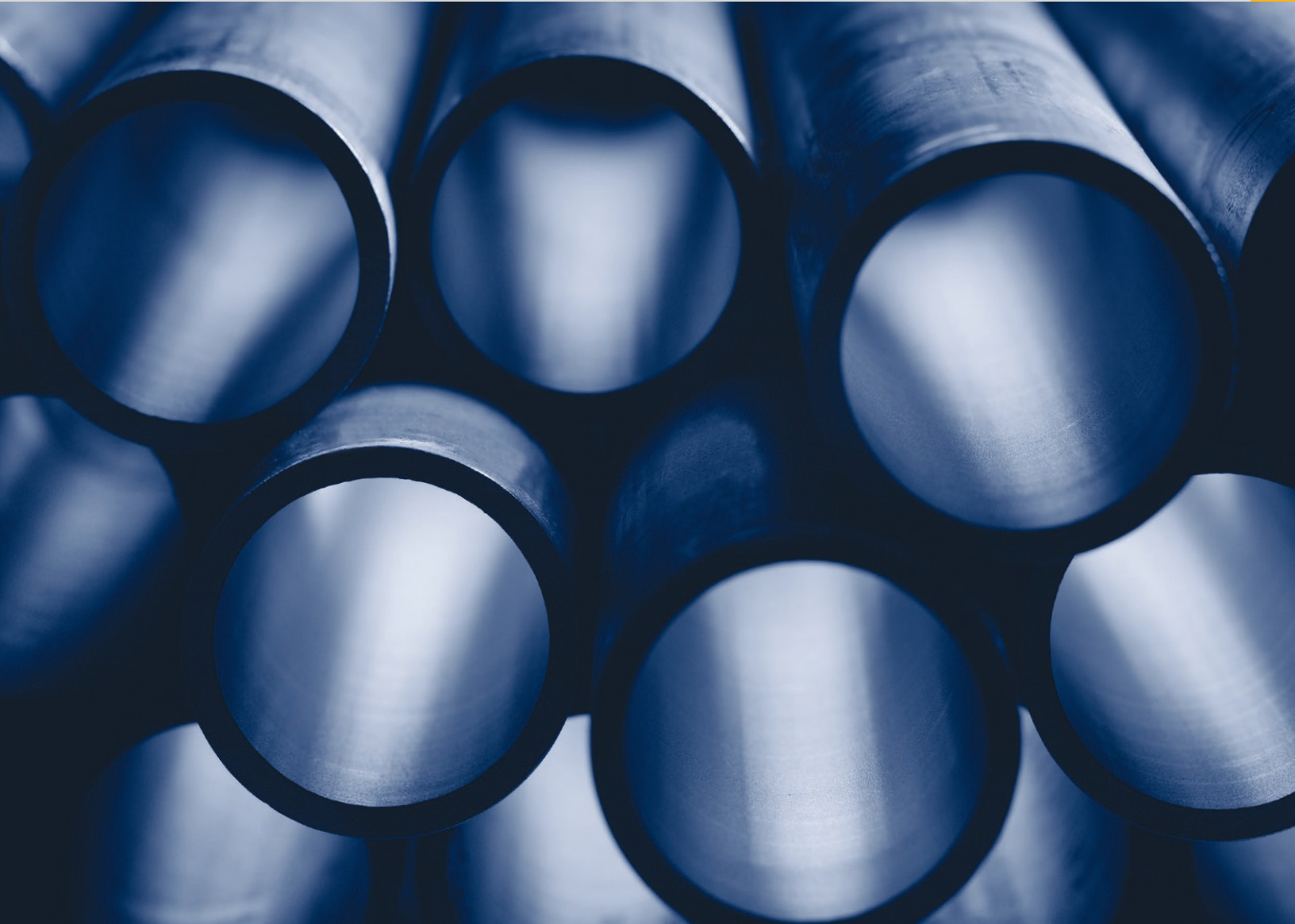




Q-Tough

High performance, wear-resistant coating for production tubing



quantiam[®] 
technologies inc.



