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23/05/16

The comparison of scratch resistance for Crystalusion protection

Aim

The aim of this testing work is to compare the scratch resistance of three coated and two uncoated mobile device screen glass samples comprising:

Sample reference	Coating
1	Samsung Gorilla Glass (uncoated)
2	Tempered Glass (uncoated)
3	Samsung Gorilla Glass (coated)
4	Samsung Gorilla Glass (competitor product coated)
5	Tempered Glass (coated)

Table 1: coated slides

ST3001 Scratch Testing equipment

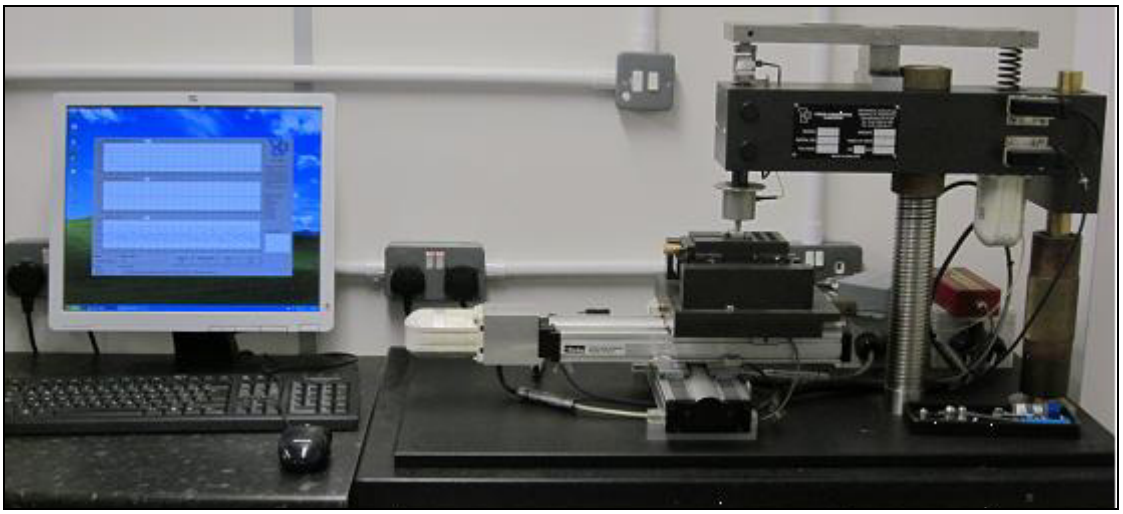

Figure 1: The ST3001 Tribo tester

Scratch adhesion testing is performed on a coated sample to measure the critical load at which a coating shows signs of failure. The test can be performed with varying table speed, load rate, initial load and final load. The friction force and acoustic emission is recorded and displayed during the scratch test. The computer programme includes facilities so that the first derivative of the friction can be plotted to provide a clear indication of the load at which total coating failure occurs.

Test conditions:

Test conditions: 0.2mm tip radius Rockwell diamond, 5 to 80N load or maximum friction 30N, 10mm/min. linear velocity, 100N/min. load rate

Full details of test methodology can be found in Designation: C1624-05 (Reapproved 2010) Standard Test Method for Adhesion Strength and Mechanical Failure Modes of Ceramic Coatings by Quantitative Single Point Scratch Testing.

