NCSX Composite Coil Testing

Resin Impregnated Bare Conductor

Longitudinal Compressive Tests

Topics

- Test Description
- Frame Deflection Corrections
- Copper Sample Calibration
- Test Loads
- Test Data
- Sample Failures
- Test Summary

Test Description

- Longitudinal compressive Test
- Sample:
  - Resin impregnated bare conductor
  - Sample length approximately 1.34"
  - Ends ground smooth and parallel
- Test Resolution:
  - Load: 1 lbf
  - Displacement: <0.0001"
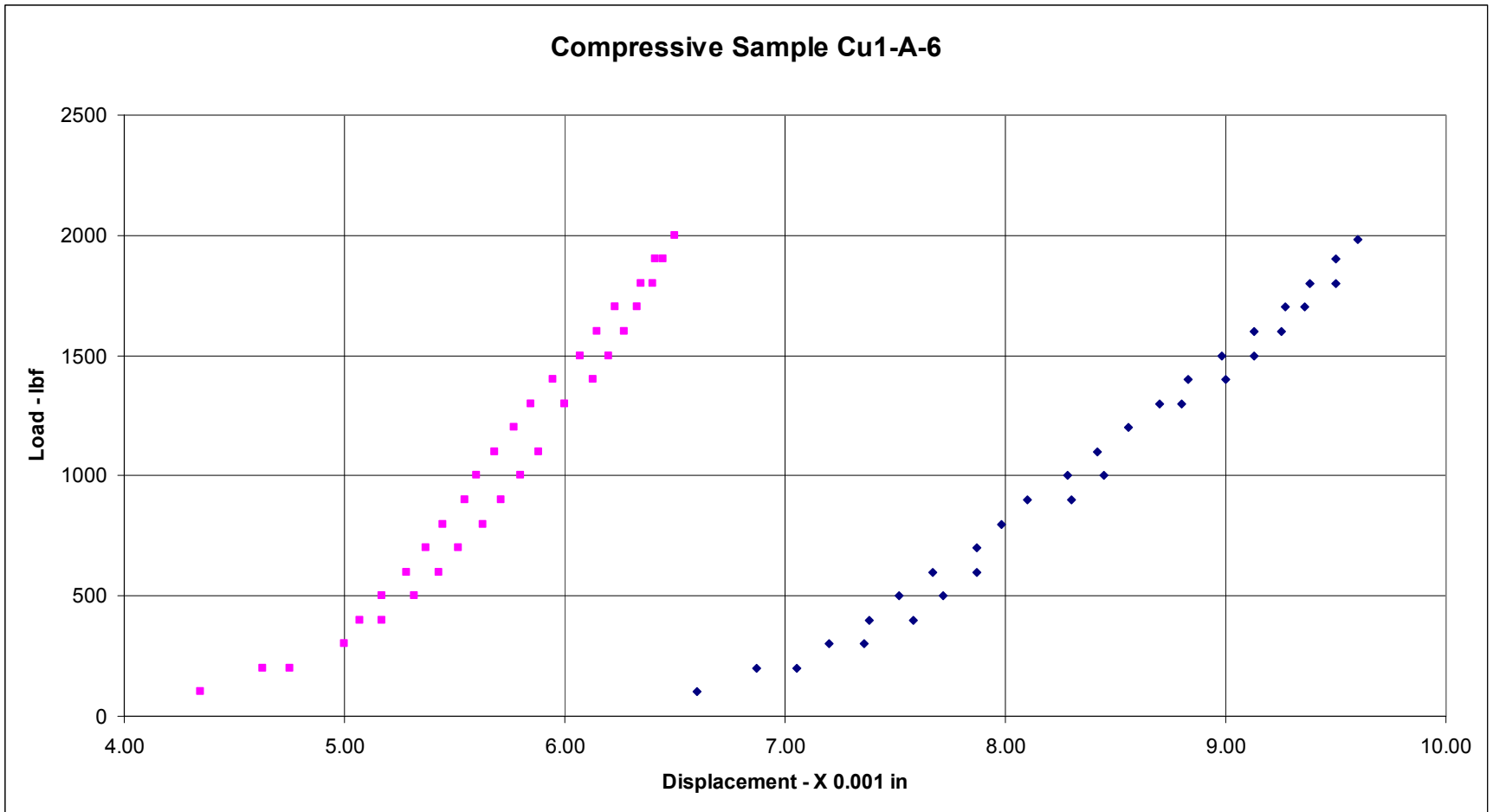- Tests performed at room temperature

