TECHNICAL REPORT

I-CAR NEW ZEALAND

CORROSION PROTECTION:

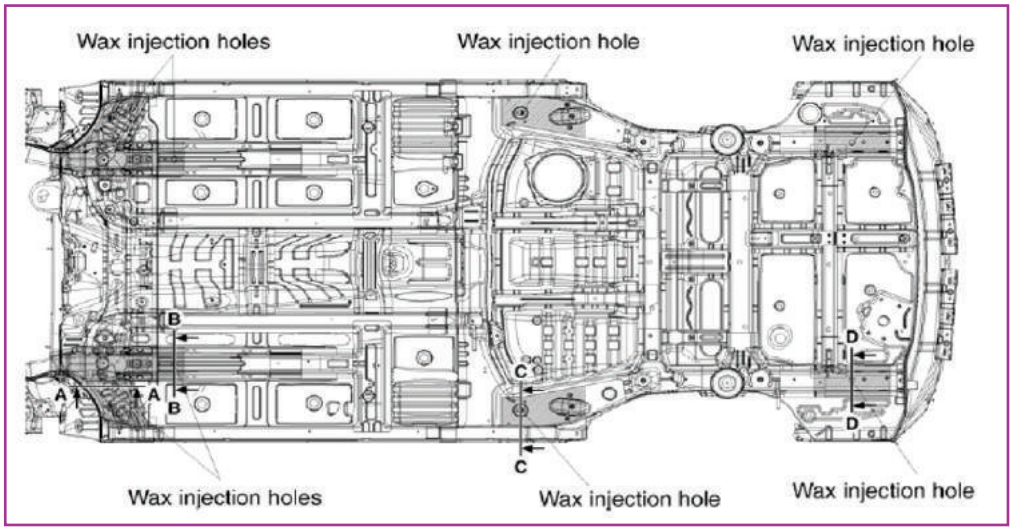
ARE YOU CONFIDENT THAT YOU GOT THE PROCESSES RIGHT?

Many of I-CAR's courses, irrespective of the subject material, and ALL of our NZ developed "Model Specific" lectures include details about the application or use of corrosion protection.

In recent years, with the proliferation of AHSS materials and multiple layers of reinforcement elements being incorporated into new vehicle structures, corrosion protection / rust prevention has become a major area of concern, with more emphasis being placed on following OEM recommendations to ensure the durability of a repair.

Some vehicle-makers , such as Hyundai and Kia, for example, have even gone to the extent of graphically showing where cavity wax injection points are located on many of their current model fleet.

KIA UNDER-BODY SCHEMATIC :-



Multiple layers of cavity wax are required to produce an effective coating or barrier – using application wands that are able to access hard to reach box sections and inner structures…..

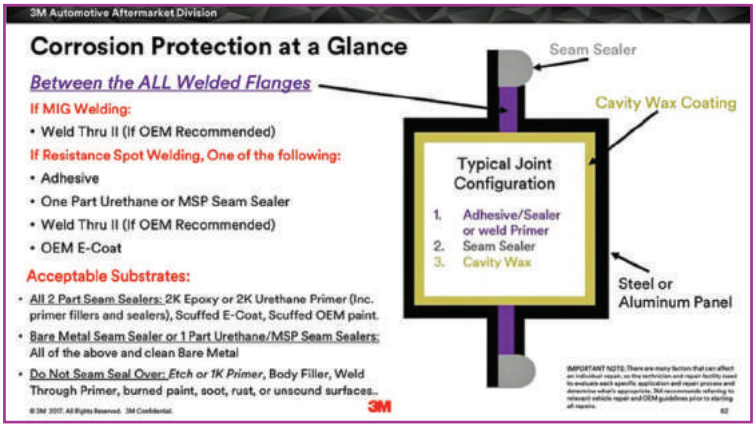
Salt spray test – 1500 hours exposure on bare steel

Salt spray test – 1500 hours exposure on coated steel
(3 layers of cavity wax)

Cavity waxes are only a part of the corrosion protection schedule though - Repatriation of other coatings and surface preparations will also typically be required :

- Weld – through primers
- Seam sealers and underbody coatings
- OEM E-Coat retention
- Texture coats and abrasive resistant materials
- Surface coatings and substrate preparation products

Lets look at the 3M initiative to simplify the entire corrosion protection schedule, as they see it ….



