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For the attention of: Mr Nino Cacace

22nd December 2014

Laboratory Test Report No. 141135

Client's order No. verbal (21st November 2014)

Introduction

R-TECH Services Limited were supplied with several shear test specimens machined from the following materials:

Laboratory Reference ID	Shear Test Specimen Origin
141135-1-1	Stainless steel clad carbon steel billet
141135-1-2	Stainless steel clad carbon steel billet
141135-1-3	Carbon steel core of above billet
141135-1-4	Type 304 stainless steel

The client advised that three of these samples had been cut from a section of clad stock from stand 4 of an 18-pass rolling train. The initial clad billet cross-section had been 5³/₄ "x 5³/₄" section, and the stand 4 clad sample had an approximate cross-section of 4¹/₂ "x 4¹/₂"; a rolling reduction of 1.56:1. The location of the two samples for measuring the shear strength of the cladding is shown in Figure 1. Other comparative test samples had been taken from the carbon steel core of the stand 4 sample, and from a separate section of solid grade 304 bar.

R-TECH were requested to carry out shear tests according to ASTM A264-12 "*Standard Specification for Stainless Chromium-Nickel Steel-Clad Plate*".



Figure 1. Showing location of shear test sample (photo supplied by Cladinox)

Dates of test 24th November to 16th December 2014

Shear test results

The shear test principle is shown schematically in figure 2.

The specimens were mounted into a custom designed shear test rig supplied by the client, and load was applied to the top of the specimen using a 300 kN universal testing machine. The specimen/rig set-up can be seen in figure 3.

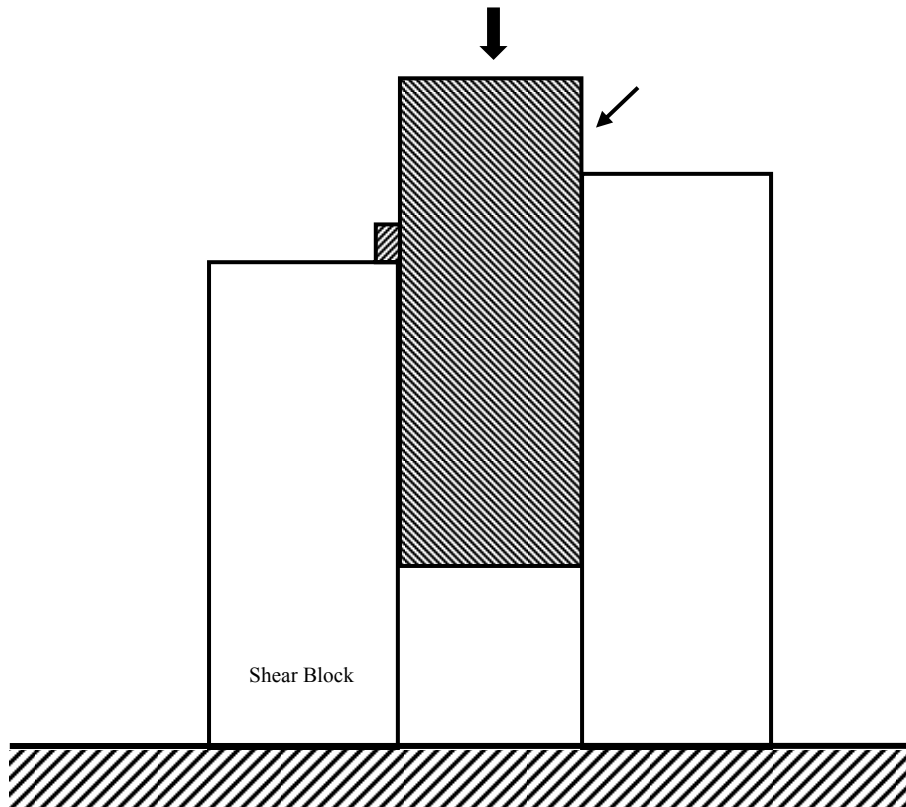


Figure 2: - Schematic of Shear Test



Figure 3: - Shear test set-up

Figures 4 to 7 show load/time plots for each of the shear test specimens tested.

