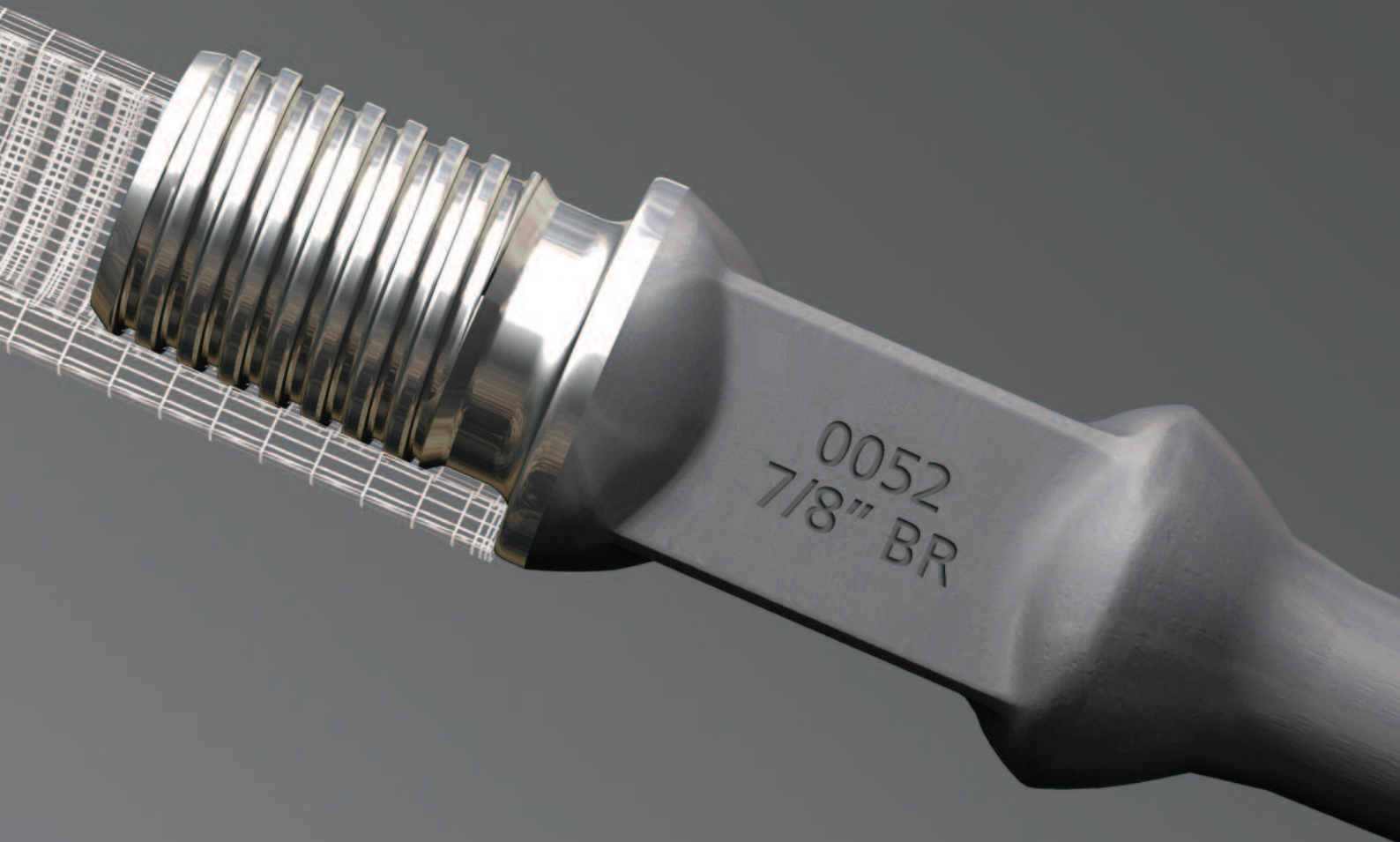