Test Sample in Fixture

Frame Deflection Corrections

Frame Correction Factor Runs 15 & 16

Copper Sample Calibration

Compressive Sample Cu1-A-6
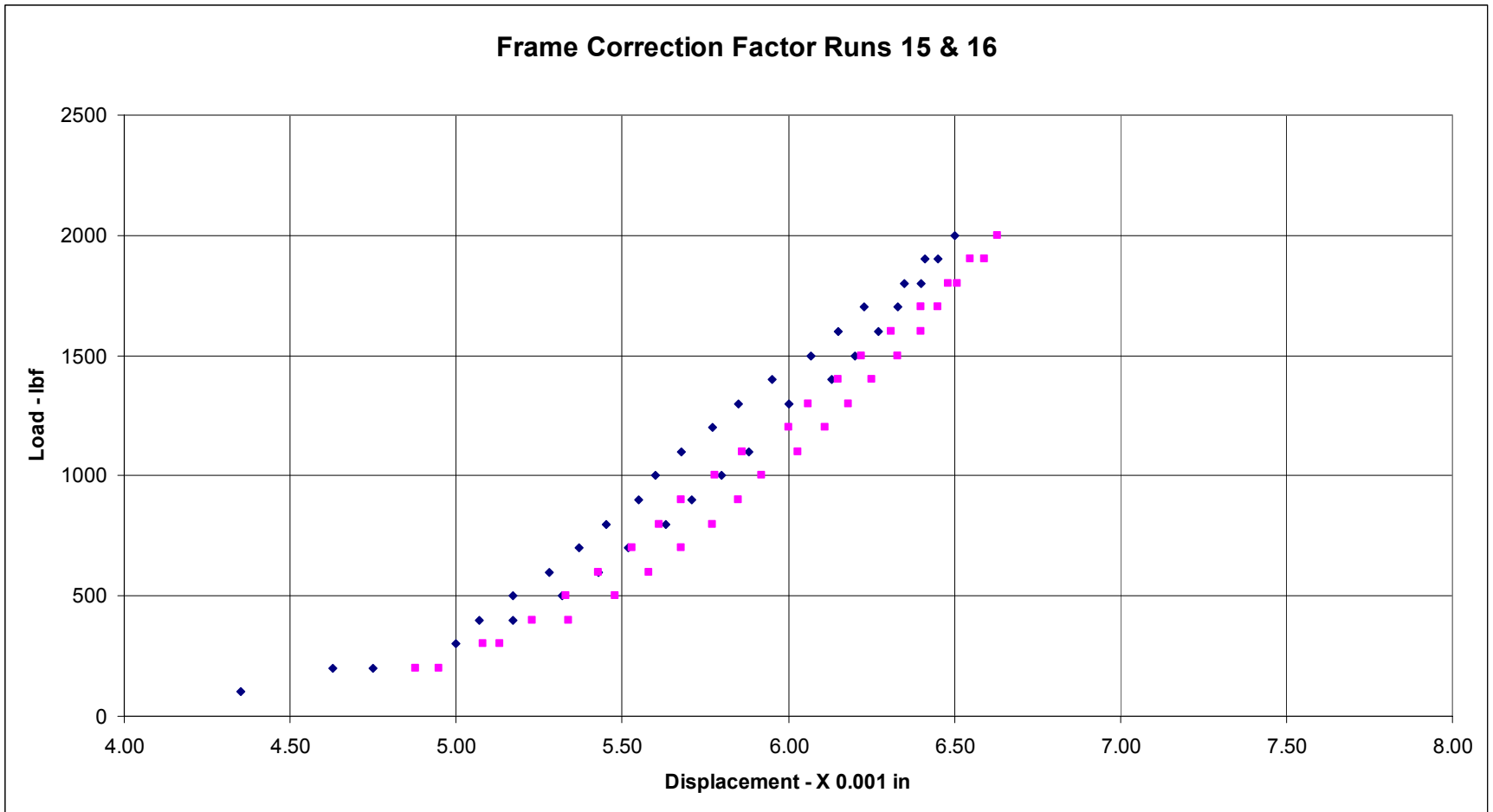
Copper Sample Calibration

