



Well Optimization Solutions

The feature of Enduralloy™ tubing is the diffusion alloying surface engineering process which creates a hard and dense alloy on the surface of the steel substrate. This engineered surface provides excellent protection against abrasion due to rod wear above the pump or around a deviation and corrosion in extreme environments where tubing failures regularly occur. These tubing failures result in increased costs associated with frequent well workovers, well servicing, lost production and high maintenance.

In addition the diffusion alloyed surface has a lower coefficient of friction which improves pumpability in a well, reducing top load and side load while increasing production rates and revenue on stream.

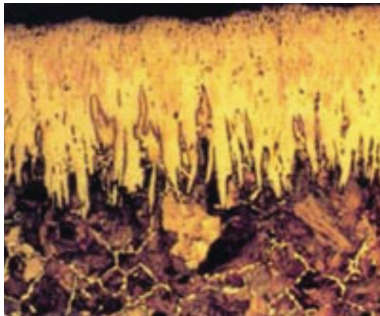
The Enduralloy™ process is trademarked and patented by Endurance Technologies Inc. This process creates an alloy that is extremely abrasion, erosion and corrosion resistant on the surface of the substrate of tubing (0.005" to 0.010" case depth).

Technical Advantages:

- Hardness of 73 to 90 Rockwell C
- High surface density for corrosion resistance
- Increased temperature resistance (up to 500C)
- Reduced coefficient of friction
- No reduction of tubing ID, does not alter metallurgical properties of J55 grade
- No corrosion from dissimilar metals
- Proven in field performance history (90,000 + joints installed)
- ISO certified quality assurance

End user benefits:

- Reduced tubing failures due to rod wear from deviations and side load
- Reduced tubing failures due to rod wear from fines and sand above pump discharge
- Reduced workover, well servicing and maintenance costs
- Increased run time in severely corrosive high H2S and CO2 environments
- Increased pumpability due to reduced coefficient of friction
- Increased revenue on stream
- Material compatibility
- Peace of mind



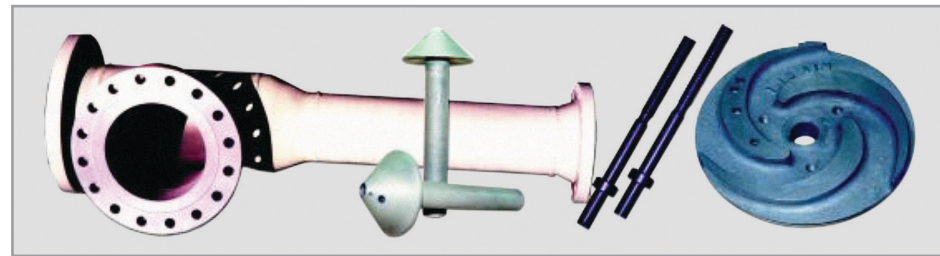
EndurAlloy™ Process

EndurAlloy™ is a thermo-chemical process also known as chemical vapour deposition, pack-cementation, diffusion alloying and boronizing. It is applied to common carbon steels and many stainless steels.

Experienced technicians pack a mixture of boron, titanium, chromium or a combination of chemicals around the inside diameter, outside diameter, or both. Areas to be left untreated are masked off. The part is placed in a custom-designed retort before entering one of Endurance's furnaces and heated to a predetermined temperature for a specified time. When heated, the chemical pack turns to a vapour, diffusing the boron, titanium or chromium evenly into the substrate of the host material, even over irregular surfaces and into small bores. It also diffuses smoothly into small, highly complex parts. Line of sight is not required, unlike coatings or other processes.

Other EndurAlloy™ Products

Endurance Technologies treats a wide variety of steels and types of equipment used in the oil and gas industry, including: Pup joints, Spool pieces, ESP stages, Chokes, valves, fittings, Pumps (impellers, cases, stuffing boxes), Seal nipples, Frac nipples, Down-hole tools and Directional drilling equipment,

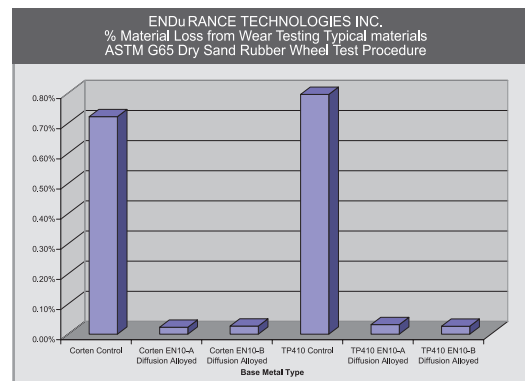


The above shows a piece of pipe with the EN-10 applied. The substrate has been penetrated .025 of an inch and has created a diffused alloy treatment that will act as an EN-10 enhancing shield in your production string.

Sales and Contact Information

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ASTM G65 Wear Test



The ASTM G65 Wear Test graph indicates the superior weight loss characteristics of EndurAlloyed™ Corten carbon steel and TP410 SS as proven in test conditions. Actual weight loss data is available on request.