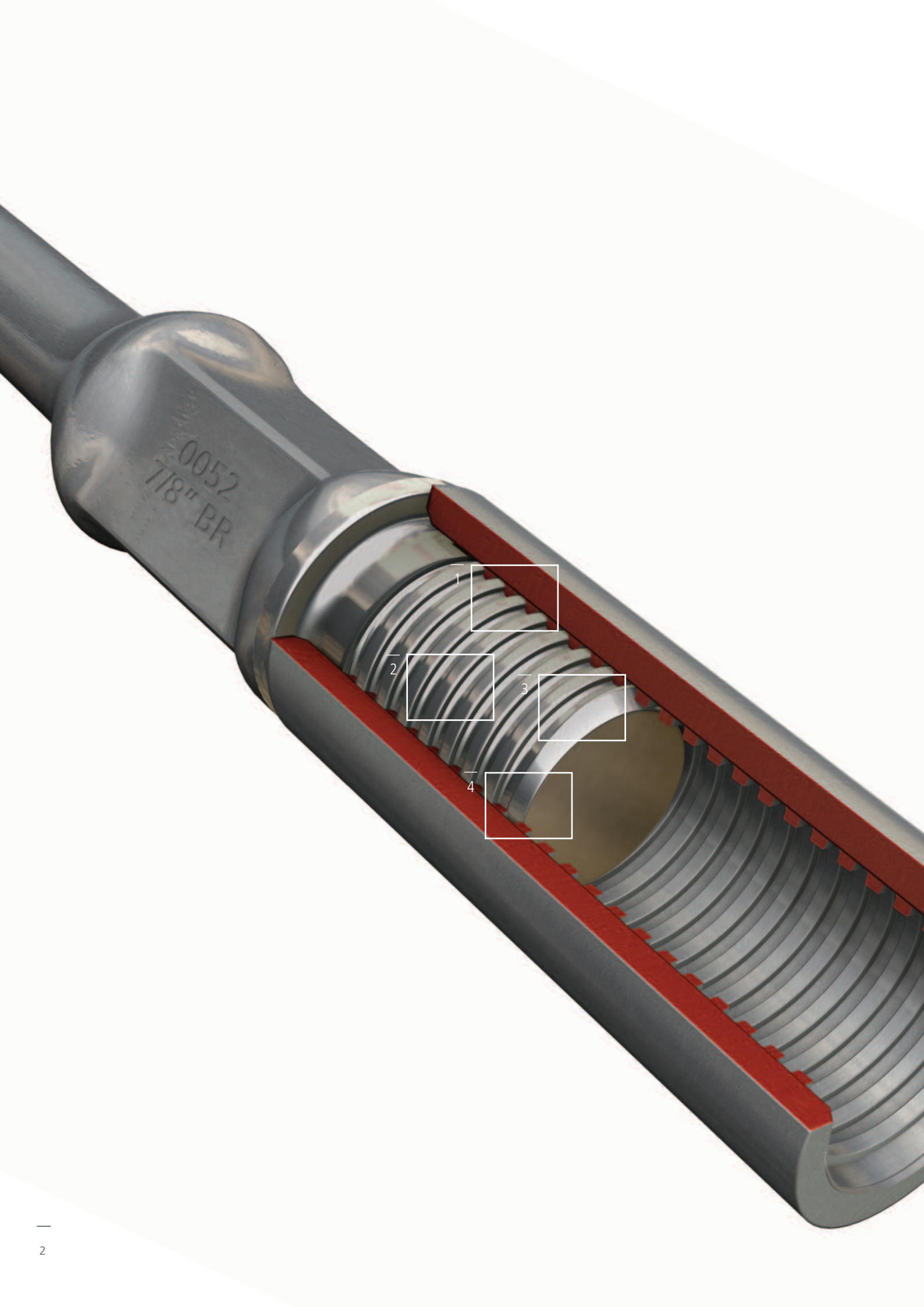




