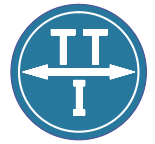
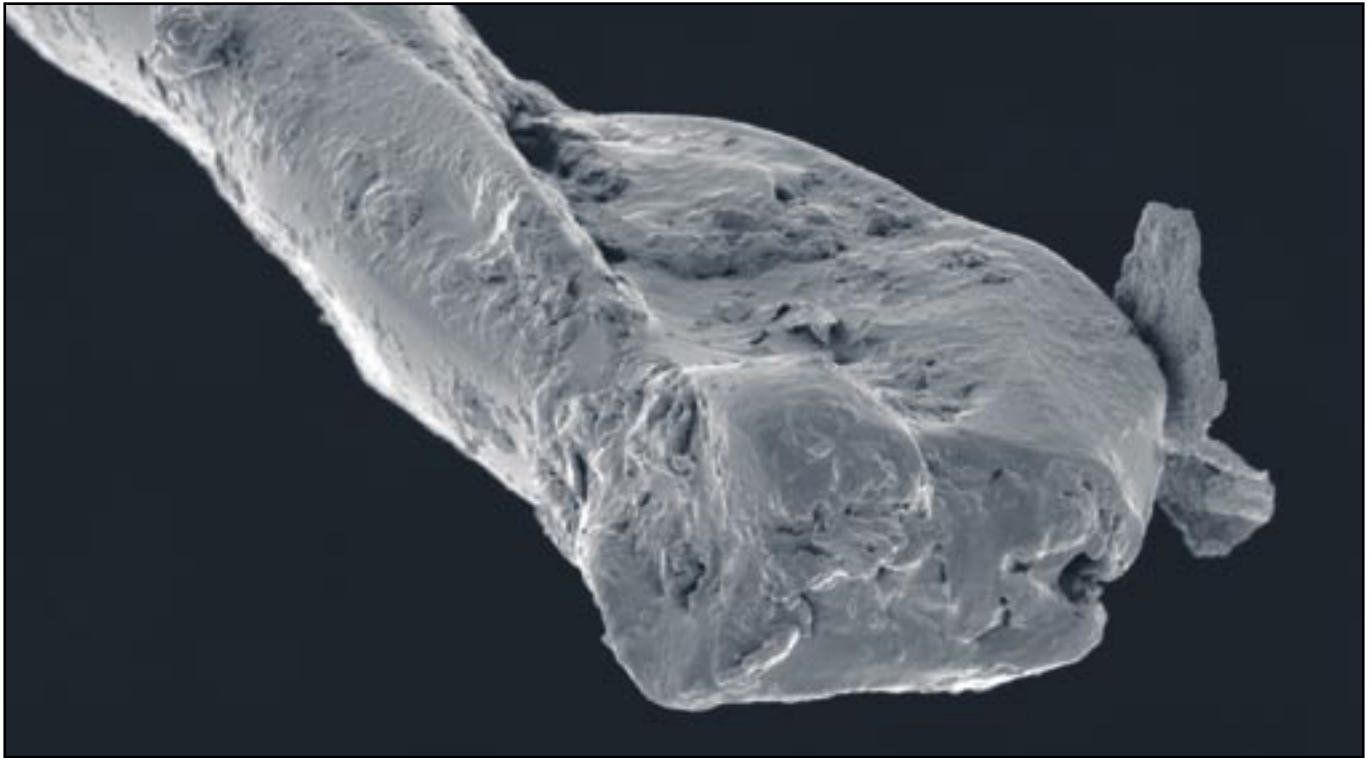


YARN ON YARN ABRASION TEST



Quantitative Measure of Yarn Durability

Technical Notes 18, January 2005



Tension Technology International has extensive experience with the **Yarn-on-Yarn (YoY) abrasion test** and is prepared to perform this testing at its laboratories in the **UK and the US.**

Interyarn abrasion has been determined to be a principal cause of failure and of short service life of large synthetic fibre ropes during tension and bend cycling. The YoY abrasion test is used to determine the quality of finish applied on yarns to enhance abrasion resistance, especially in wet conditions. It is also used to compare the relative abrasion resistance of various yarns.

The test measures abrasion cycles to failure on interwrapped yarn at various applied tensions. The yarn is interwrapped in contact with itself between three pulleys, as shown in Figure 1. For wet testing the