The overwhelming theme that comes to light here, and has been discussed in depth by a panel of Subject Matter Experts in recent times, is the need to use all of the appropriate products from ONE manufacturer – and that they have valid OEM approvals or certifications.

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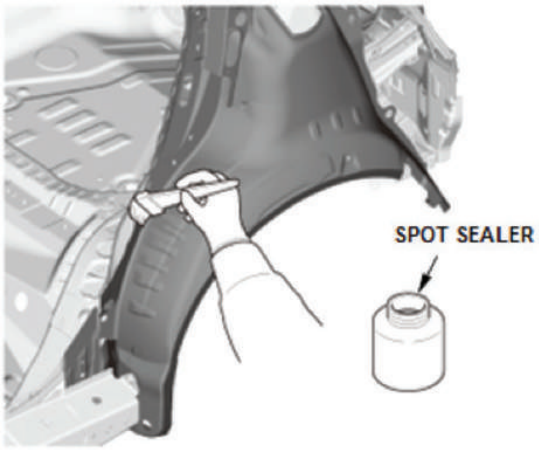
Weld – through primers:



Anti-rust treatment
Thoroughly apply electrically-conductive weld through primer (spot sealer) evenly on the mating surfaces in the welding area.

In certain fields of engineering and steel welding practices that also encompass automotive applications, weld – though primers are described as a corrosion protection process that is "better than nothing" – determining that other surface protection is required to ensure a rust-free welded joint.

How they work – The conductive coating applied to the flange joint(s) liquifies or melts into the molten weld pool and protects the "burnt" or fused connection from corrosion- the effectiveness of the coating can be compromised by prolonged and excessive heat, whereby the material is completely burnt away. Light, even application over all of the bare metal mating surfaces is paramount to producing both an effective, strong weld with few or no impurities, and to provide a level of surface corrosion protection.

While most weld-through primers are zinc – based, copper sprays are also used, and for many repairers, are a preferred coating as there tends to be less splatter and better conductivity at the weld site. There is some argument, and evidence to suggest that copper sprays are less effective for corrosion control, as in some environments they may generate galvanic corrosion. In any and all situations, copper and zinc sprays should never be mixed together in a welded joint.

Galvanic Action Table :

Metal Corroding \ Contact Metal	Magnesium & alloys	Zinc & alloys	Aluminium & alloys	Cadmium	Steel-carbon	Cast iron	Stainless steels	Lead, tin and alloys	Nickel	Brasses, nickel silvers	Copper	Bronzes, cupro-nickels	Nickel copper alloys	Nickel- Chrome_Mo Alloys Titanium, silver, graphite Graphite, gold,platinum
Magnesium & alloys		X	X	X	X	X	X	X	X	X	X	X	X	X
Zinc & alloys			X	X	X	X	X	X	X	X	X	X	X	X
Aluminium & alloys				X	X	X	X	X	X	X	X	X	X	X
Cadmium					X	X	X	X	X	X	X	X	X	X
Steel-carbon				X		X	X	X	X	X	X	X	X	X
Cast iron					X		X	X	X	X	X	X	X	X
Stainless steels					X	X		X	X	X	X	X	X	X
Lead, tin and alloys							X		X	X	X	X	X	X
Nickel										X	X	X	X	X
Brasses, nickel silvers						X	X	X	X		X	X	X	X
Copper							X	X	X			X	X	X
Bronzes, cupro-nickels													X	X
Nickel copper alloys														X
Nickel-Chrome-Mo Alloys Titanium, silver, graphite Graphite, gold,platinum														

