

Laser ablation to prepare Carboguard 890 past its recoat window

A terminal operator had newly fabricated storage tanks shop-coated with Carboguard 890 that were past the product's 90-day recoat window. Extrinite collaborated with Carboline to test whether laser ablation could prepare those surfaces for recoating in place of sweep blasting.

Results

Adhesion pulls on laser-prepared surfaces maxed out the gauge at 3000 PSI.

Pull tests were performed on five pieces covering the realistic conditions on a tank: bare steel prepared by laser then recoated, existing coating roughened by laser then recoated, a laser-prepared weld area, existing coating adjacent to laser work, and an untouched baseline.



3000 PSI

Adhesion pulls on laser-prepared surfaces, the gauge maximum



5 of 5

Pieces pulled at the gauge maximum, including the untouched baseline



1.98–3.5 mils

Surface profile recorded on steel with no previous profile



4–6 mils

Carboguard 890 dry film thickness tested

Adhesion pull tests: Carboline field report, April 2025

Condition tested

Pull result

Carboguard 890 applied directly over laser-prepared steel at 4–5 mils

Maxed out at 3000 PSI

Condition tested	Pull result
Existing 890 roughened by laser without removal, recoated same day	Maxed out at 3000 PSI
Field-welded tie-in: rust removed and weld profiled by laser	Maxed out at 3000 PSI
Existing 890 adjacent to laser work: did preparation affect it?	Maxed out at 3000 PSI
Untouched 890 baseline, no laser preparation	Maxed out at 3000 PSI



Reading the results

Every pull maxed out the gauge, including the untouched baseline. That means the test demonstrates that laser preparation **did not reduce** adhesion below the gauge ceiling on this coating system. It does not establish a numerical adhesion value, and it does not show laser preparation outperforming any other method, because no method could be distinguished at 3000 PSI.

That is still the commercially relevant finding. The concern with any new preparation method on an existing film is that it damages what it touches. On this testing, it did not, including on the coating adjacent to the work.

The problem

Carboguard 890 has a 90-day recoat time. After 90 days the surface must be abraded (by sweep blasting or sanding) before additional coats are

applied. On newly fabricated storage tanks that have sat through fabrication and transport, that deadline passes routinely.



Sweep blasting

Sweep blasting is the default answer.

On a tank farm it brings media handling, containment, and the risk of over-blasting through the existing film into bare steel on a surface you were trying to keep.



Sanding

Sanding is slow and inconsistent over large areas and around weld seams.



The question

The commercial question was narrow: can laser ablation abrade an intact Carboguard 890 film enough to restore recoat adhesion, without compromising the film or the substrate underneath?

Parameter study

Extrinite collaborated with Carboline to obtain samples coated with Carboguard 890 at 4–6 mils dry film.

Laser parameters were varied across samples to observe the effect on the coating as the beam moved across the surface. Separately, laser preparation

was performed on sections of a newly built tank and adhesion pull tests were carried out and reported by a Carboline field services engineer.

Parameter study on Carboguard 890 samples at 4–6 mils DFT

 01	 02	 03	 04
Low power / medium frequency	Low power / high frequency	Medium power / medium frequency	High power / medium frequency
Coating both intact and abraded; surface not compromised; ready for recoating	Most of the coating removed; surface uncompromised; ready for recoating, though less uniform	Coating entirely removed from the substrate with the surface profile still visible	Surface profile intact but less so than sample 3; discoloration indicating extra heat exposure



Four different results

The useful finding is not that one setting won. It is that the four results are meaningfully different from each other, which is the whole argument for parameter control: the same machine can be set to roughen a coating without removing it, remove it entirely while leaving the profile, or put more heat into the substrate than the job needs. That is a decision an operator makes, which is why operator training is available with every rental.

Operator training for rentals

Further findings

Profile, what came off with the coating, and what the results mean for a coating specification.



Surface profile recorded

Profiles of 1.98 mils, 2.80 mils and 3.5 mils were recorded during this work.

The starting steel was Vis 1 B condition with no previous profile before laser cleaning.

Profile matters because it is usually the acceptance criterion a coating manufacturer will name. A surface can be visually clean and still fail a specification on anchor profile. Extrinite measures and reports profile rather than asserting a cleanliness grade and leaving profile to be assumed.

Surface profile and what these systems produce

How Extrinite runs an application test

 Removed in the same pass

Hydrocarbons and chlorides came off with the coating.

Laser ablation removed hydrocarbons and chlorides from the surface in the same operation, which eliminates the separate chemical cleaning step on contaminated surfaces. Advantages recorded in Extrinite's report on this work:

Recorded in testing	Stated limits in the same report
✓ No spent media to contain or dispose of ✓ Hydrocarbons removed: no separate chemical cleaning required ✓ No chlorides left on the surface ✓ Small and large areas prepared with minimal setup time ✓ The 890 blended and feathered without affecting adjacent areas	— Laser ablation is line of sight. It prepares any visible area, and only visible areas. — Results depend on parameters being controlled correctly for the coating and substrate. — Excess power puts heat into the substrate, visible as discoloration.

Where laser cleaning is the wrong method

 Your coating specification

Sherwin-Williams Protective & Marine has stated in writing that it approves laser blasting as a surface preparation method provided the surface profile required by the product data sheet for each product being used is met.

The principle holds regardless of who signs the letter: coating manufacturers accept the preparation method that meets their product's stated surface requirement. So the question to put to your coating supplier is not “do you allow

laser cleaning” but “what profile and cleanliness does this product require, and will you accept it if we measure and document that we achieved it”.

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