
METALLURGY INVESTIGATION REPORT

SITE/LOCATION: Armorgalv
CLIENT: Armorgalv
PLANT/SUBJECT: TZD Coating Hardness and Micrograph
CONTACT: Wayne Sharman - Business Manager
CONTRACT/WO NO.: n/a **CLAUSE NO.:** -
REPORT NO.: L226-01 **REVISION NO.:** 0
INSPECTED BY: K. Swain
AUTHOR: K. Swain **CHECKED:** K. Gilby
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INTRODUCTION

A high tensile bolt that had been coated using the ArmoGalv thermal zinc diffusion galvanizing process was submitted to Austpower Engineering for micrographs and hardness testing of the coating.



Figure 1 Bolt as received. Red line indicates cross section taken for examination.

INVESTIGATION

Coating Micrographs

A cross section was mounted in resin and polished to a 1 micron finish, and etched in 0.5% Nital. Micrographs were taken at various magnifications both in the etched and unetched conditions. Some micrographs have already been provided and further micrographs with the coating thicknesses are given in appendix 1.

The coating thickness averaged 40 microns with a 10 micron thick layer adjacent the steel which was identified as the gamma layer.

Hardness Testing

A Shimadzu micro Vickers hardness tester with a 15g load was used to give the smallest indentation possible. The indentations were then measured at x100 magnification on an Olympus PMEG 3 microscope.

The small indentations required have resulted in a loss of accuracy, and are indicative only. However they do demonstrate that the gamma layer is much harder than the steel, and that the bulk coating has a hardness comparable with a high tensile steel.

Table 1: Microhardness Results

Location	Hardness Results			Average (HV)
	1	2	3	
Steel	343	329	308	327
Gamma Layer	679	568	568	605
Adjacent Gamma Layer	482	329	315	375
Bulk Coating	376	262	290	309

Micrographs of the coating and hardness location are provided in Appendix 1.

Appendix 1 Micrographs

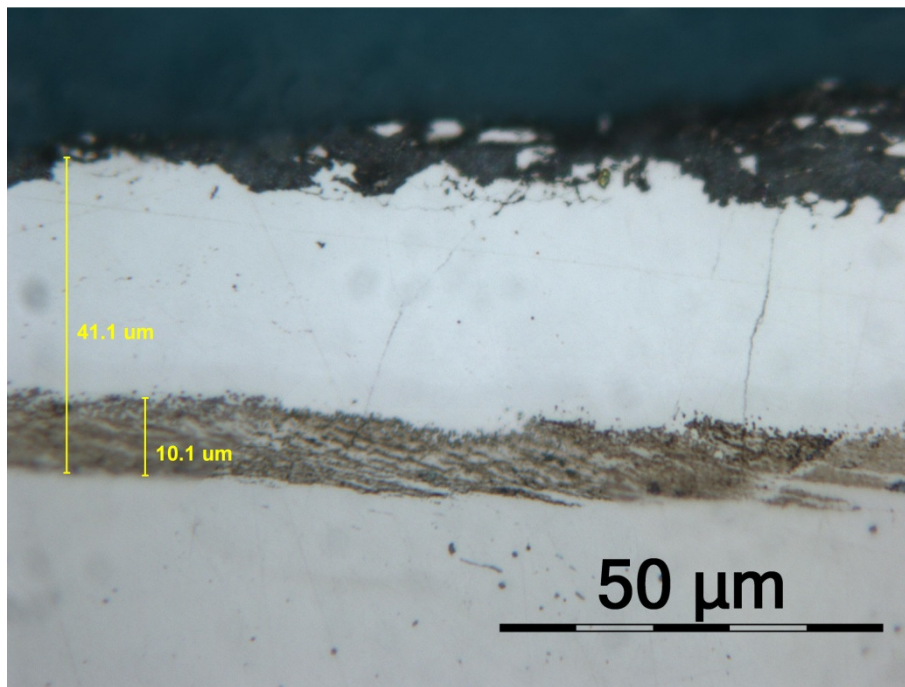


Figure 1: Unetched coating (original magnification x 1000)