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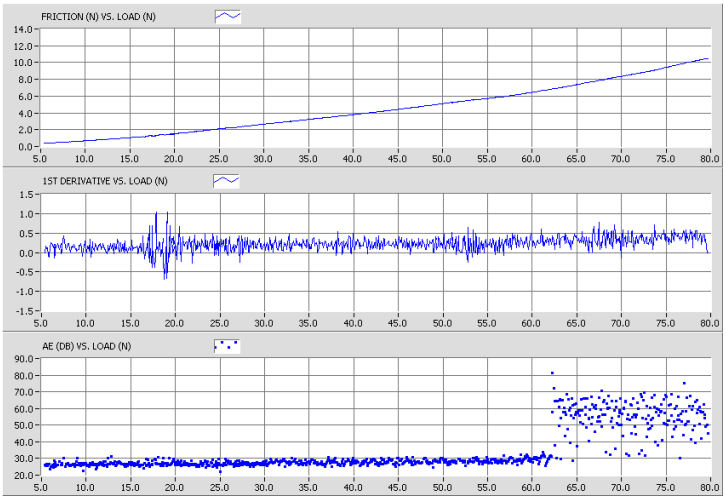
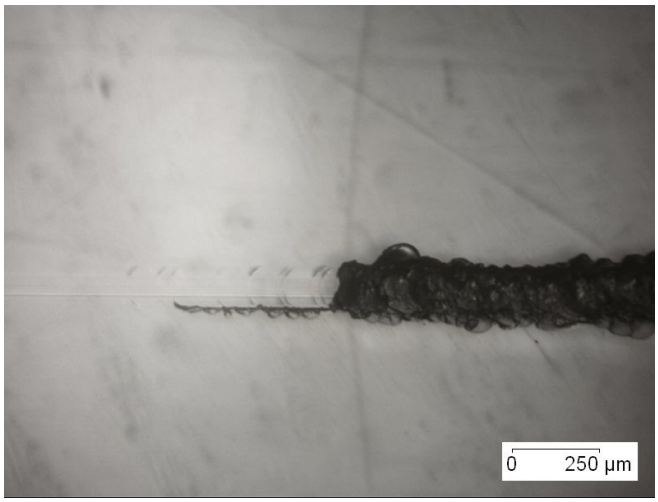
Test results

A 5 to 80N scratch test was performed on each sample to monitor and compare the friction at increasing loads. Test conditions: 0.2mm tip radius Rockwell diamond, 5 to 80N load or maximum friction 30N, 10mm/min. linear velocity, 100N/min. load rate see Figures 2 to 6. Sample 1 and sample 2 are uncoated substrates supplied for datum reference.

Figure 2: Sample 1 - Samsung Gorilla Glass (uncoated)

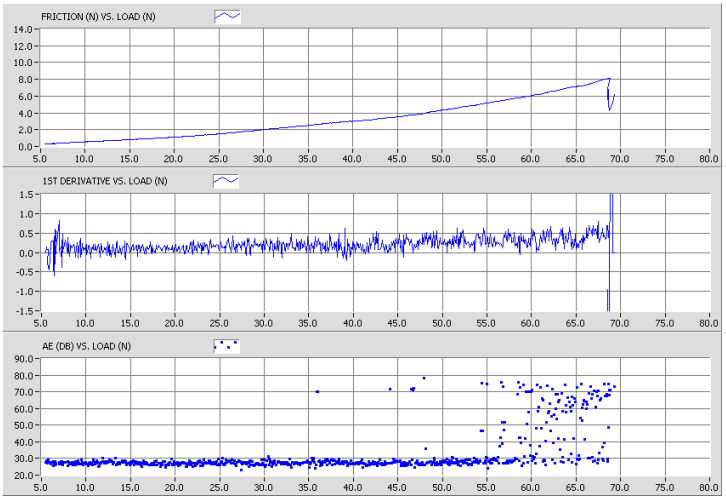


graph of friction vs load

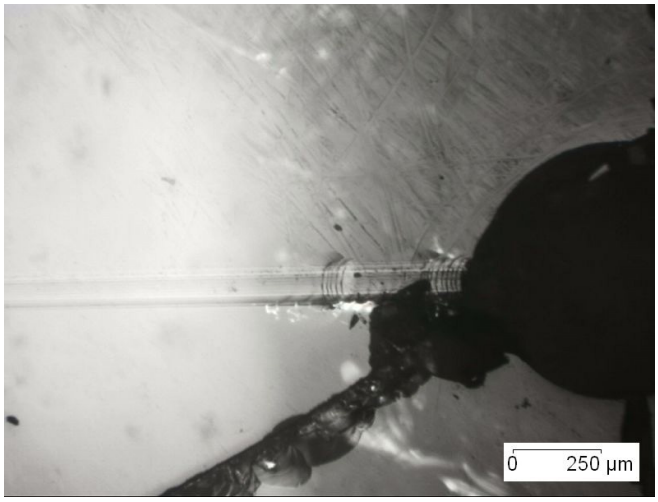


substrate delamination at 63N

Figure 3: Sample 2 - Tempered Glass (uncoated)