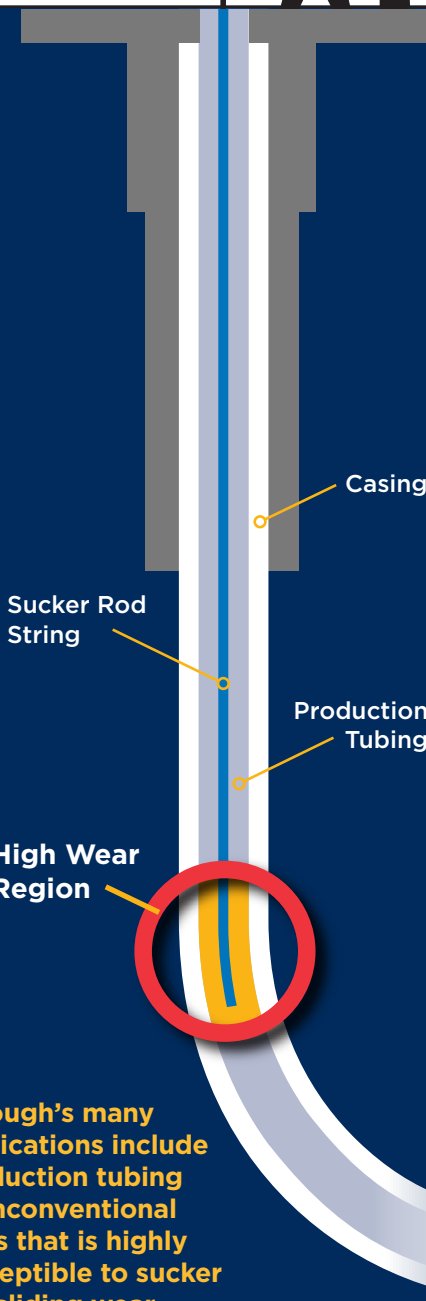
Q-Tough

Wear is a pervasive problem in many upstream oil and gas applications, leading to low reliability and increased costs. Quantam Technologies has developed a portfolio of customizable wear and corrosion resistant coatings, including those tailored to address specific challenges in the oil and gas sector.

In unconventional wells, high costs are driven, in large part, by the frequency of failures and the associated cost of workovers. For rod-driven wells, tubing perforations caused by sliding wear between the sucker rod and the inside of production tubing are among the most common causes of downtime. Our Q-Tough coating resolves this problem. Production tubing lasts longer when Q-Tough is applied at high-wear locations, eliminating resource-intensive workovers, reducing costs, and increasing reliability.

Field testing proves remarkable results

Over four years of field testing production tubing in 44 unconventional wells has shown stellar results. Field trial well runtimes have exceeded 4x typical runtimes, producing savings of over \$75,000 in workovers per well per year. During this period, no coating related failures have occurred.



Q-Tough's many applications include production tubing in unconventional wells that is highly susceptible to sucker rod sliding wear.

4X Typical Runtime = **\$75,000** Savings Per Well Per Year

Q-Tough
at-a-glance

Composite microstructure consisting of small, well-dispersed hard particles in a ductile corrosion resistant metallic matrix with negligible porosity

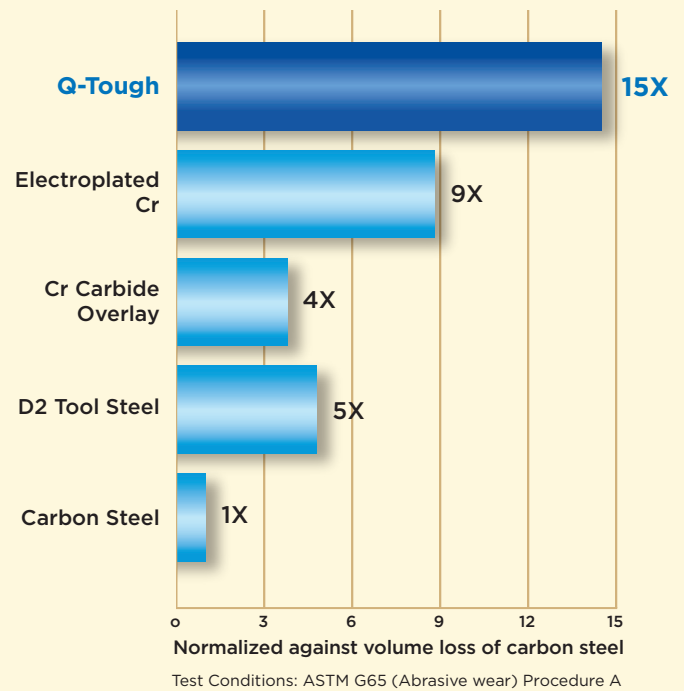
15x improvement compared to carbon steel under laboratory abrasive wear conditions (ASTM G65 – Procedure A)

Compatible with a wide variety of substrates (carbon and alloy steel, stainless steel, and Ni-based alloys)

Metallurgical bonding and high coating toughness eliminates the need for special handling and minimizes delamination