BlueRod[®] Premium Sucker Rod





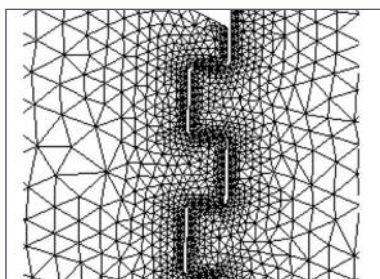
BlueRod® Premium Sucker Rod

Tenaris's BlueRod® premium sucker rods open up a new future for oil pumping operations as they provide an excellent performance in the field.

Tenaris presents its latest development, the BlueRod® premium sucker rods with a remarkably resistant connection designed for high loads. The connection improves the rod's fatigue life and provides an excellent performance in the field.

The total capacity of the sucker rod string depends entirely on the connection capacity. Up to now, a third of conventional pumping failures were traceable to this part of the sucker rod. The new BlueRod® offers 100% connection efficiency and opens up a new future for oil pumping operations.

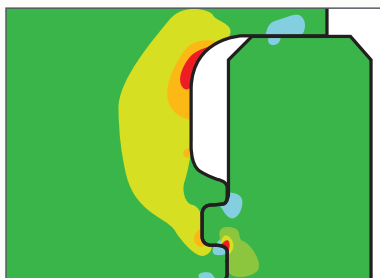
1



Flank-to-flank contact.

Reduces the thread's tendency to loosen.

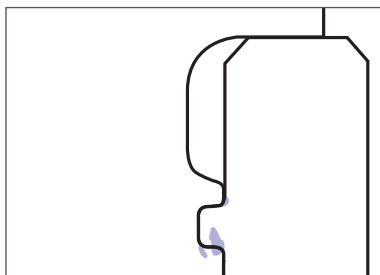
2



Stress reduction.

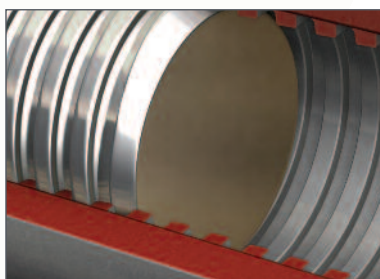
Higher fatigue life.

3



Reduction of thread deformation.