X = Galvanic Corrosion Risk

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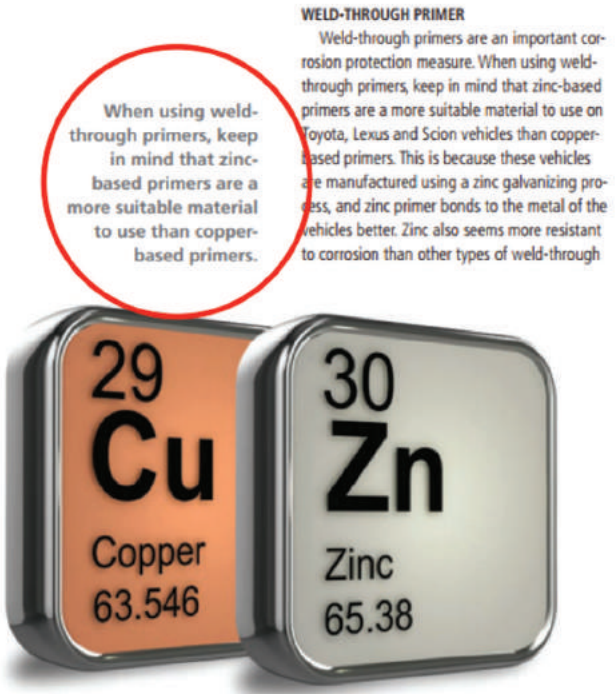
Excerpt from the Toyota / Lexus publication “Collision Pros” (2015)

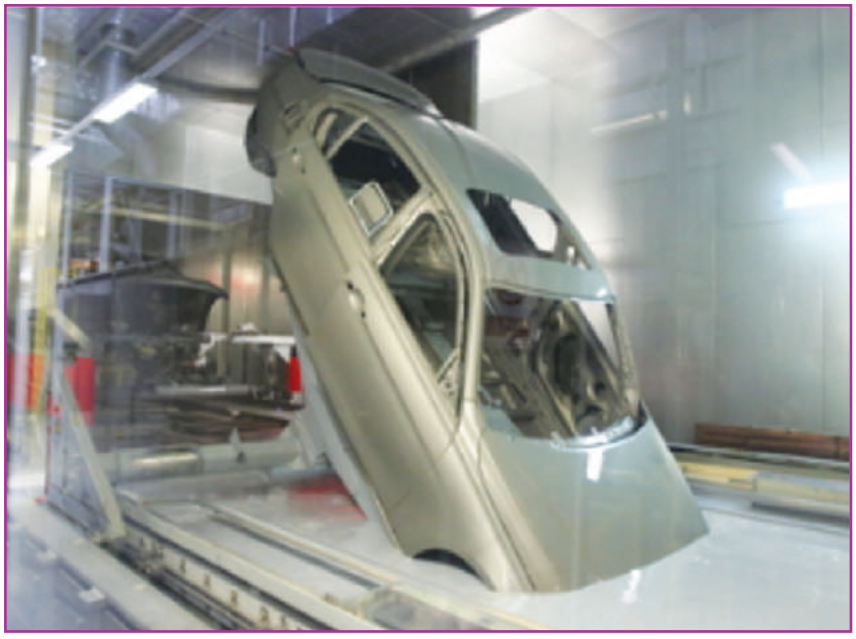


While most OEM’s do recommend the use of weld – through primers, there are several exceptions to this – most notable is the Chrysler / Dodge / Jeep group. As these brands are part of FCA (Fiat Chrysler Automobiles), this prohibition now extends to Fiat repair instructions also. Honda, as another example, state that weld through primers should only be used when doing STRSW – NOT when MIG plug or butt joint welding and brazing.

Of the many vehicle-makers that do require weld-through primers, there are those that do not describe a particular product and then others that specify certain brands (including OEM specific). As an example, Volkswagen state that in their Body Repair Manuals, an OEM genuine part number (D 007 500 04) weld-through primer should be used on all flange joints.

In all instances, weld – through primers are NOT TO BE USED where adhesives are present, or for any aluminium parts.