- Removing frame compression from Copper Sample Data provides a modulus of: 17.9 Msi

- This is close to the expected copper modulus of about 17 Msi.

Test Loads

- Samples were found to yield between 1500 and 2000 lbf load

- Test cycles were run between near 0 and 2000 lbf.

- Several samples failed near zero to 2000 lbf, so load range was reduced to 1800 lbf peak.
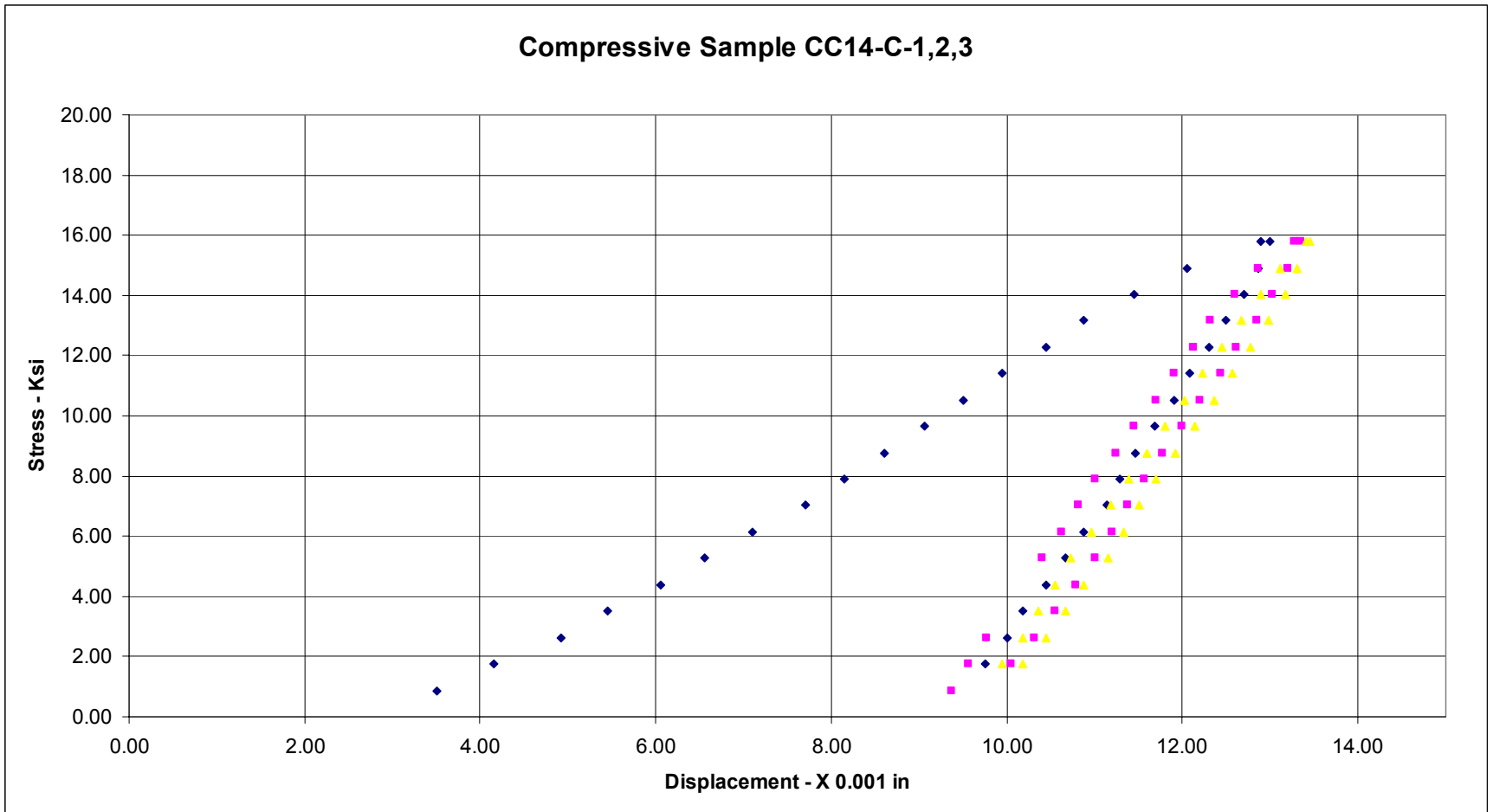
- Load rate was 7.5 lbf/sec