4

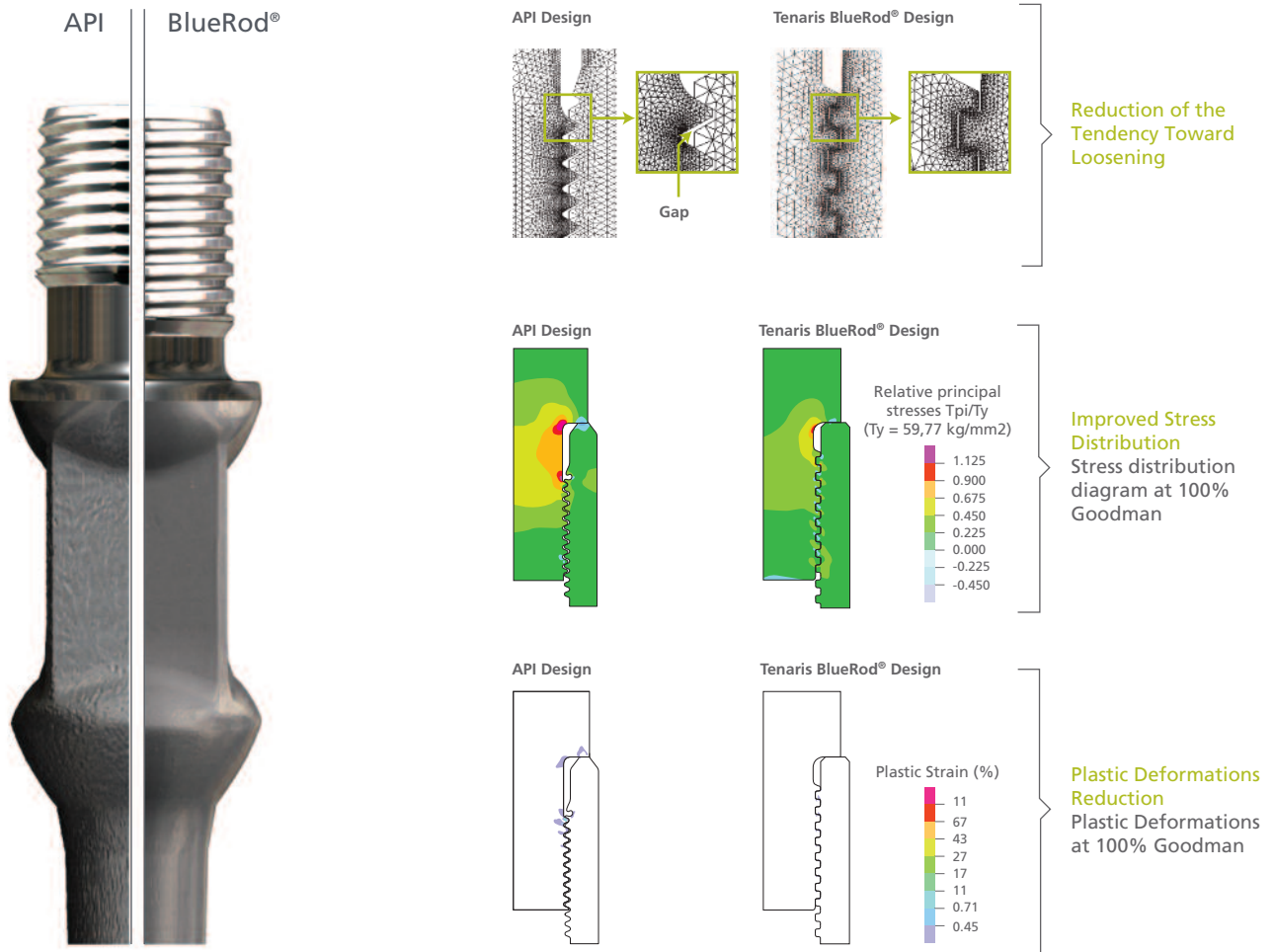


Diametrical interference.

Increases the working capacity by decreasing the necessary pre-tension in the pin make-up.

Pumping at maximum performance

Conventional connections' design limitations drove Tenaris to develop this product capable of increasing the life and efficiency of sucker rods.



BENEFITS

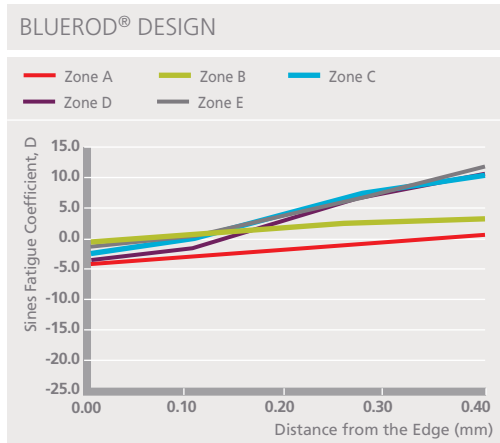
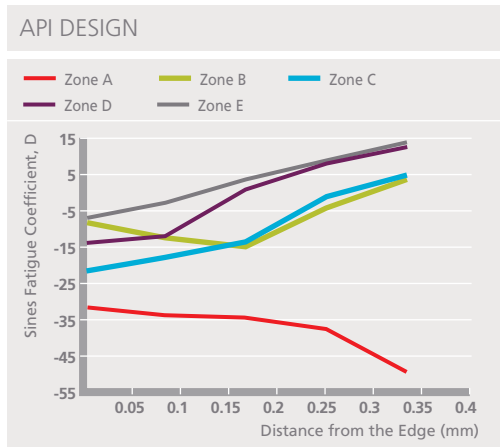
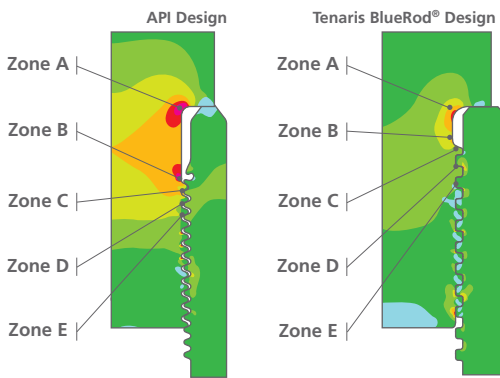
- Dramatically reduces the number of workover operations caused by sucker rod connection failures.
- Expands the traditional working capacity of the rod pumping system to operations that are normally restricted to ESPs.
- Improves performance in high load operations.
- Reduces the stress level, together with the energy consumption, in the pump jack by using a lighter rod string composed of smaller sucker rods.

