



**Fatigue Test of 0.135" Diameter Extra High Strength (HS285) Steel
Wire Samples**

(GTRI Sub-project No. A7483-000)

**Submitted to,
Kiran Manchiraju
Senior Research Scientist
Southwire Co.
One Southwire Drive
Carrollton, GA 30119**

**Submitted by,
Gautam Patel
Georgia Tech Research Institute
Electro-Optics, Environment, and Materials Laboratory
Materials Analysis Center
925 Dalney St.
Baker Building, Room 273
Atlanta, GA 30332**

August 10, 2004



In this study, 0.135” diameter steel wire samples from Southwire Company were subjected to comparative fatigue testing. The test subjects included (1) regular strength steel and (2) extra high strength steels. Test subjects were provided by the Southwire Company and the work was performed under GTRI contract #A7483-000.

TEST PROCEDURE AND RESULTS

Georgia Institute of Technology and Georgia Tech Research Institute have equipment for fatigue testing (axial and torsional) large size samples. A MTS Servo 20K Tension/torsional machine was selected for the test since this machine can grip small diameter samples and can be twisted to a maximum degree. In order to firmly grip such small diameter samples into the equipment grips, the ends of the wires were encapsulated in an epoxy and copper seams.

The testing parameters selected were as follows:

Gage length ----- 4”
Frequency ----- 3.5hz
Torque (Rotation/twist) ----- zero degree to +35 degrees to – 35degrees
Axial load ----- 30lb
Data collection ----- every 8 second

Figures 1 and 2 show the setup of the machine. Number of cycles to twist were recorded and noted. The low strength steel wire broke at 54,000 cycles. The extra high strength steel wire did not break after 60,415cycles. This test ran for more than 10 days having 60,415 cycles recorded. It was decided to abort the test.

Thank you for letting me assist you with your fatigue testing. Please call me if you have any questions at 404/894-3460.

Respectfully submitted,

Mr. Gautam Patel
Research Engineer II



Figure 1 shows the test setup. Wire is gripped between the upper and lower grips. The upper grip is fixed while the bottom grip rotates.

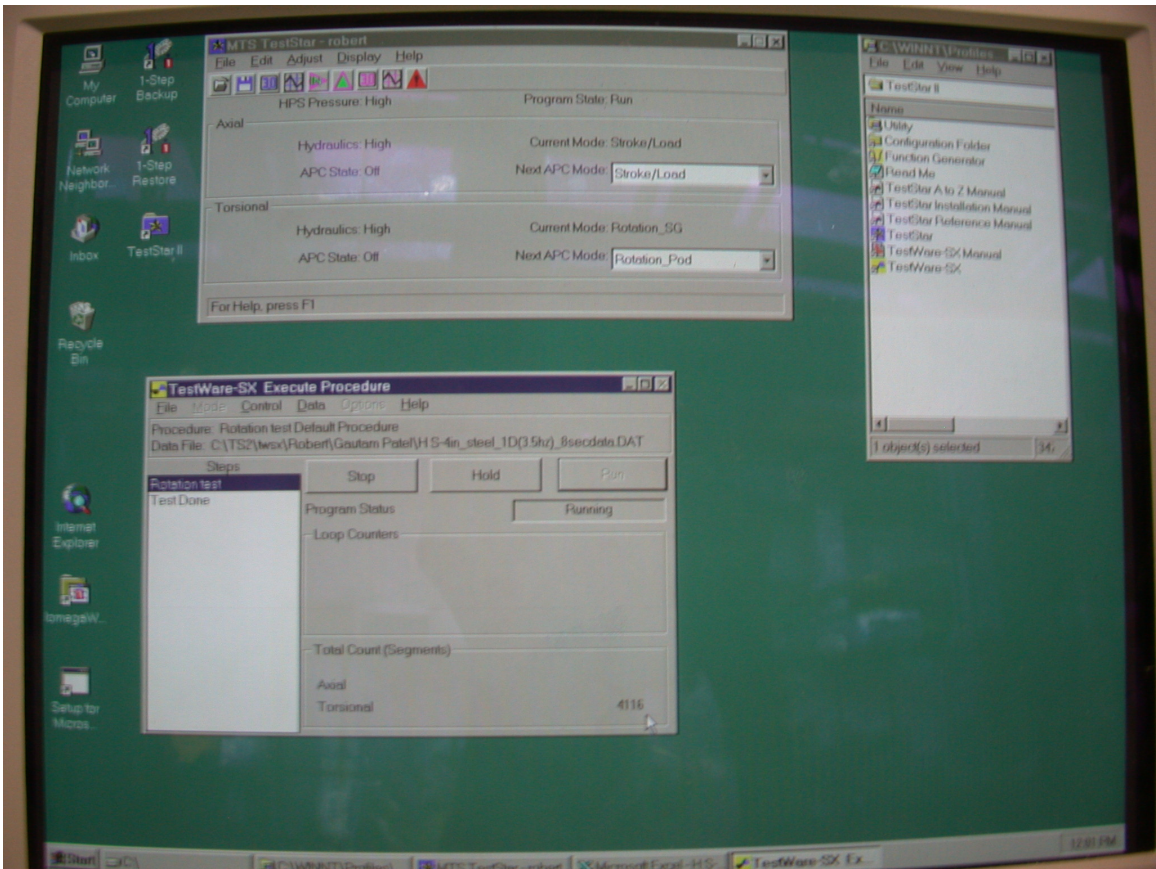


Figure 2 shows the data acquisition system. Number of cycles recorded is shown at an arrow.