Test Data

- Samples were usually cycled several times.

- Some samples had failures.

- Initial curves were of two types
  - Expected straight then yield
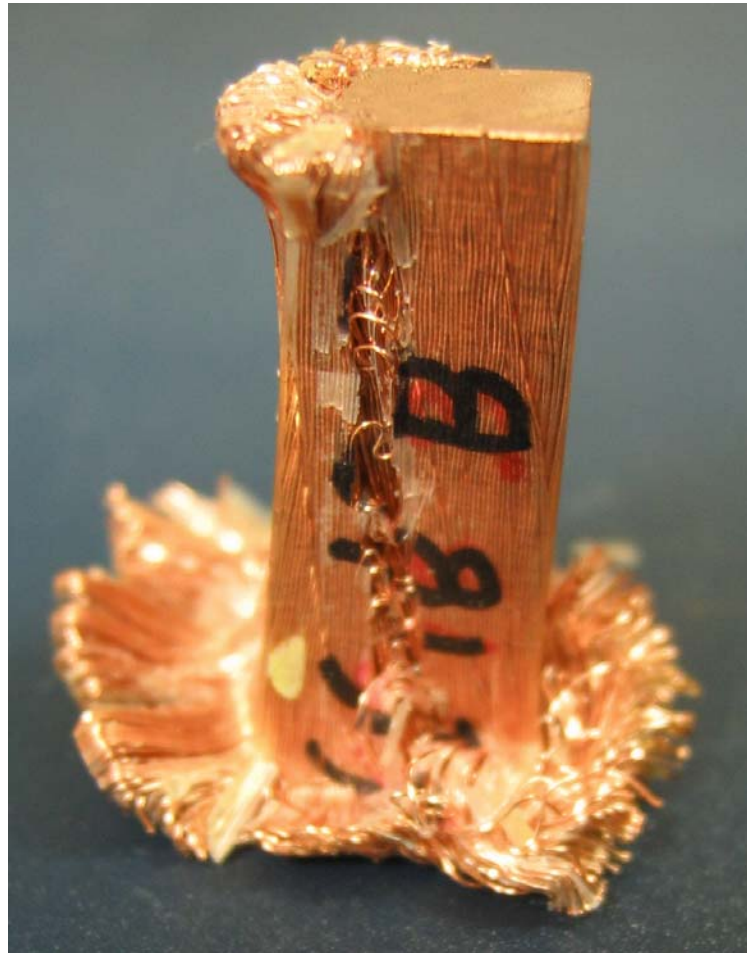 - Very soft with out definite yield point