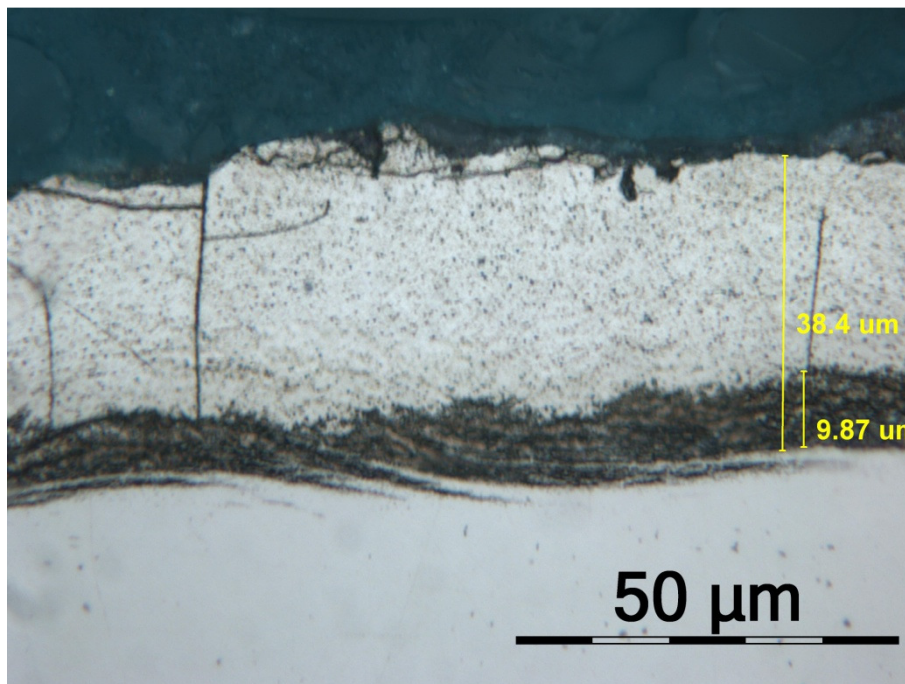


Figure 2: Etched coating (original magnification x 1000)

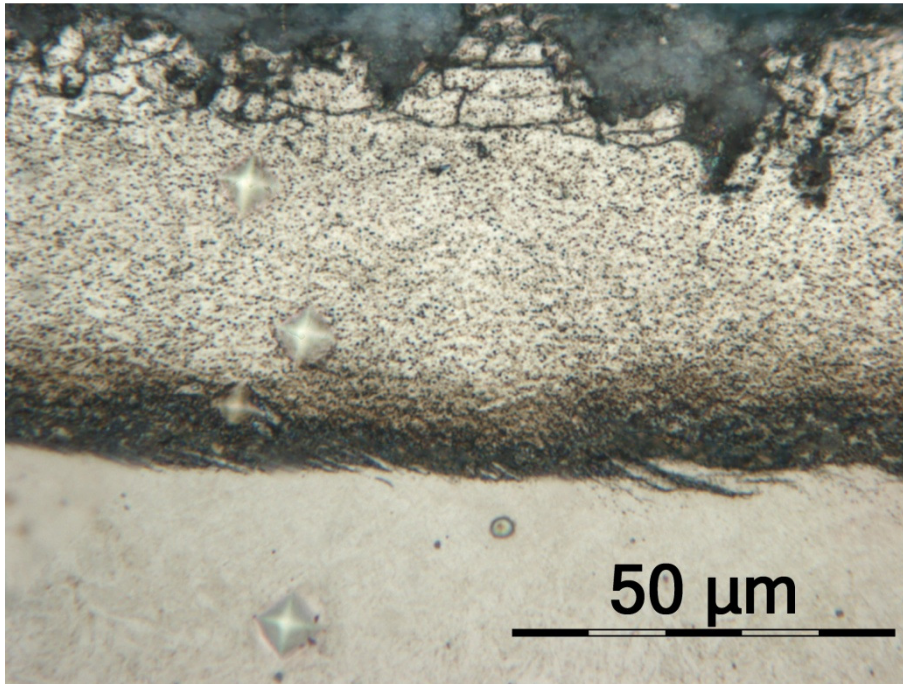


Figure 3: Hardness Indentations at location 1 (original magnification x100).

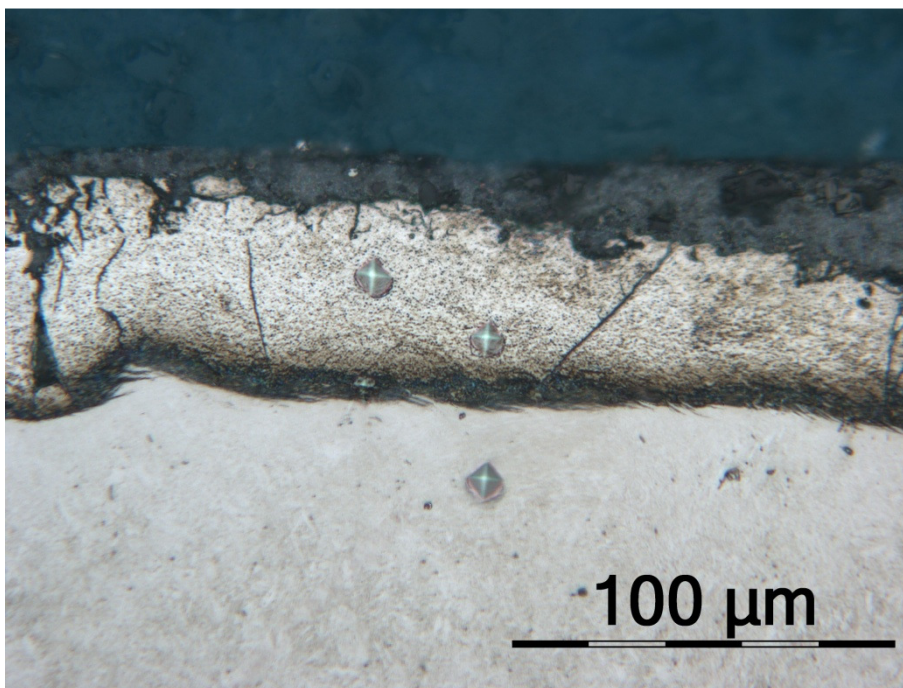


Figure 4: Hardness indentations at location 2 (original magnification x50).