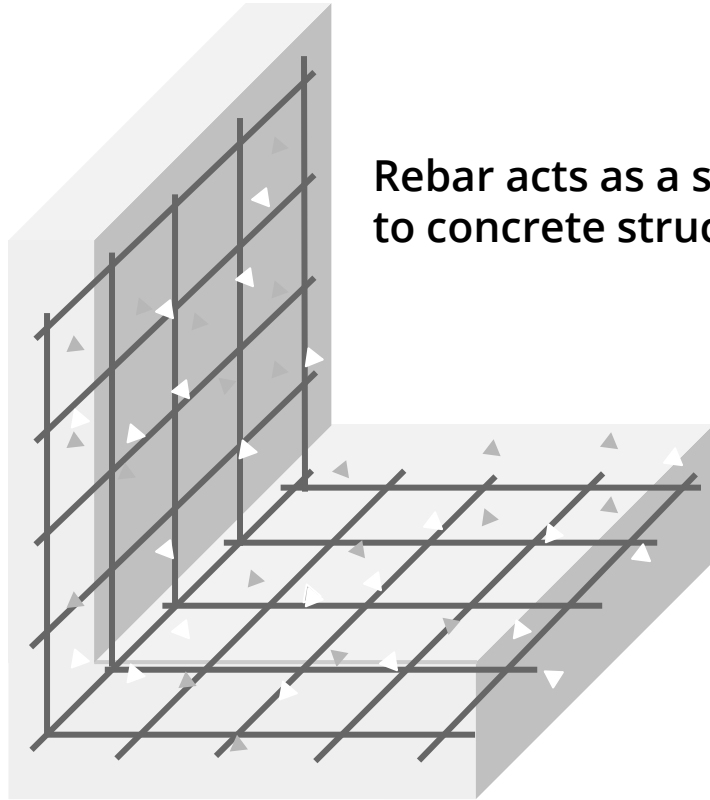


Stainless Steel Coated Rebar for Chloride-Resistant Concrete Highway and Bridges

Sam McAlpine, PhD
Allium Engineering INC

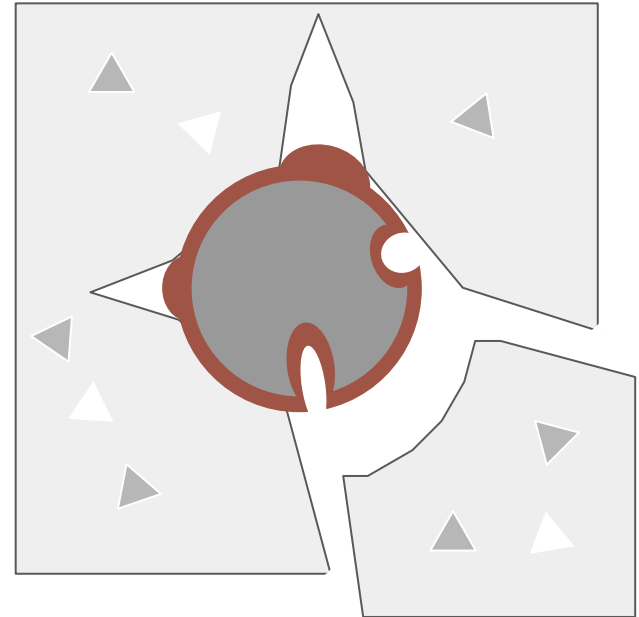


Problem: Rebar corrosion causes concrete degradation



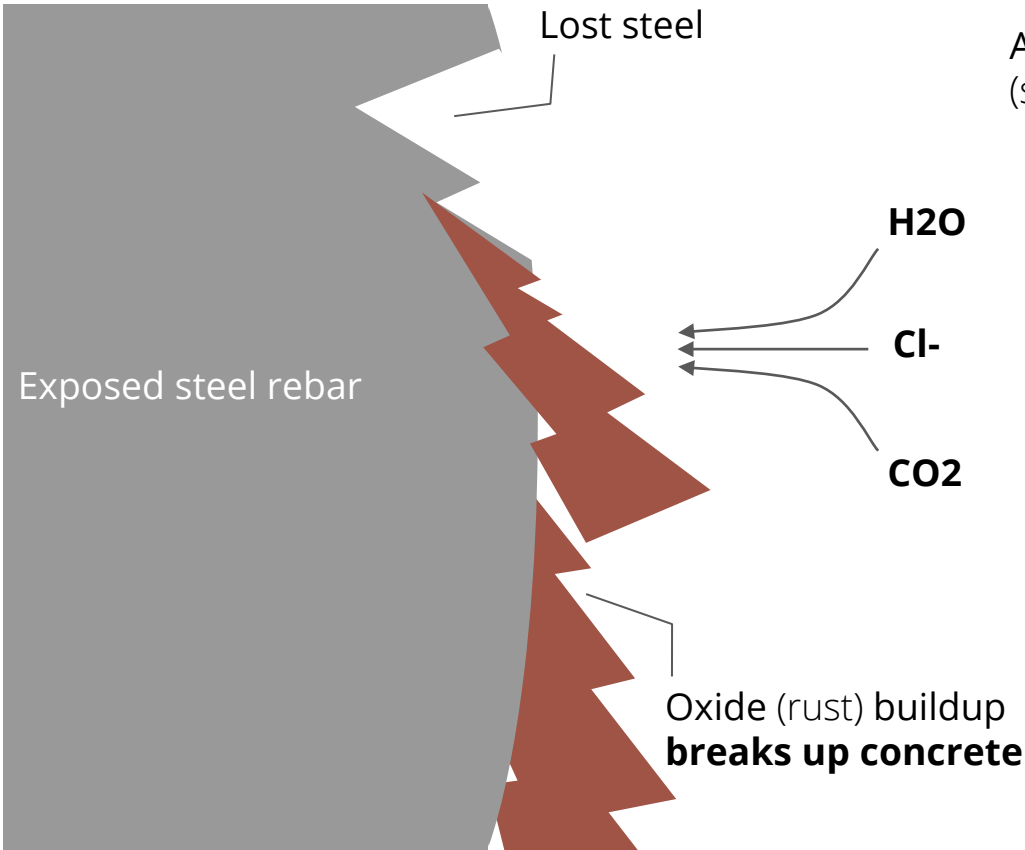