E-Coats (Electro – deposition) :-



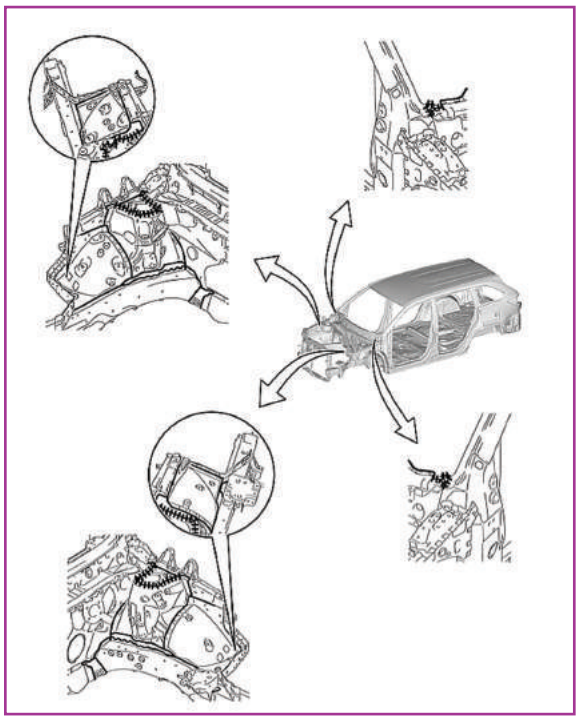
As we know, most new replacement panels supplied from any given OEM are completely covered with a black (sometimes grey or r ed/brown oxide) coating.

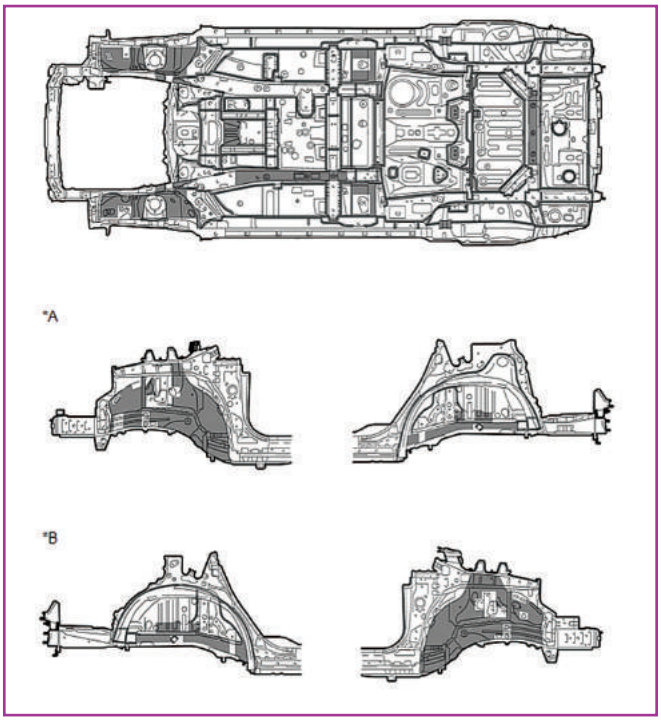
That coating has very good corrosion protection properties and is best described as being a cross between painting and plating, and is not able to replaced if removed in the body shop.

With this in mind, the general consensus amongst industry experts is that this coating should only be removed where absolutely necessary . Most of us are guilty of indescriminate removal of E-Coat when preparing new replacement panels for welding and then have to rely more heavily on other corrosion protection processes (like weld-thru primers).

Underbody coatings & sealers :-

Toyota Highlander example of underseal locations & sealer application areas -



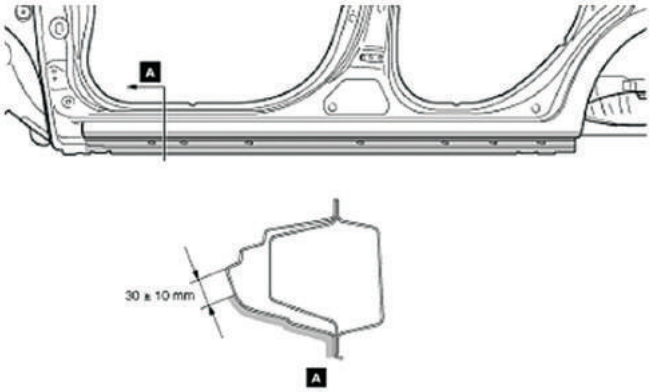


Stone chip coatings / texture coats :-

From Mitsubishi Body Repair Manuals (BRM) – general information

As shown here, the OEM is graphically showing the location and film build requirements, in addition to specifying the particular products to be used.

From Mitsubishi's Body Repair Manuals (BRM) – general information



Primer: Rocker panel primer
Recommended primer:
Glasurit FX89-7300 (Polyester basis) or FX90-7103 (Water basis) or equivalent
Coating thickness: 0.3 mm or more

Substrate product – specific areas :-

(New generation Toyota Hi-Lux shown)