



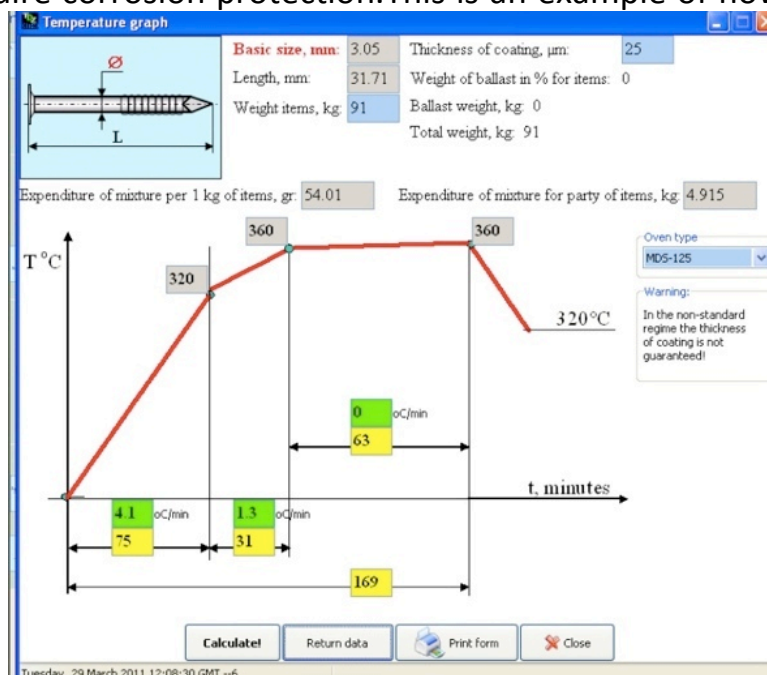
## CHIP PROOF COATINGS FOR FASTENERS

Thermal Diffusion Zinc/Iron has been promoted for more than a hundred years under the trade name of “Sherardizing”, principally applied by Bodycote, Int’l. in the UK, and more recently, by Levicor in Belgium and Geenkote in Germany. These companies have never proven that they could control the process thickness and quality from batch to batch, nor have they developed a worldwide base of licensed applicators.

When Dr. Isaak Shtikan of **Distek** invented and patented the SINGLE USE zinc thermal diffusion powder more than 20 years ago, that ensured precise and controllable quality on a continuous basis. There are now more than 40 licensees worldwide using the **Distek** process, and 5 companies licensed to use the newest technology known as **ArmorGalv®**, recently approved for use by the the US Navy, such as **Chem-Plate Industries**.

Not only did **Distek** invent the patented single use powder, but also developed the most efficient equipment for applying this process, ranging from small fasteners to 40 foot long oil well sucker tube pipes, in batch sizes from 50 pounds to 12,000 pounds at one time.

Based on many years of PRODUCTION experience, **Distek** also developed a unique proprietary computerized control system available to their licensees for applying the zinc thermal diffusion process given the myriad of different types parts and ferrous based alloys that require corrosion protection. This is an example of how one type of part is controlled:



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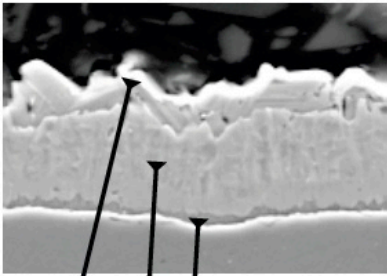
1800 Touhy Ave . Elk Grove Village, IL Telephone: 847/640.1600 Fax: 847/640.1699

HTTP: [www.chemplateindustries.com](http://www.chemplateindustries.com)

**Distek** and **Chem-Plate Industries** has recently partnered with **Atotech** to combine the unique properties of **ArmorGalv<sup>®</sup>** Zinc Thermal Diffusion with **Atotech's** very effective topcoats and its revolutionary Planetary Motion dip spin equipment that eliminates recess fill on complicated stampings and fasteners. One goal was to develop a chip-roof finish that could withstand the rigors of road debris for undercarriage automotive applications.

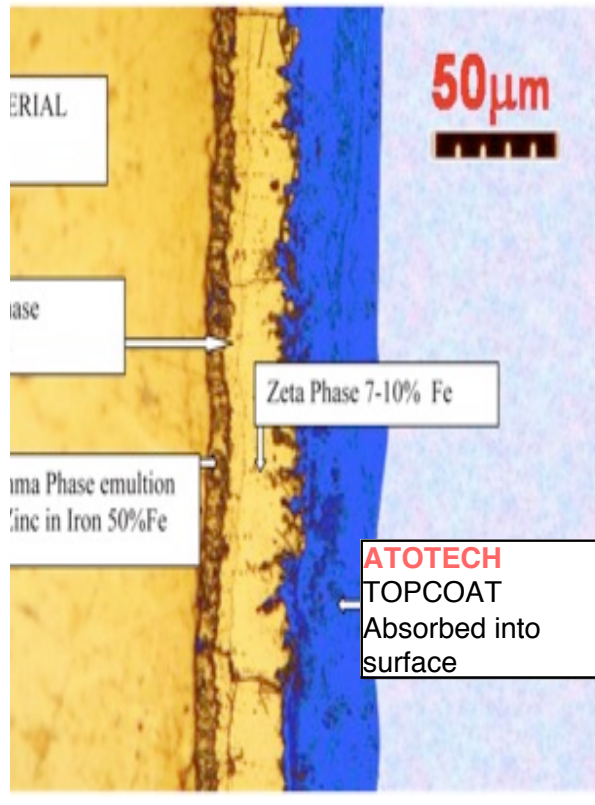
A very important and unique property of the **ArmorGalv<sup>®</sup>** Thermal Diffusion "coating" is that actually becomes part of the surface of the metal. Instead of it depositing as a separate metallic layer like that of electroplating, mechanical plating and zinc rich dip spin, the thermally diffused zinc becomes a continuation of the base metal itself with varying degrees of zinc/iron phases that is extremely difficult to remove physically, and is, therefore highly abrasion and chip resistant.

