

Summary / Foreword

- Greenway Steel & Chemcoaters began discussing GHG Protocol / carbon (emissions) accounting & monitoring in 2023. (Greenway Steel has since begun to support Chemcoaters with CO₂e monitoring via analysis of Scope 1 / 2 / 3 data).
- Chemcoaters was also interested in confirming whether their specialty corrosion inhibitor (InterCoat® ChemGuard) could generate CO₂e savings to value chain when applied at a steel mill's galvanizing line.
- **Greenway helped Chemcoaters confirm that there was a CO₂e savings realized by using InterCoat® ChemGuard ("ICCG") to displace heavier zinc-coating weights (G90 or above) - by comparing Scope 3 emissions data alongside CO₂e emissions associated with other raw materials relevant for steel manufacture.**

Background

- **Greenway Steel**, based out of Tuscaloosa, AL, provides data and analysis to partners in the metals industry to measure an organization's carbon footprint (CO₂ emissions). Greenway's goals are to advocate in support of sustainable global steel production, and support partners in implementing Greenhouse Gas ("GHG") emissions reduction strategies.
- **Chemcoaters** is an independent coil-coater located in Gary, Indiana. Chemcoaters focuses on (1) cleaning & retreating ferrous and nonferrous metals, (2) advanced dry-film lubricant technologies, and (3) more recently - a unique family of corrosion inhibitors for galvanized steel substrates, called InterCoat® ChemGuard.
- **InterCoat® ChemGuard** is the trade name for a family of corrosion inhibitors developed & coated at Chemcoaters, which have been supplied commercially since 2011. InterCoat® ChemGuard is used in a variety of applications and serves to drastically delay formation of white & red rust, alongside other unique qualities required for secondary processing. In some cases - InterCoat® ChemGuard is effectively used to displace higher zinc coating weights, which is in part the basis of this study.
- **ASTM A653** specifies coating weight designations (and tolerances) for steel coil & sheet that has been continuously hot-dip galvanized with zinc (or some other zinc-alloy) coatings. "G90" is a common zinc weight for exposed/outdoor applications, nominally requiring 0.90 oz / ft² of zinc. "G165" - a heavier zinc coating, requires 1.65 oz / ft² of zinc by the same token. "G30" - the lightest coating weight typically available, specifies just 0.3 oz / ft² under the norm.
 - Galvanized steels are commonly used in a wide range of end-uses (HVAC, tubing, construction, automotive, truck & trailer, appliances, etc.)

Methodology

A basic methodology was used to compare CO2 emissions generated / saved as a result of including InterCoat® ChemGuard in the production route of a steel mill's galvanizing line.

- For context – ICCG is best-applied via roll-coating, in a fashion similar to that of paint / passivation application.
- In many cases – a galvanizing line can apply ICCG without a change in assets (rather, a change in practice may be required).
- ICCG in its various formulas serves to provide a dramatic life extension for zinc-coated products. HDG G30 + ICCG coatings can substitute for both G90 and G165 coatings based on current testing data & market presence (customers). In some cases, performance up to G185 and G235 is even possible.

The calculation devised was:

- Determine CO2e associated with producing galvanized steel at a given thickness for (1) HDG G90 substrate, (2) HDG G165 substrate, and (3/4) HDG G30 substrate + the appropriate coating level of ICCG to serve as a substitute for either.
- This can be expressed as;
 - Determine quantity of zinc displaced by reducing G90 and G165 coating weights to G30.
 - SUBTRACT CO2e associated with zinc displaced.
 - SUBTRACT CO2e associated with heating zinc displaced in zinc pot.
 - ADD CO2e generated by use of ICCG in lieu of displaced zinc.

Data:

- Chemcoaters secured CO2e data associated with raw materials for formulas where full traceability was available from its vendors. This completed the data set for one of the commonly specified ChemGuard formulas.
- Greenway Steel provided standard CO2e data for metallic zinc & related heating requirements, alongside common chemical items used in Chemcoaters internal blending work.

Results / Conclusion

- CO2e 'displaced' by reducing zinc requirements on a continuous galvanizing line outweighs the CO2e added via the application of InterCoat® ChemGuard at that facility.
- CO2e 'savings' of 22 lbs to 174 lbs were possible when using G30 as a base and applying ICCG to reach performance levels equivalent to G90 or G165, depending on gauge, on a per-ton-basis.
 - This results in a nominal 1% CO2e savings (or greater) for most commonly galvanized gauge ranges.
 - Applies to galvanized steel at 0.07" thickness or below, with performance requirements of G90 or better.
- CO2e 'savings' generated increase as steel thickness decreases, given that square foot / ton of steel is inversely related to steel thickness (there is more area to coat and hence more coating weight on a ton of thinner steel, relative to thicker steel).