Robert E. “Bob” Audlee
VP & COO
Stainless Steel Coatings, Inc.

Proud Makers of* STEEL-IT *Brand Coatings since 1974

STEEL-IT®

Our story-

- We make a line of coatings from 316-L Stainless Steel, that are applied like paint in a variety of markets where performance is critical, such as Food Processing/Packaging, Architecture, Agricultural Equipment, and Off-Road Racing, as well as diverse others.

Room for Improvement

- Our process involves the use of a variety of solvents, including Xylene.
- One anticorrosive compound we used in the product contained trace amounts of hexavalent chromium as a byproduct of its manufacturing process.

Quality

- Our basic formulations had been virtually unchanged for years.
- We had spent decades establishing a reputation for quality and performance.
- We were concerned about the consequences of a botched reformulation attempt on finely-tuned chemistries.

Quality Impacts Considered

- Constant pressure to reduce VOC's in coatings were a factor in finding safer, less toxic, VOC exempt compounds.
- Cautious reformulation, with an emphasis on maintaining the expected "customer experience."
- Rigorous testing, including accelerated exposure testing.

Lack of Reliability

- Our products are expected to function at a high level of performance reliably, consistently, and repeatably.
- As USDA compliant coatings, failures such as chipping or flaking are absolutely unacceptable.
- Our coatings are designed to survive under conditions where most others fail. We cannot risk underperformance.

Reliability Impacts Considered

- Our solution to insuring reliability was similar to ascertaining quality. In our industry, reliability is a subset of quality.
- Testing, Testing, and more Testing. We did all the standard tests, then literally hit coated objects with hammers, threw them at gravel and concrete surfaces, etc.

Customer Requirements or Perception

- We didn’t want to disrupt customer perceptions.
- We wanted the coatings to mix, apply, and perform as they always had, especially as anticorrosive coatings.
- For OEM manufacturers, the finished, coated product even had to look as if the formula was unchanged.

Customer Requirements Considered

- In many cases, we substituted lower toxicity, VOC-exempt solvents for Xylene. We used a solvent popularly known as “Oxsol”, or “PCBTF” (Parachlorobenzotrifluoride). This was not a simple substitution. Because Xylene and Oxsol have differing physical properties, other compounds in the formulations needed to be adjusted as well, to ensure that the product behaved in a manner familiar to our customers.

Customer Requirements Considered (continued)

- We had been using a high-performance anticorrosive material, “ZBZ”, or Zinc-bis-triorthophosphate. REACH chemists had discovered that this compound contained trace amounts of hexavalent chromium, as a byproduct of the manufacturing process, and it was likely to be ‘orphaned’ under REACH.

Customer Requirements Considered (continued)

- After trying dozens of other zinc-based compounds, that were billed as ‘direct swaps’ for ZBZ, we had found none that performed as well. Most raised viscosity so high that the paint was too thick to spray. (Adding solvent raises the VOC’s, which is not an option).
- On a hunch, one of our suppliers suggested we try a novel, proprietary magnesium-based compound.

Customer Requirements Considered - an Unexpected Win

- The magnesium compound seemed to work, but viscosity issues continued.
- The magnesium compound was more expensive than ZBZ.
- When we were able to overcome the viscosity problems, testing showed that the new compound provided FOUR TIMES the corrosion resistance as the older formulation. Without the potential hazards of hexavalent chromium.

Technical Uncertainty

- We were unsure as to whether suitable substitute materials were available.
- We had little to no experience working with these new compounds.
- As our product is unique, there was not a lot of existing research we could rely upon, or draw lessons from.

Technical Uncertainty Considered

- We did quite a bit of R&D, and a LOT of testing to ensure that our technical solutions worked properly and predictably.
- There is a concept called “regrettable substitution”, which occurs when a material or process believed to be less hazardous turns out to have an unexpected hazard.

Technical Uncertainty Considered (continued)

- By ‘reusing’ solvent used to clean vats, we became subject to MassDEP rules regarding recycling operations. We found we had to file for a “one time notification Class-A recycling permit.”
- We may have made one of those “regrettable substitutions”. Some early research indicates that there may be previously undetected hazards to the use of PCBTF. We are monitoring the potential for this carefully.

Capital Cost

- Our only “Capital Cost” was an energy efficiency upgrade, in partnership with *OTA* and the MassSave energy efficiency program, *National Grid*, and Prism Energy Services
- We paid about 1/3 of the ‘retail’ price for upgrades.
- We reduced energy costs by 20-25%.
- As energy costs rose, the upgrades paid for themselves in less than three years.

Conformance to a Standard

- Although our coatings are tested under a variety of standards, our primary goal was to be able to meet or exceed the test performance of the product for each of them.
- Outside Standards (such as the ASTM surface preparation methods for aluminum) may require toxic materials or dangerous processes. We are always working to find alternatives, and present them to customers.

Operating Cost

- There were three measurable changes in cost:
  - Electric costs were reduced due to efficiency increases.
  - HAZMAT waste disposal fees were reduced, as we now generate less waste for disposal.
  - We are now exempt from TURA fees.

Technical Difficulty

- The Energy upgrades were handled completely by NatGrid/Massave.
- Process changes were very easy.
- Reformulation was very difficult, time consuming, and prone to trial and error.

Lack of Management Support

- Although management is always inundated with suggestions, plans, and requirements, we were able to take a step back, and approach this as more than just a TUR effort.
- In our industry, allowable levels of VOC's are constantly being reduced. As our primary use of toxics is solvents, by reducing solvent use, we "kill two birds with one stone".

Lack of Management Support (continued)

- We were fortunate. Our management tends to support "green initiatives." Many of our customers do, as well. The architectural field, through LEED (Leadership in Energy and Environmental Design) certification, places a heavy emphasis on "green" technology.
- European customers are very aware of REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) regulations, which tend to be stricter than the US.
- Many of the projects that we integrated TUR efforts into already HAD management approval. TUR became "just another part" of those projects.

Other Things Considered More Important

- There are always other “Important Things” to consider.
- We tried to ‘tie’ TUR goals with other goals and requirements, such as VOC regulatory changes, REACH updates, the introduction of the Global Harmonization standard, OSHA regulations, etc. This way, as other projects met their milestones, TUR was progressing as well.

Our Generalized Solution

- We tried to ensure that TUR changes were not in a “vacuum”
- We combined TUR plans with other ongoing projects-
  - The introduction of the Global Harmonization Standard
  - Perceived Market pressures to ‘go green”
  - Safety and Health enhancements
  - Cost reduction
  - International regulatory compliance
  - Energy efficiency.
  - Hitting the ‘moving target’ of upcoming regulations