Lab testing of Quantiam's Q-Tough coating under sand abrasion wear conditions shows a 15x improvement over carbon steel

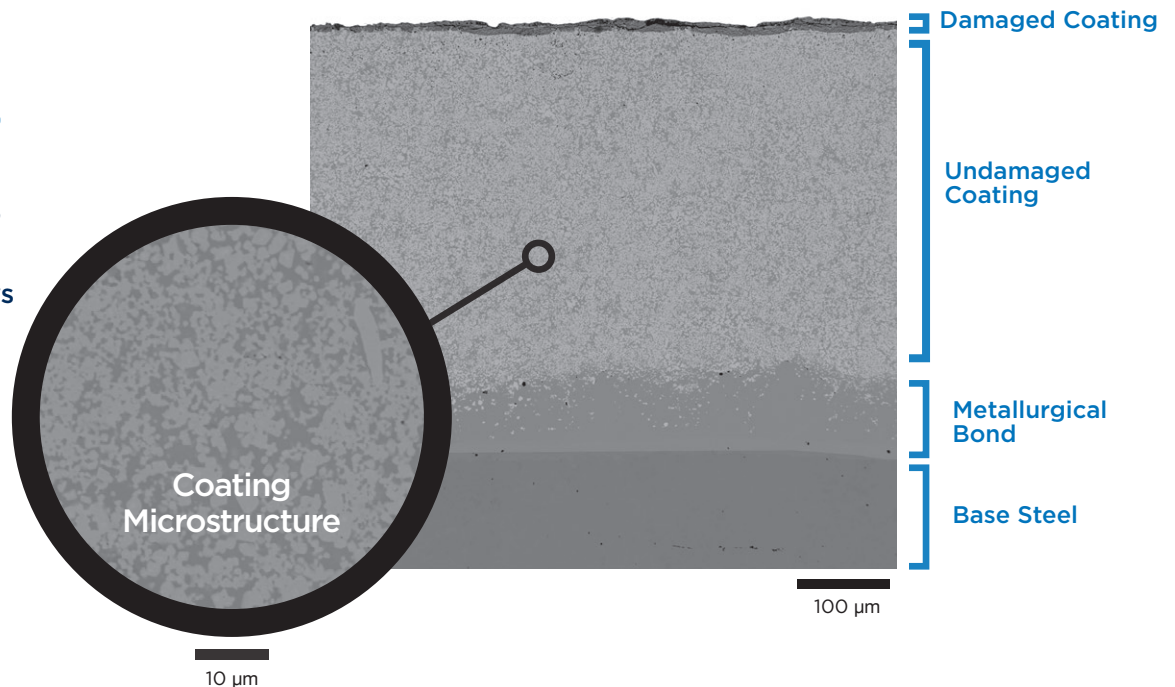
Relative Wear Resistance



Microscopic inspection validates high performance

After more than 500 days of field use, borescope inspection of Q-Tough coated production tubing showed no observable material damage on the inner surface along the full tube length. Cross-sectional samples were taken at random locations for coating microstructural evaluation. This analysis showed that 93% of the Q-Tough coating thickness remains after more than 500 days downhole.

93%
coating
thickness
remains
after 500+ days



Microstructural Evaluation of Coating After 500+ Days of use

Cost-effective, non-line-of-sight manufacturing process enables coatings to be applied to parts with small internal diameters and complex shapes

Coatings can be applied to internal and external surfaces with thicknesses from 50 to 1000µm (0.002" – 0.040")

Performance benefits can be realized by selectively coating problem areas

Smooth surface finish and unique composition enables long runtimes without accelerating wear of other components

Quantiam Technologies

A global leader in high performance coatings for internal surfaces and complex shapes

Twenty years on and our drive to innovate is stronger than ever. We continue to redefine what's possible, creating novel coatings that solve persistent and expensive real-world problems.

We specialize in producing advanced coatings for internal surfaces and complex shapes using a cost-effective, proprietary, non-line-of-sight manufacturing process.

Our products are the result of leading edge research and expertise in coating development, surface and materials science, and catalysis. Our extensive lab and field testing prove that our products are capable of outlasting the rigours of everyday use under severe operating conditions.

We are

home to one of the most extensive advanced materials and nanomaterials development and characterization facilities in Canada's private sector

We develop

advanced coatings that can be applied to internal surfaces and complex shapes using our proprietary non-line-of-sight deposition process

We partner

with companies in the petrochemical, energy, CleanTech, and aerospace sectors, to solve real-world problems using surface and materials science

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