Rebar acts as a steel skeleton
to concrete structures

Rust weakens the steel rebar,
expands and breaks the concrete



Solution: Our stainless rebar coating prevents rust

Plain rebar



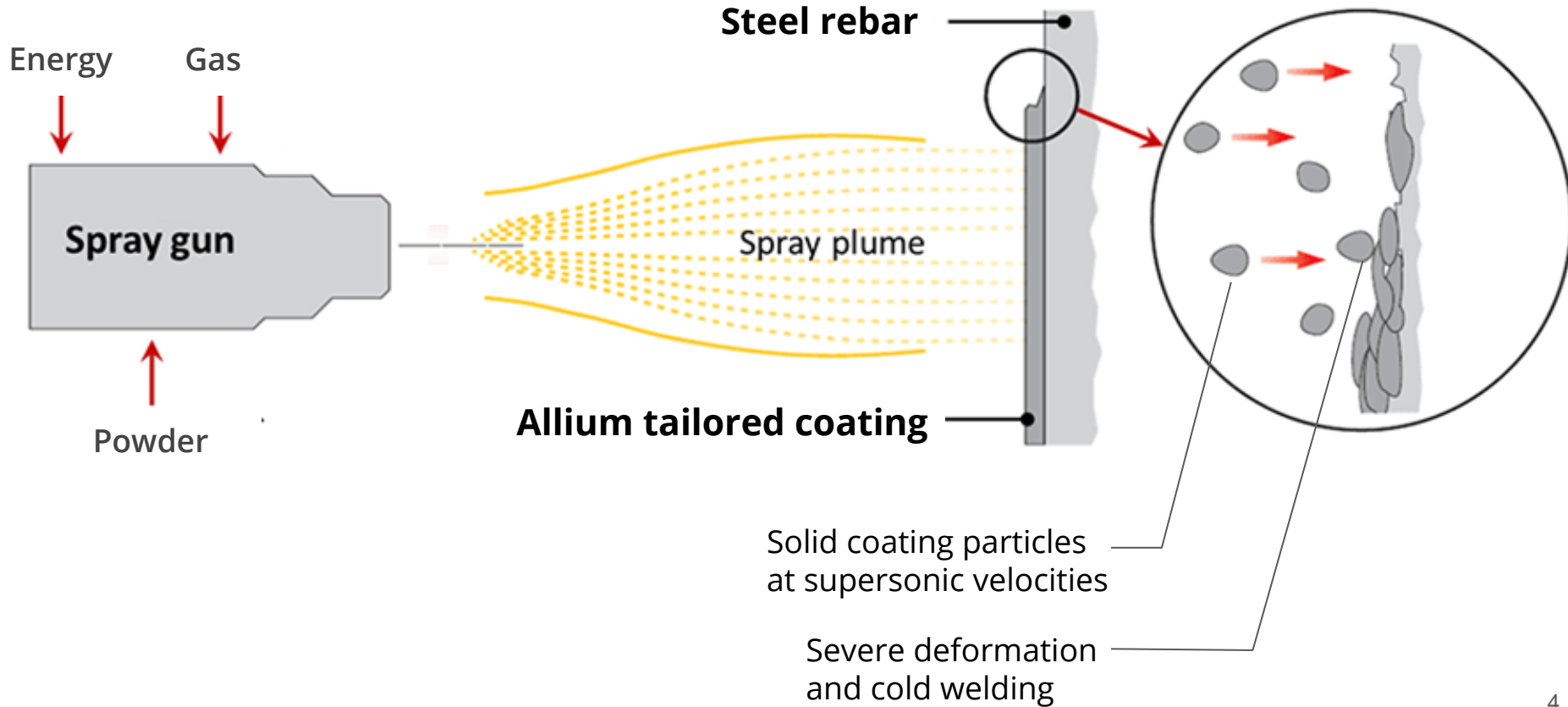
Allium protected rebar

Allium metal coating
(stainless steel)