graph of friction vs load



substrate total failure 56N

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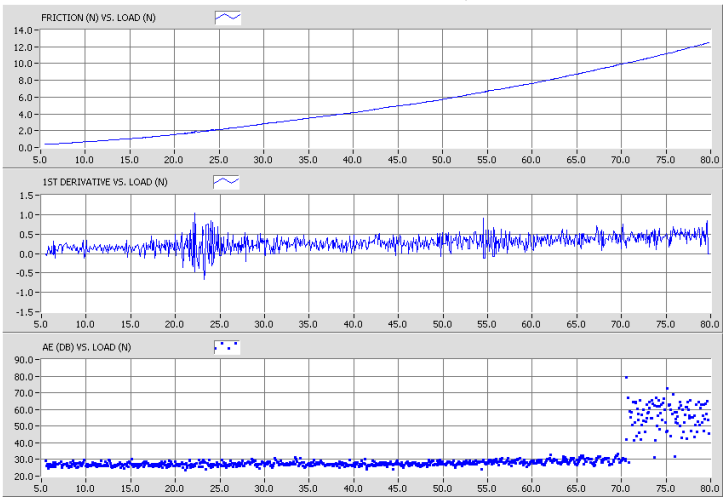
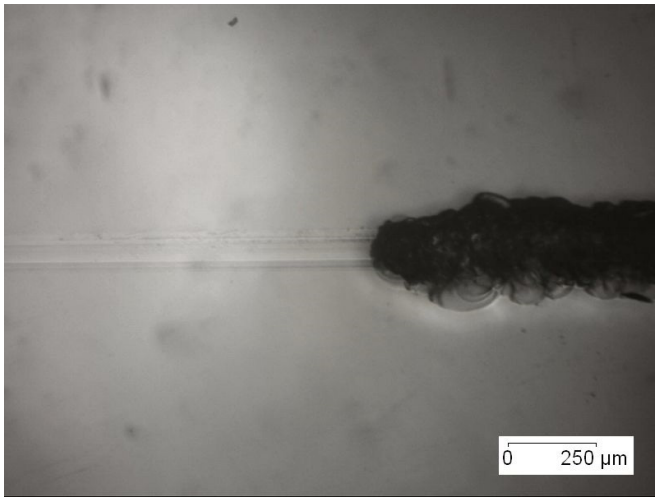
Firgure 4: Sample 3 - Samsung Gorilla Glass (Crystalusion coated)