Below is the explanation of how a 25 $\mu$  "coating" of **ArmorGalv<sup>®</sup>** is structured.



Phase	Formula	Iron Content	Space Group	Lattice Parameter
Zeta ( $\zeta$ )	FeZn13	5.9 – 10,1 %	C 2/m monoclinic	a = 10.86 Å b = 7.61 Å c = 5.06 Å
Delta ( $\delta$ )	FeZn11 – FeZn6.67	8.1 – 13.2 %	P63mc hexagonal	a $\approx$ b $\approx$ 12.8 Å c $\approx$ 57.1 – 57.6 Å
Gamma ( $\Gamma$ )	Fe5Zn21 – Fe4Zn9	18 – 55 %	F43m (I43m) cubic	a = 17.98 Å (a $\approx$ 8.95 – 8.99 Å)

ADHESION MECHANISM OF **ArmorGalv<sup>®</sup>** AND **Atotech** TOPCOATS:



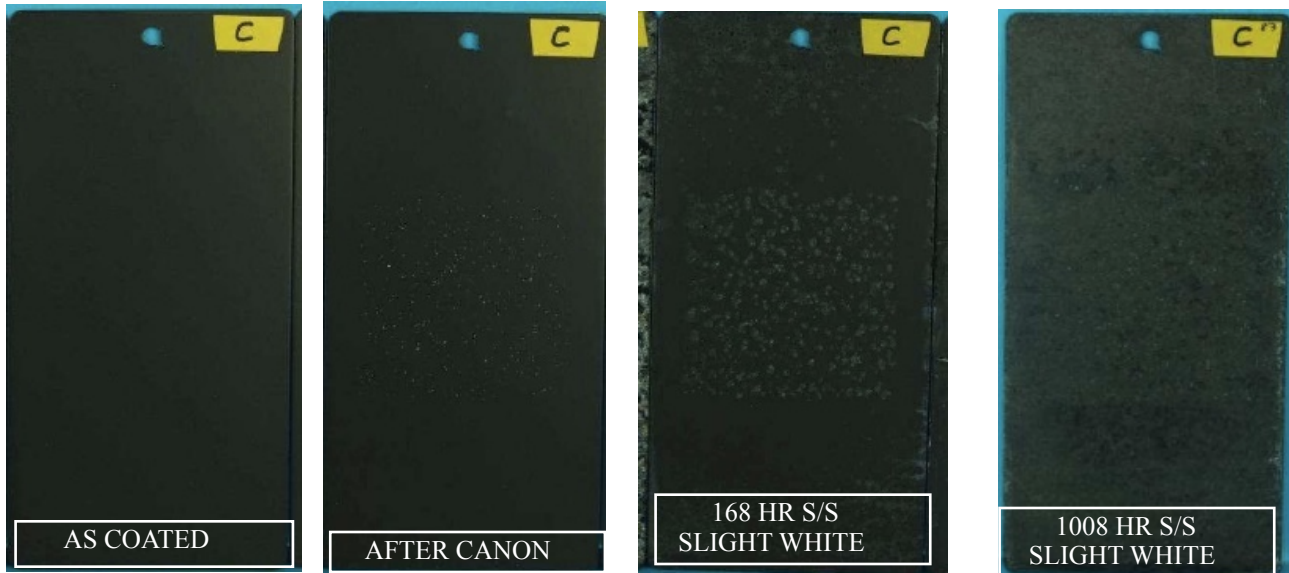
With this goal in mind a Q-Panel was prepared as follows:

- 1) **ArmorGalv<sup>®</sup>** Thermal Diffusion 25μ
- 2) **Atotech ArmorGalv<sup>®</sup>** Tru-Plate CP
- 3) **Atotech ArmorGalv<sup>®</sup>** Techdip Black SL

The Q-Panel was then subjected to the BMW DYCO TEST, whereby it was subjected to a bombardment of rocks from an air canon a 100 kilometers per hour and then salt sprayed per DIN EN ISO 9227.



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The salt spray testing was stopped at 1,008 hours with no signs of increased white corrosion from the 168 hour level and with no signs at all of red rust nor any paint degradation.

If you refer to the structure of the **ArmorGalv®/Atotech** coating above it will explain why the **ArmorGalv®/Atotech** coating resisted the impact of the DYCO BMW CANON TEST so well. The Gamma and Delta phases have become integrated with the steel surface by inter-diffusion and cannot be easily physically removed from the original substrate.

The uppermost Zeta layer of the **ArmorGalv®** “coating” has a very geographic surface that tends to absorb the **Atotech** protective topcoats below the surface, as is also pictured above.

The combination of the **ArmorGalv®** basecoat and the specially designed **Atotech** topcoats when applied to small parts in **Atotech's** revolutionary non filling Planetary coating machine, results in a finish that is very well suited to resist damage in areas of a vehicle that will be impacted by road debris or by other sources of impact that can severely damage most other coatings applied in the traditional manner.

This coating is available also in Silver.