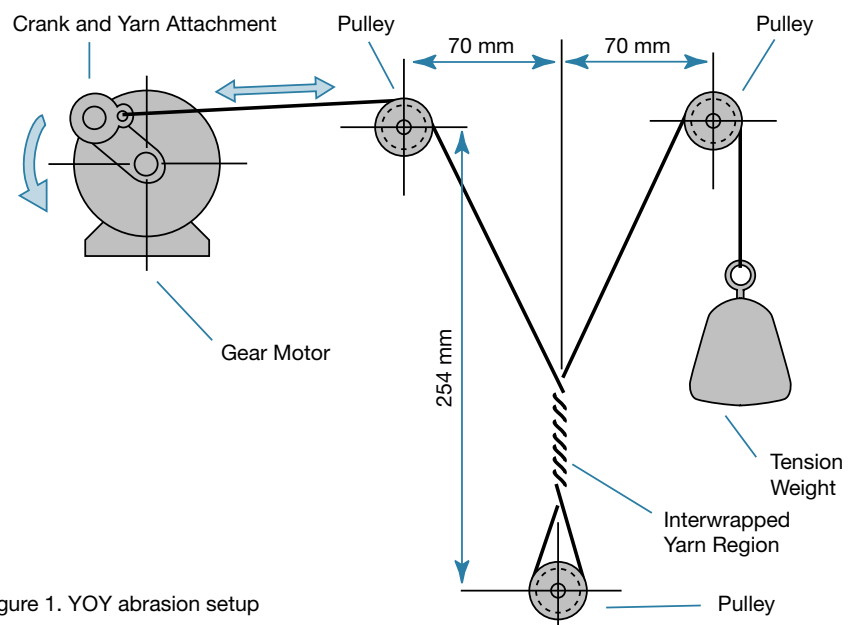


Figure 1. YOY abrasion setup

interwrapped yarn is immersed in water. The yarn is then drawn back and forth under tension until it fails. A number of tests are conducted at each of several applied tensions.

The cycles to failure for the tests at each applied tension are then statistically analysed. These statistical results are then plotted on a log-normal basis for the purpose of comparing with a standard or the performance of

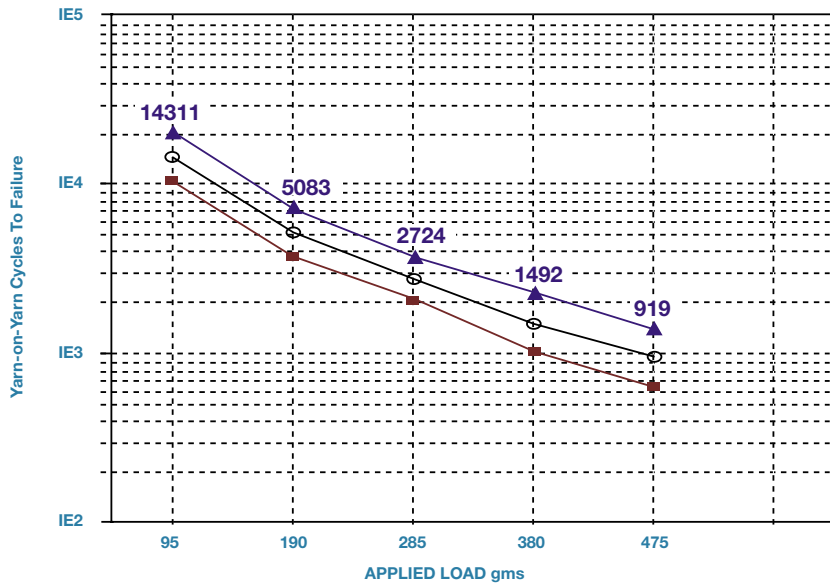


Figure 2. Mean and +/- 2 standard deviations cycles to failure example results

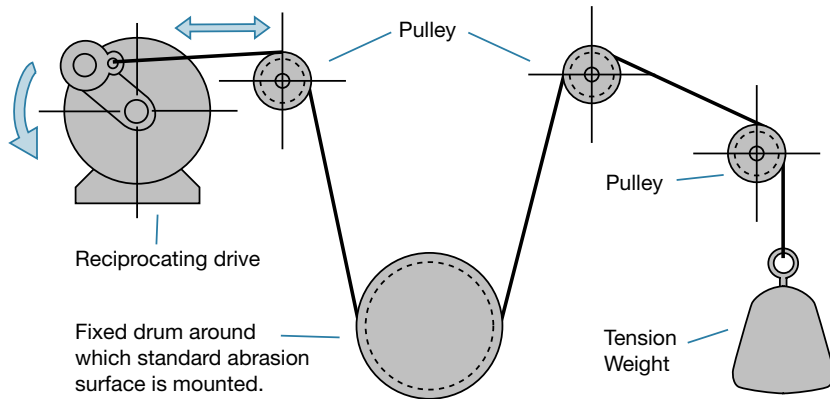


Figure 3. Test configuration for abrading materials over a standard surface

another yarn. An example YoY abrasion plot is shown in Figure 2.

The YoY abrasion test was conceived and developed by two founders of TTI during research for the Oil Companies

International Marine Forum (OCIMF), prior to the formation of TTI. The test is now used as a quality assurance procedure in the OCIMF "Guidelines for the Purchaser and Testing of SPM Hawsers" (2000).

The YoY abrasion test is now described in ASTM D-6611, "Standard Test Method for Wet and Dry Yarn-on-Yarn Abrasion Resistance" and in Cordage Institute (CI) 1503 "Test Method for Yarn-on-Yarn Abrasion, Wet and Dry". It is the basis for CI 2009P "Performance Requirements for Marine Grade Polyester Yarn for Fiber Rope".

TTI conducted extensive testing of polyester, aramid, HMPE and LCAP yarns as part of the Tethers 2000 Research Program. TTI has conducted many other such tests, including tests for yarn producers and rope makers during the evaluation of new yarn products and new yarn finishes.

TTI have extended the principle of abrasion testing to cords and strands.

The first configuration (Figure 1) determines abrasion resistance, cord-on-cord or strand-on-strand.

The second configuration is shown in Figure 3, where the material to be assessed is abraded over a standard surface. TTI have conducted extensive research to optimise the specification of the standard surface to achieve maximum reproducibility

Testing may be conducted to failure, or stopped after a pre-determined number of cycles, for analysis of the residual tensile properties of the material under examination at the main TTI laboratory.

For further information on TTI's experience in Yarn Testing and its interpretation contact:

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