FEATURES

- Flank-to-flank contact that eliminates the gap existing in the conventional profile thread, thus reducing the tendency to loosen.
- Cut-tapered trapezium profile thread with diametrical interference that reduces the pre-tension in the pin make-up.
- Lower displacement during make-up and uniform contact between the flanks, allowing a better stress distribution and a reduction in the permanent deformations created in threads during both make-up and operation.

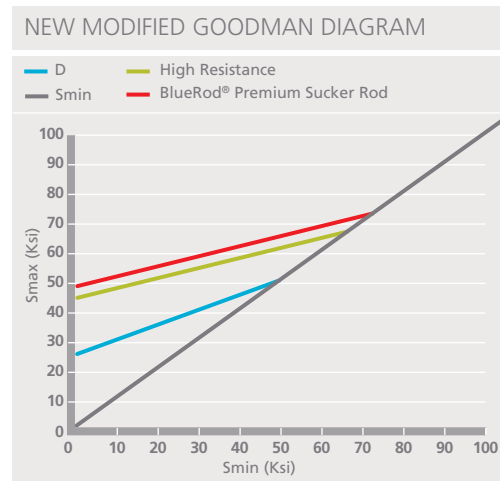
MULTIAXIAL STRESS FATIGUE ANALYSIS

The Sines method was employed to evaluate fatigue behaviour. The Sines coefficient predicts a better fatigue behaviour the higher its value. The charts show that the new BlueRod® exhibits higher and more uniform values than the conventional one.



NEW MODIFIED GOODMAN DIAGRAM

Given the results obtained through Finite Element Analysis (FEA), lab tests and field trials, a new Goodman diagram showing a higher working capacity for the BlueRod® was generated.



Increased rod string working capacity

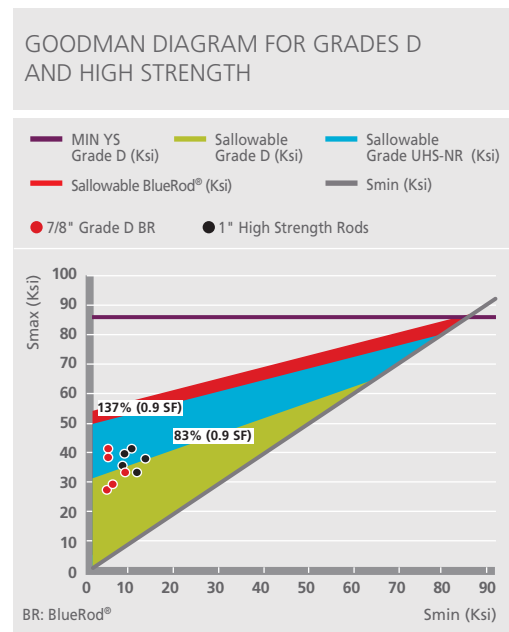
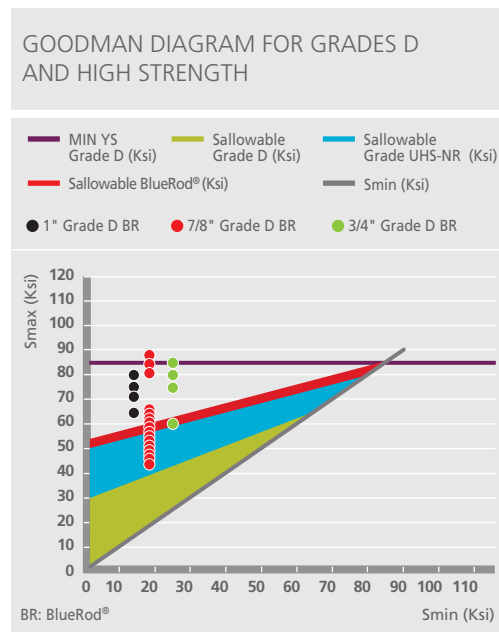
The BlueRod® premium sucker rods improve the rod's fatigue life and provide an excellent performance in the field, maximizing the results of rod pumping system applications.