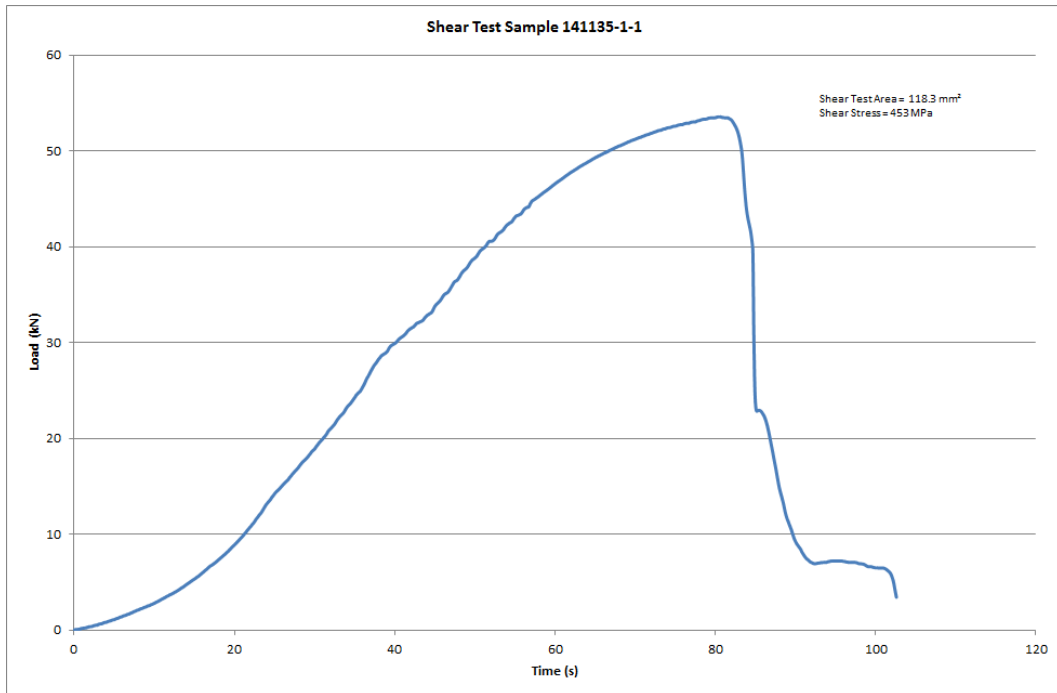


Figure 4: - Shear test load/time plot for Specimen 141135-1-1

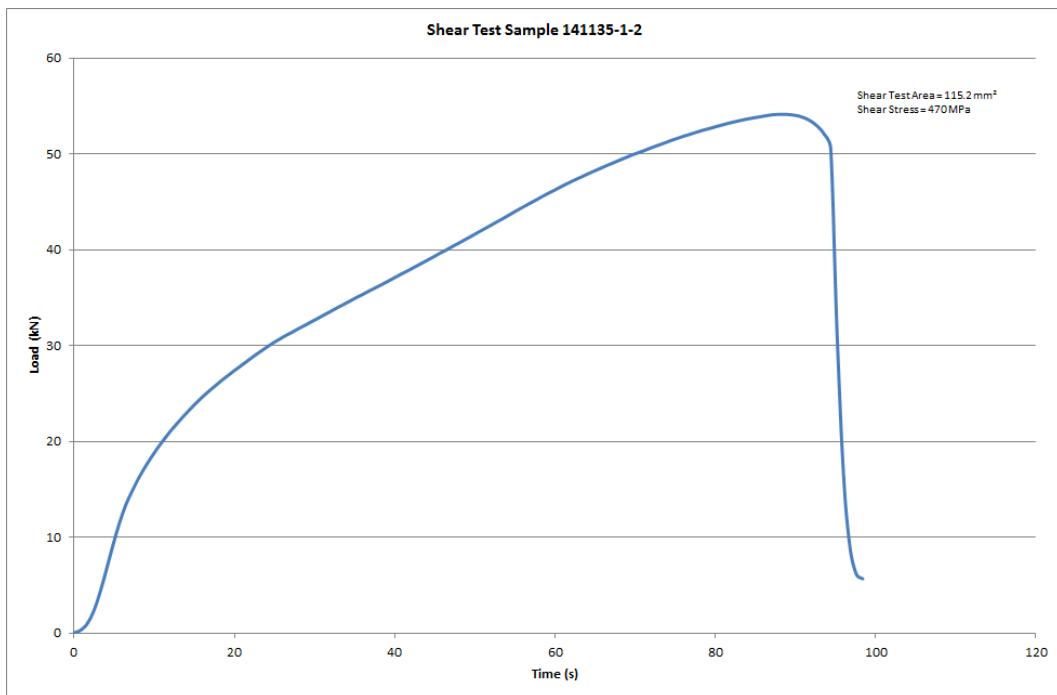


Figure 5: - Shear test load/time plot for Specimen 141135-1-2

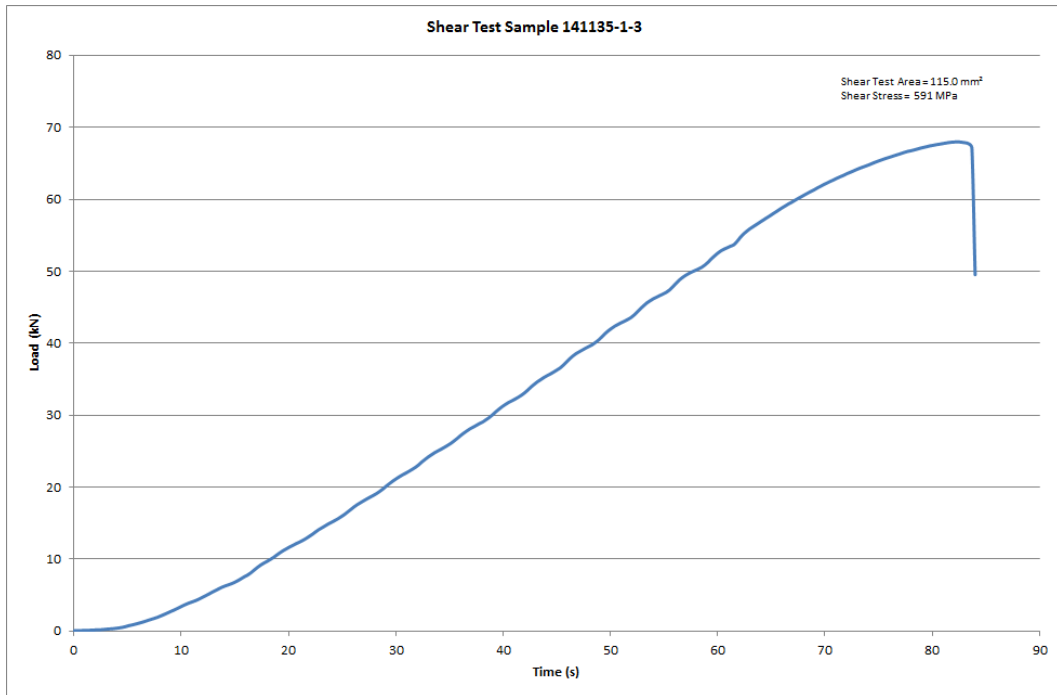


Figure 6: - Shear test load/time plot for Specimen 141135-1-3

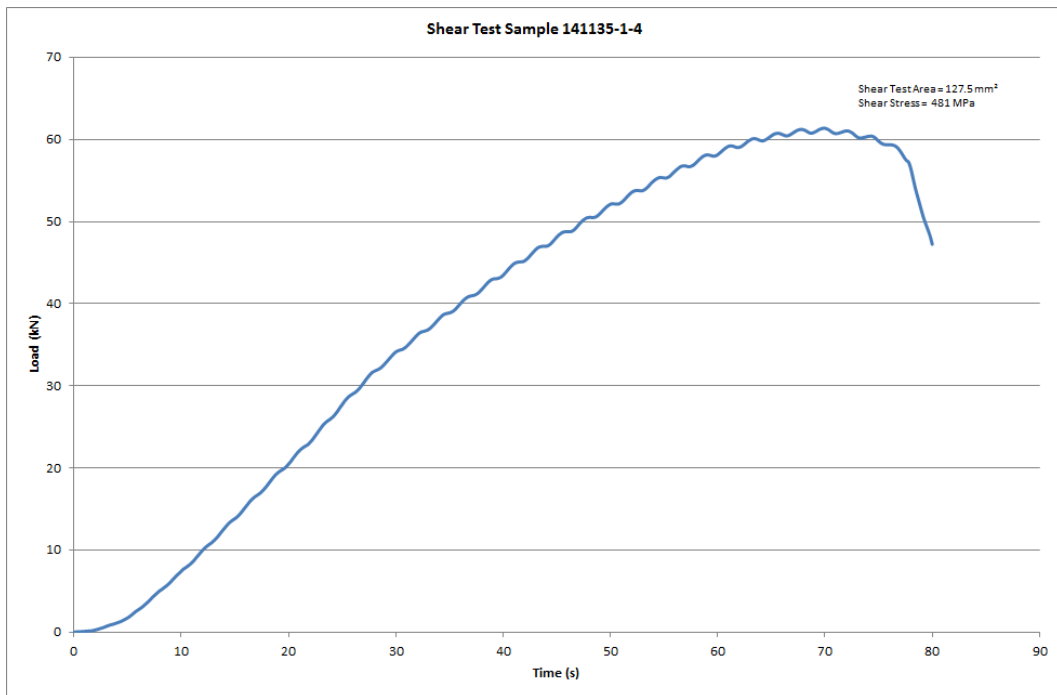


Figure 7: - Shear test load/time plot for Specimen 141135-1-4

The two stainless clad test specimens gave values of shear stress of 453 MPa and 470 MPa respectively. These values are greatly in excess of the minimum value specified in ASTM A264 of 140 MPa.

The test carried out upon a specimen taken from the carbon steel core of the stainless clad billet gave a shear stress result of 591 MPa and the specimen machined from solid type 304 stainless steel gave a shear stress result of 481 MPa.

Test report authorised by:



R J Chiplen
Laboratory Manager

End of report