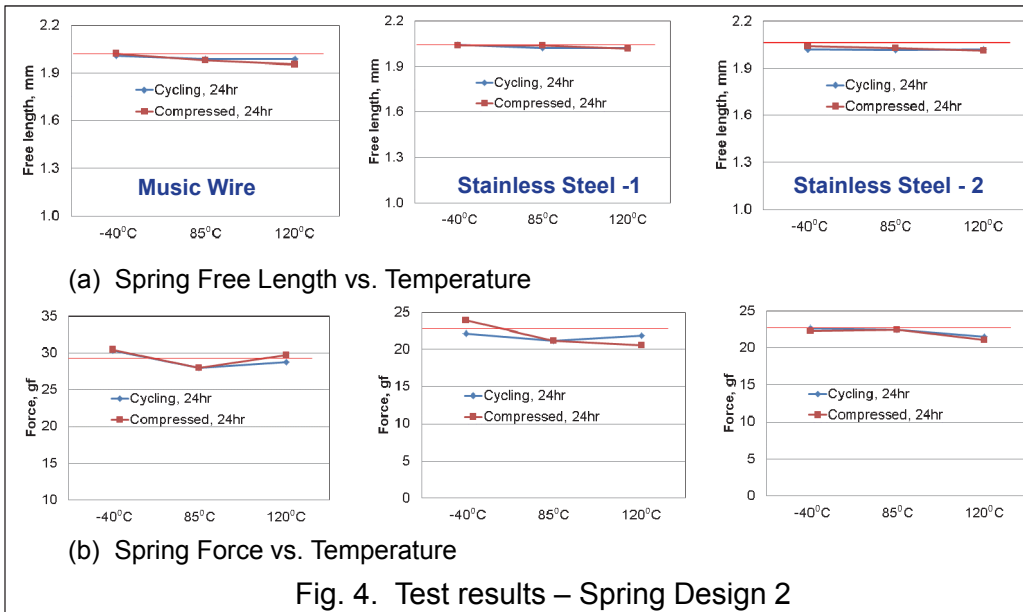
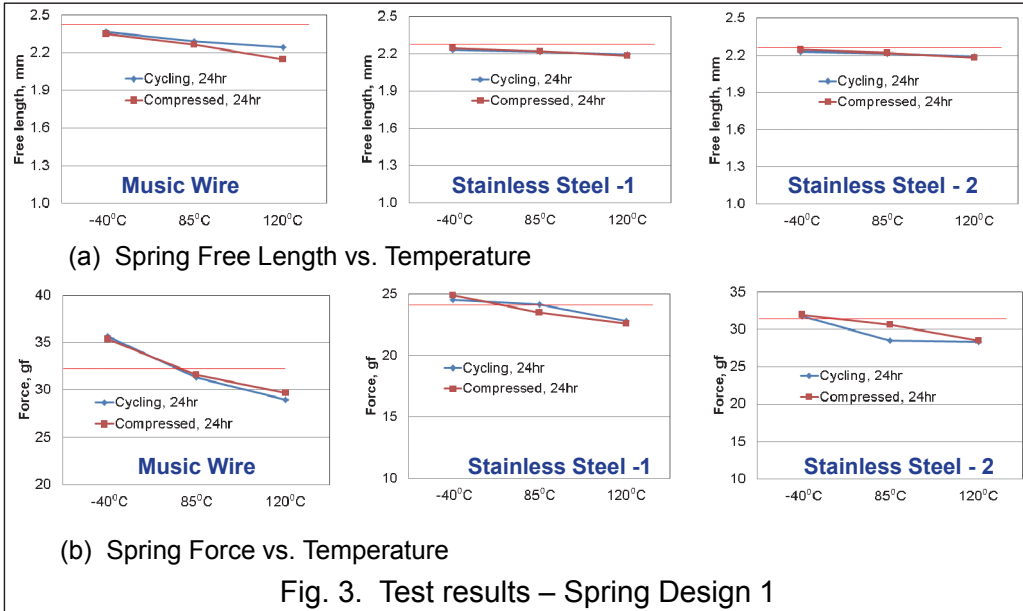


Fig. 1. Hot/cold cycling test set up

Fig. 2. Spring performance criteria

Test Results – High & Low T°C, Cycling & Compressed Only



Discussion -1

- The free length of the spring decreases slightly at higher temperatures: ~ 5% for music wire spring, <3% for stainless steel spring, tested in the range of -40 to 120°C.

Discussion -1, continued

- Data shows spring force increases at -40°C without fracture; music wire has higher force than stainless steel.
- Music wire springs performs at 120°C.
- Spring performance at hot / cold temperature depends on design; sample 2 has less force or more stable free length in hot / cold tests.
- With the same spring length, music wire springs can gain much higher working force (~30%) than stainless steel springs.

Test Results – Spring in moisture

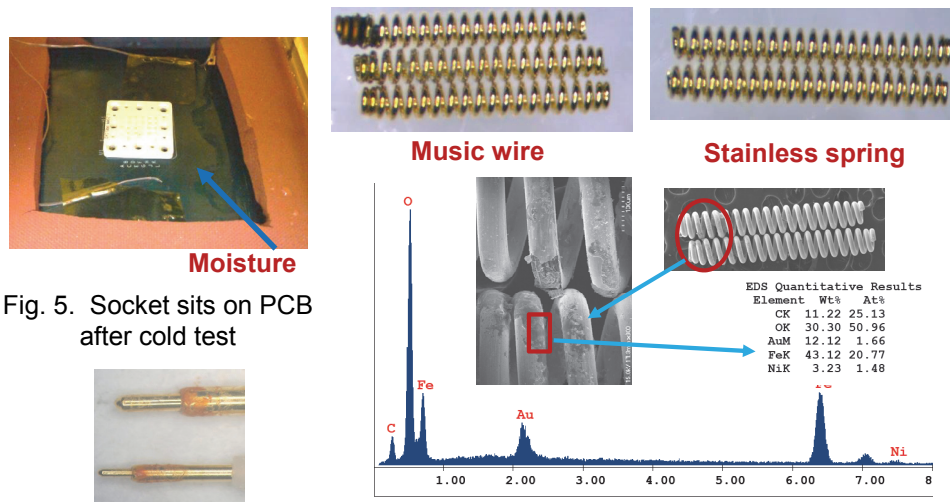


Fig. 5. Socket sits on PCB after cold test

Fig. 6. Customer return probe

Fig. 7. Spring sample analysis

Discussion - 2

- Corroded spring was found in customer returned probe (an infrequent occurrence).
- Lab tests show springs can corrode when there is water present on mother board from condensed moisture during cold cycling.
- Exposed Fe of spring due to wear encounters moisture or water causing corrosion.

Summary

- Music wire springs can work in temperature range of -40~120°C.
- Spring relaxation is a function of design and proper working deflection.
- SS springs operate in a wider temperature range but the spring force is much lower than that of music wire springs at same deflection.
- To avoid potential spring corrosion, operators should remove sockets from boards in the handler following cold test if the test is not immediately continued.