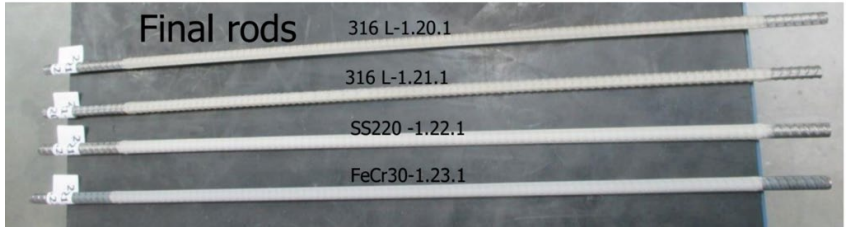
Protective
oxide barrier

Protected steel rebar

Our in-line coating uses cold spray technology

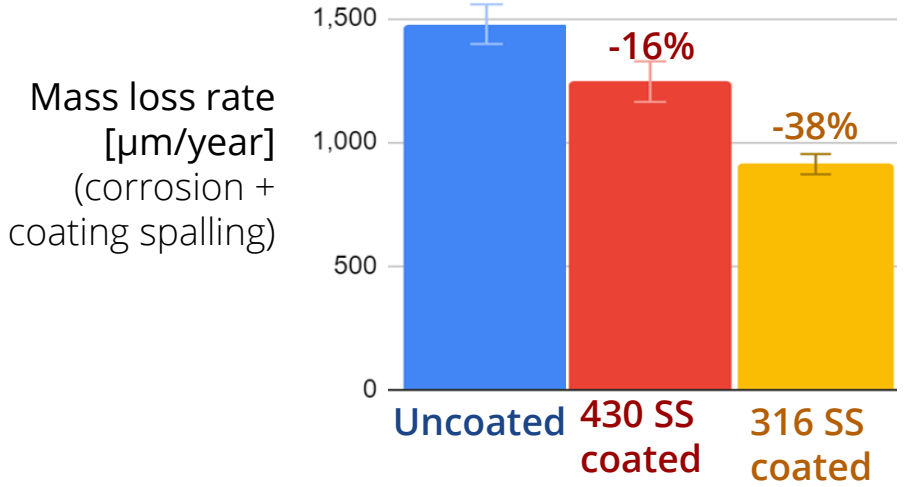


Corrosion Resistance: Up to 4x reduction in corrosion rate



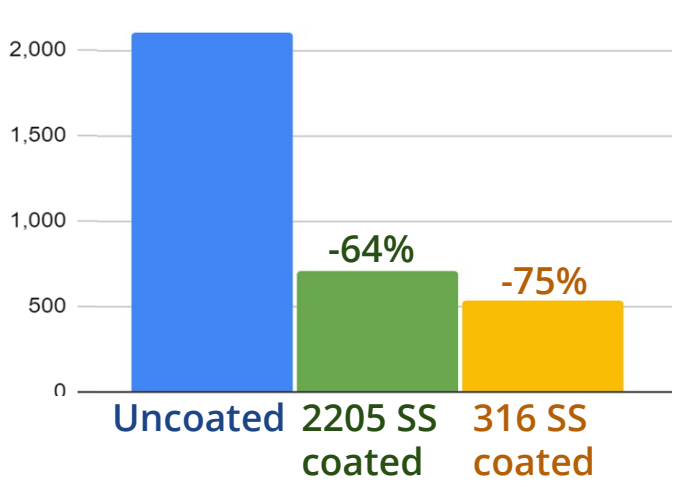
Aggressive corrosion test 1:

salt spray prototype 1
Coating delamination reduces effectiveness



Aggressive corrosion test v2:

salt spray prototype 2
Improved spraying boosts effectiveness



Cracking is an issue, but can be solved

Annealed 1 hr @ 1100C, quenched,
tempered 1hr @ 600C

Cracking in as-sprayed bars



No cracking in annealed bars



Future Directions

- In-concrete corrosion testing
- Rebar-concrete bond strength testing
- Scaling-up manufacturing capability

Acknowledgments

- NCHRP Funding through IDEA program
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- Jim Wild and Logan from VTRANS

Thank You!

Questions?