Type 1 Curve

Compressive Sample CC17-B-1,2

Type 2 Curve

Compressive Sample CC14-C-1,2,3
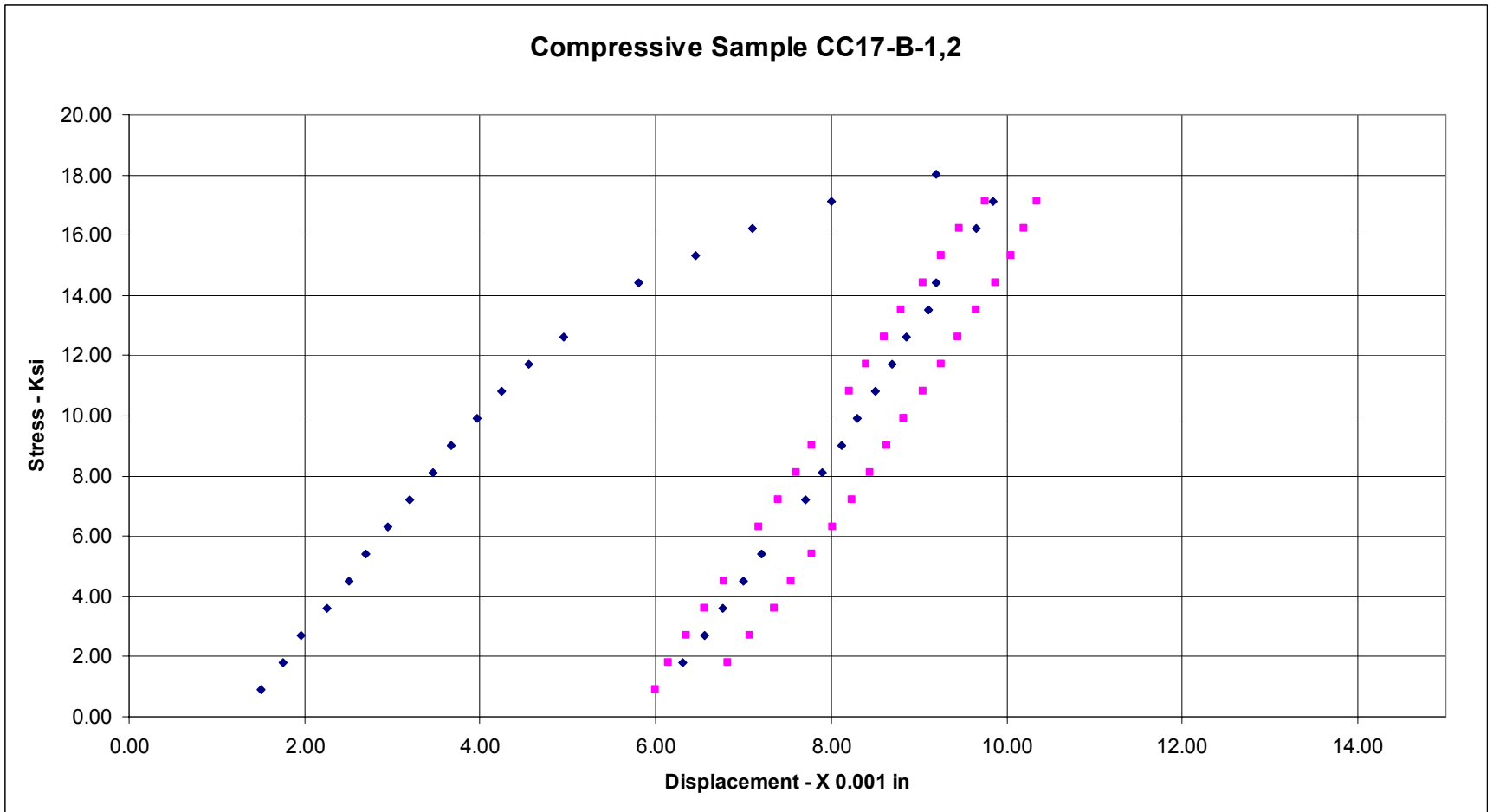
Sample Failure (type 1 curve)

Sample Failure (type 2 curve)

Test Results

- The compression modulus for type 1 initial compression cycle was about 6 to 8 Msi.

- The compression modulus for type 2 initial compression cycle was about 2.5 to 3 Msi.

- Subsequent cycles were all nearly the same for both type 1 and 2
  - Average 9.114 Msi
  - SD 0.570 Msi

Modulus Data

Longitudinal Compression Modulus