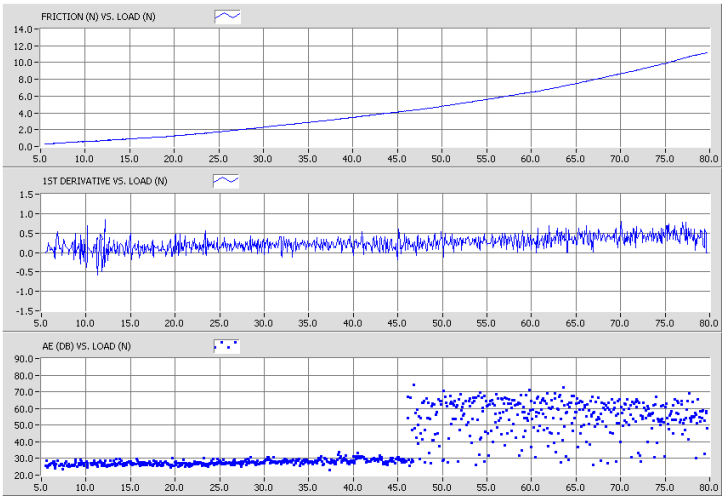


graph of friction vs load

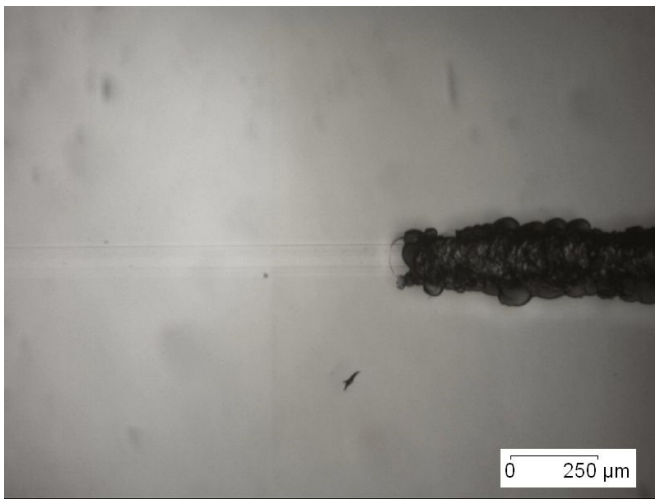


substrate delamination at 71N

Figure 5: Sample 4 - Samsung Gorilla Glass (competitor Nano product coated)

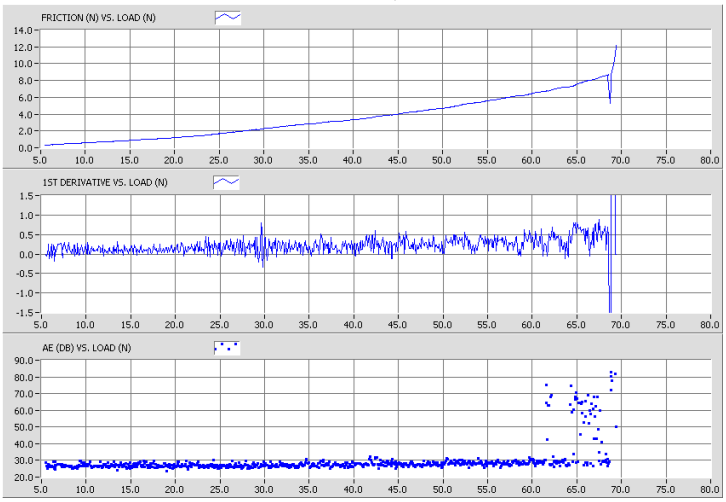


graph of friction vs load

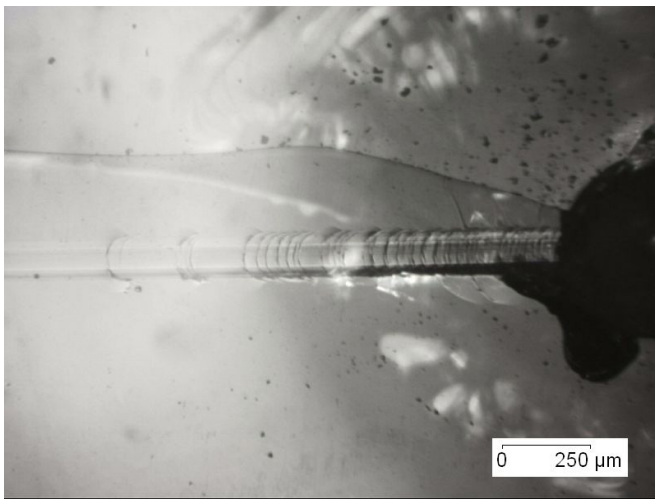


substrate delamination at 46N

Figure 6: Sample 5 - Tempered Glass (Crystalusion coated)



graph of friction vs load



substrate total failure 62N

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Conclusions

Both coated and uncoated samples of a generic Tempered glass device protector substrate displayed significantly less tensile strength compared with the Corning Gorilla Glass device screen substrate. Both samples experienced complete substrate failure before the 80N maximum load was achieved.

The Crystalusion protection coated Corning Gorilla Glass device screen substrate experienced delamination at 71N compared with the 63N delamination experienced by the uncoated variant. The competitor nano protection product experienced delamination at 46N compared with the 71N delamination experienced with the Crystalusion protection product. The Crystalusion protection product displayed a 56% higher resistance to delamination compared to the competitor product and 13% higher resistance to delamination compared to Corning Gorilla Glass device screen substrate.

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