

Case Study: Black Magic™

Three-metal blackening challenge solved.

The Challenge

The 'more the merrier' may be a better solution for a lot of situations, but when it comes to blackening parts, it can sometimes lead to trouble. That was the case for a manufacturer of sound reduction products for the firearms industry that was needing a part blackened that was comprised of three separate metals. When issues arose in getting a consistent finish on the part, the manufacturer called in Hubbard-Hall to see what they could do in helping blacken the part to a finish that met and exceeded expectations.

The Approach

Hubbard-Hall teams were also working with the manufacturer in solving a cleaning issue that was leaving a white haze on the stainless steel parts after vapor degreasing. The water-based cutting fluid was causing the haze effect, which created an issue because the parts needed to subsequently be welded and could have no



Finishing
the Hard to Finish

Executive Summary

A manufacturer needed to blacken a part made from three welded substrates.

- Aquaease PL recommended for to solve a white haze effect
- Testing done to blacken part included Cobalt 6, Inconel, and 17-4 Stainless Steel
- Black Magic RT SS4 used to provide deep and consistent black finish

residue on them. After Hubbard-Hall solved that issue by installing an aqueous cleaning line with its Aquaease PL product, the team began testing the parts with its Black Magic line of blackening chemistry to find the right combination for the three types of metal that was being finished: Cobalt 6, Inconel, and 17-4 Stainless Steel.

The Outcome

The Cobalt 6, Inconel, and 17-4 Stainless Steel substrates presented a challenge for the Hubbard-Hall team in developing the right chemistry that would work on all three substrates. Most parts that are 17-4 can be easily blackened, but the Cobalt 6 and Inconel in the welded part created significant research at Hubbard-Hall's Inman, South Carolina lab, where parts were tested to see how closely they met specifications. Black Magic SS C was initially tested at mid temp 255°F, followed by Black Magic RT S20 at room temp, and then Black Magic RT S30 also at room temp, but none produced a consistent and deep black among all substrates that were satisfactory to the Hubbard-Hall team. Additional testing was done and resulted in a deep and consistent black with Black Magic SS4 at room temp using the following process:

1. Parts are cleaned in Aquaease PL 918 made up at 10% by volume and heated to 160°F for 5 minutes.
2. Cool, clean water rinse.
3. Parts are immersed in a solution of 50% muriatic acid for 90 seconds.
4. Cool, clean water rinse.
5. Parts are immersed in Black Magic RT SS4 made up at 50% by volume for 30 seconds.
6. Cool, clean water rinse.
7. Parts are immersed in Metal Guard 500 for 30 seconds.
8. Parts are air-dried.

“Hubbard-Hall stayed focused on finding us a solution. I was impressed with their determination and communication to our team.”

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