LABORATORY TESTING

Laboratory tests were performed to evaluate and compare the maximum resistance of BlueRod® and API connections. To this end, it was necessary to increase the rod body diameters of the samples and to isolate the effects on them.

OPTIMUM PERFORMANCE VERIFIED ON SITE

When the sucker rod string reaches 10 million cycles, it is considered to have infinite fatigue life. This number of cycles has been reached in an operating well in which high-strength sucker rods were replaced by 7/8" Grade D BlueRod®.



The connections' stress level was evaluated following the Modified Goodman Diagram method, as recommended by API Specs.

Results showed that:

- Grade D BlueRod® reached infinite fatigue life (10 million cycles) working up to 336% on the Goodman Diagram.
- The conventional connection could not surpass half these cycles at lower stress levels.

The chart shows 7/8" Grade D BlueRod® working under similar stress conditions to those of 1" high-strength rods with conventional connections. In this scenario, the new Tenaris BlueRod® has enabled a higher Grade D efficiency to be achieved in the field.

IMPROVED PERFORMANCE

The ability of BlueRod® technology to increase string capacity is fundamentally driven by the adoption of new design technologies, supported by results obtained from:

- Thread design through Finite Element Analysis.
- Full scale laboratory tests.
- Customer field trials.
- Laboratory failure analysis.

HANDLING AND OPERATIONS

No special tools are necessary for handling and make-up operations when using Tenaris BlueRod®. Conventional power sucker rod tongs can be used with this new product.

ACCESSORIES

As part of its integrated manufacturing process, Tenaris produces all accessories needed for the setting up of BlueRod® premium sucker rods, including reductions, cross-overs, pony rods and couplings.

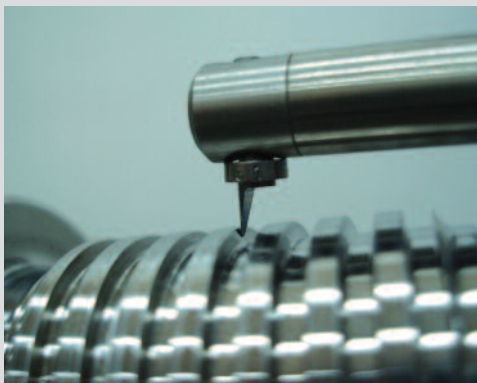
General Dimensions

DIAMETER (INCHES)	LENGTH (FEET)	THREAD PITCH (TPI)	WRENCH SQUARE
3/4"	25 OR 30	10	API
7/8"	25 OR 30	6	REINFORCED
1"	25 OR 30	6	API

Material Specifications

ROD GRADE	YS (KSI)	UTS (KSI)	COUPLING
KD BLUEROD®	85 MIN	115 - 140	UHS 8630M
D BLUEROD®	100MIN	125 - 140	UHS 8630M

MANUFACTURING & QUALITY CONTROL



Tenaris uses state-of-the-art numerical control lathes and control gauges in order to ensure the highest quality in its connections.

Strict measurement equipment permanently monitors compliance with the design variables of the thread in order to ensure the uniformity and reliability of the product.



For further information please contact:
sucker.rods@tenaris.com

