CARTER®
*Bearings Are Our Business*

## Carter Stainless Steel

Carter Bearing has been manufacturing cam followers and yoke rollers in Grand Haven, Michigan for over fifty years. About twenty years ago, Carter introduced stainless steel versions to the industrial market with the 440C Xtenda™ series. While CRES is a significant improvement in corrosion resistance over standard bearing steel, there is sometimes a need for a more durable, more corrosion resistant material in especially harsh environments. That is why Carter has a new addition to it's stainless line, Xtreme Duty Stainless, a custom order CREN (corrosion resistant high nitrogen) material called XD15NW that is widely used in the Aerospace industry.

## Superior Corrosion Resistance

CREN bearings offer extreme corrosion resistance due to the addition of Nitrogen in the chemical composition. The difference between a standard stainless and the CREN steel is visible in the chart to the right. To prove this concept, a 96-hour salt spray test (left) was done on both materials. As you can see the addition of Nitrogen, in combination with Chromium and Molybdenum, gives CREN steel a far superior level of corrosion resistance and protects against pitting, which can be a major contributor to bearing failure. Nitrogen also contributes to a low residual austenite after heat treatment, which allows for a minimum hardness of 58 HRC giving it more strength than the standard stainless as well. Verified by the requirements for Aerospace, CREN bearings should have at least two times the L10 life of standard steel bearings, and even more for 440C stainless.

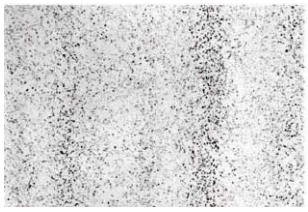
| Material | C | N | Cr | Mo |
|---|---|---|---|---|
| CRES | 1.08 | - | 17.0 | - |
| CREN | .40 | .20 | 15.5 | 1.70 |

*XD15NW*

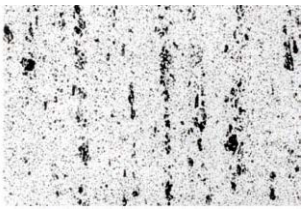
*440C*

## Increased Fatigue Resistance

The two microscopic (x200) images to the right display another important feature of the CREN material. In CRES steel, formations called 'carbide inclusions' (clumps of carbon bonded together) occur throughout the material. As a bearing rolls the material will wear down over time, especially in a contaminated environment. Carbon wears at a slower rate than the other elements, and therefore these carbide inclusions can cause high points in the material. This leads to vibrations and premature failing under dynamic loading. Looking at the CREN microstructure, the carbon is much more uniformly spread, which will provide a more balanced wear pattern and increase the life of the bearing. The reason for this is that Nitrogen is essentially a molecular mediator. Many other elements tend to bond easily with it, so when it is properly added to the steel Nitrogen causes elements that would normally cluster together, such as Carbon, to be more evenly distributed.



*XD15NW*



*440C*

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