

# **TS** **TECHNIQUES SURFACES**

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## **ARCOR**

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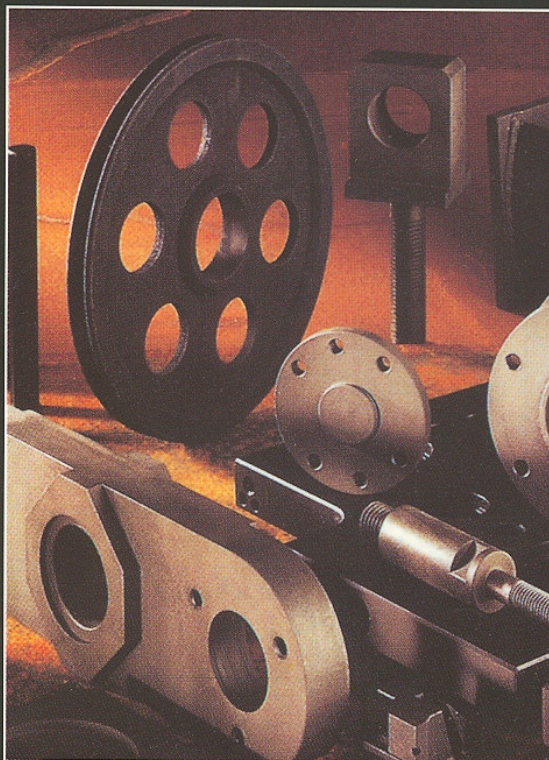
Thermochemical surface treatment to improve resistance to wear, seizure, scuffing, and corrosion.

### **Characteristics of the Process**

ARCOR is a treatment which combines thermochemical diffusion in molten salt baths with a passivation and finishing treatment to produce a surface having exceptional resistance to wear, seizure, scuffing, corrosion and fatigue.

In addition to an extensive range of original applications range of original applications ARCOR may enable a duplex treatment cycle (e.g. heat treatment + surface finishing) to be replaced by a single treatment providing superior properties at a significantly lower cost.

ARCOR also eliminates any risk of failure due to hydrogen embrittlement - a major problem encountered with many applied coatings.



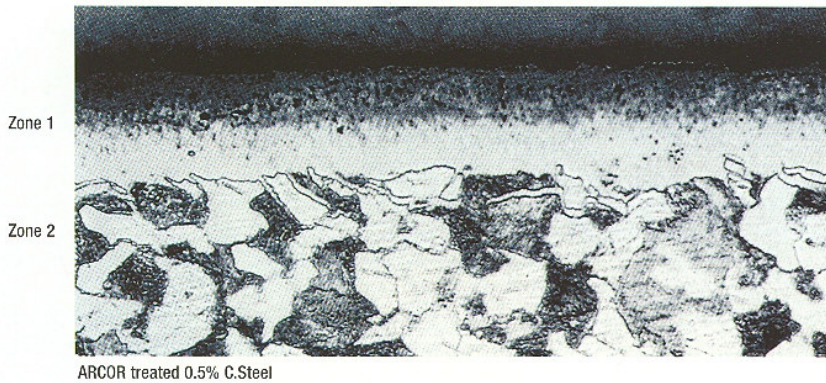
### **Treating Parameters**

Treating temperature is low (max 570°C) for a period of 60-120 minutes. Cost is therefore very competitive and problems associated with higher temperature treatments are avoided.

### **Applications**

Where exceptional problems of wear, seizure, scuffing, corrosion and wear are encountered ARCOR is an ideal low cost treatment. Subject to engineering, quality, environmental or cost considerations ARCOR can be considered as an alternative to traditional applied coatings such as nickel, chromium, cadmium, zinc, etc.





ARCOR treated 0.5% C.Steel

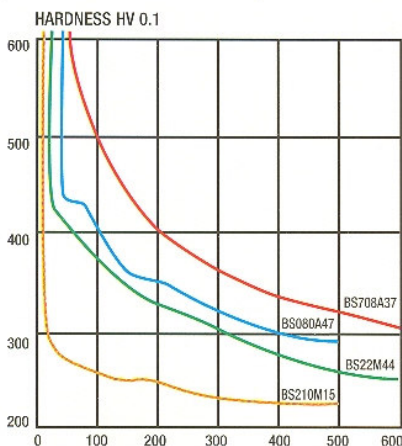
## Characteristics and Properties

The treatment produces a duplex surface layer consisting of  $\epsilon$  iron the depth of which is dependent on the composition of the substrate. For general engineering ferrous materials the thickness is between 10 and 25 microns. Some highly alloyed materials may give substantially thicker layers.

The duplex layer consists of a porous zone at the surface beneath which is a compact layer of  $\epsilon$  iron nitride - zone 1.

Beneath the surface layer is a deep zone of nitrogen diffusion, the hardness and depth of which will depend on the alloy content of the substrate. The compressive stresses created in this zone give rise to a significant increase in fatigue resistance - zone 2.

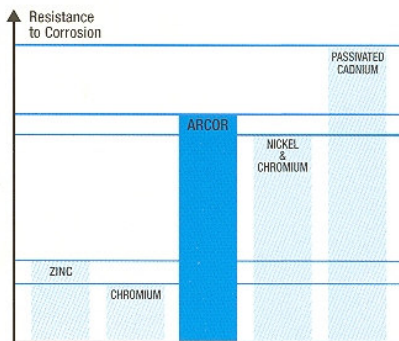
The ductility of the surface layers enables excellent compatibility with mating surfaces without surface cracking or exfoliation of the surface layers.



## Corrosion Resistance

High corrosion resistance is obtained by a combination of oxidation of the porous surface layer followed by passivation and impregnation with organic compounds. In certain specific instances impregnation may be adjusted to give particular tribological properties.

Corrosion resistance (ASTM B117) is significantly superior to many conventional anti-corrosion treatments (chromium, nickel, zinc, etc.) and symmetrical parts of good surface finish may exceed 800 hours.



## Resistance to Seizure, Scuffing and Wear

The exceptional surface properties associated with nitrocarburised layers (resistance to seizure scuffing and wear) are retained by the ARCOR process. By careful selection of the impregnation material certain properties may be further improved - e.g. lower coefficient of friction.

## Resistance to Fatigue

Significant and important increases in fatigue strength are obtained from the compressive stresses created in the zone of nitrogen diffusion.

ARCOR C is the standard treatment which involves nitrocarburising, oxidation and impregnation with an organic sealant. Dependent on the surface finish required inter-stage polishing may be required.

ARCOR S includes a special passivation treatment and is designed for parts with sharp edges and free cutting steels where corrosion resistance is difficult to maintain on the edges and corners.

ARCOR PH is a variant given only to parts where a specific degree of surface roughness is essential.

In order to obtain the best results from ARCOR treatment a few simple precautions may need to be taken during manufacture and treatment :

- **Dimensional Stability**  
Where precise dimensions are essential, especially with parts of complex shape, stabilisation at 580-600°C will be necessary prior to finish machining. Machining allowances may be necessary for very precise parts.
- **Corrosion Resistance**  
For maximum resistance to corrosion, parts for treatment must be free from burrs, surface discontinuities, welded or brazed joints and work hardened surfaces.
- **Surface Finish**  
This is largely dependent on the surface finish of components prior to treatment. Surfaces of roughness 1.0 - 1.2  $\mu\text{m}$  will be the same after treatment, surfaces smoother than 0.5  $\mu\text{m}$  will be slightly roughened.
- **ARCOR treated parts must not be machined or degreased as some, or all, of the surface properties will be lost.**



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