

## Press Release

### Hardchrome Engineering provides Nitreg® Gas Nitriding of Stainless Steel.

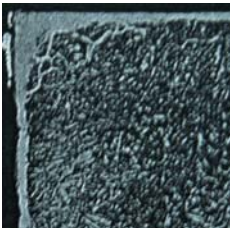
Hardchrome Engineering has announced they are about to complete upgrading their Nitreg® nitriding furnace capacity to include a proprietary technology from Nitrex Metal Inc. (Canada) for gas nitriding of stainless steel.

"This new technology based on the Nitreg® nitriding process allows treatment of stainless steels in one uninterrupted cycle," said Hardchrome's Commercial Manager Craig Dugan. The process is also adapted to meet environmental targets through recovery and incineration of emissions. "Currently we operate two state of the art Nitrex computer controlled nitriding systems of which one will be upgraded with the new technology. The upgrade involves retrofitting hardware and software by Nitrex," said Mr. Dugan.

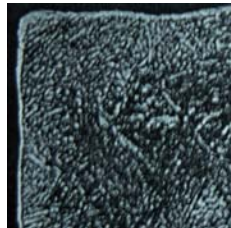
"We believe this will be the only system of its type in Australia and will substantially increase the nitriding options we can offer our customers" added Mr Dugan.

Nitriding with Nitreg® significantly increases the hardness, the wear resistance and the fatigue strength of stainless steels. By computer controlling the nitriding potential, a range of case depths, hardnesses, and white layer thicknesses are possible. The table shows results of some stainless steels nitrided by Nitreg®.

Due to their primitive controls, conventional nitriding processes often result in the formation of brittle nitride layers at the surface of the workpiece. (Figure 1) With Nitreg® computer controlled nitriding, the nitriding potential is controlled throughout the process thus preventing the formation of brittle nitride layers and allowing for a significantly greater penetration of the nitriding effect. Components nitrided in this manner have a greater case depth, a minimum of distortion and a final uniform case hardness that can be specified by the client (Figure 2).

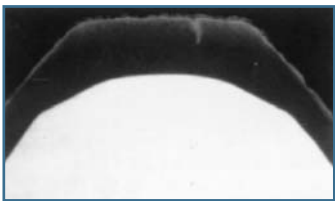


**Figure 1**  
Conventional method



**Figure 2**  
Nitreg® process

"The application for this technology covers most industries where stainless steel is used and where improved wear and/or hardness requirements are essential," concluded Mr Dugan. One example is the gear industry. Looking at the cross section of a 17-4PH stainless steel gear tooth (Figure 3), we see that the nitrided case on the right, obtained by Nitreg® controlled gas nitriding, shows uniformity throughout, whereas the case on the left, obtained by plasma, appears thick and irregular.



**Figure 3** Stainless Steel Nitriding cross section

Hardchrome Engineering is a family owned business established in 1968, specialising in engineering, coatings, heat treatment and a number of emerging technologies.

The company has two operating centres, one in South Australia and the head office in Clayton, Melbourne.

The Melbourne plant comprises of 30,000 m<sup>2</sup> of processing area and performs electroplating, aircraft component repair and gas nitriding. The Adelaide facility specialises in the chrome plating of automotive press form dies.

The company employs 60 people, including fully qualified chemists, metallurgical engineers, chemical engineers and first class electroplaters.

Table 1 - Hardness Results for Stainless Steel Nitriding

STEEL GRADE	PROCESS RESULTS AFTER NITREG® NITRIDING WITH ACTIVATION			
	Time (h)	White Layer Thickness (µm)	Case Depth (µm)	Superficial Hardness (HV <sub>1</sub> )
410	7	4	120	950
420	13	3	175	960
422	13	0	75	1099
440-B	7	5	90	1070
440-C	7	1.5	84	1070
Hitachi ASL-81 (13.5% Cr)	10	5	110	1050
300 series	7	0	78	915
305	5	5	68	915
300 series (Hitachi ASB125)	18	0	110	1066
304	7	0	65	1050
17-4 PH	35	6	100	1041
17-4 PH	10	0	60	1100
21%Cr-2%Ni	12	2	60	1150
23%Cr-8%Ni	12	4	60	1100
Custom 455	24	8	160	1280
A286	7	0	20	1011



**Figure 4** Hardchrome Nitrex Furnaces

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