



# K-Bar Saves Over \$44,000 by Reducing Paint Waste and Burnoff

Minnesota Technical Assistance Program ■ INTERN SUMMARY

## Improved part inspection and process changes decrease cost

<b>Company</b>	K-Bar Industries, Inc. Faribault, Minnesota
<b>Results</b>	Decreased powder paint use by 8,800 pounds per year, saving over \$27,000 annually. Burnoff of racks and reject parts decreased by 20 percent, saving over \$17,000 annually.
<b>Cost</b>	Paint system improvements cost \$36,000.

K-Bar Industries, Inc. manufactures metal outdoor-maintenance power equipment, shop equipment and parts for its parent company Northern Tool and Equipment Company, as well as metal parts and assemblies for other retailers. The company coats over 3,000 different parts of various sizes and shapes in its automated powder coating line.

In 1992, K-Bar installed its powder paint booth. Parts were hung on hooks or racks and traveled on a conveyor past four oscillating, automatic powder guns. Parts passed between two manual touchup stations before heading to the curing oven. Many of the powder paints were reclaimed for reuse. Hooks, racks, and parts needing rework were sent out for burnoff stripping.

Powder coating systems apply opposite electrostatic charges to the paint and the parts to draw the coating onto the parts. Powder paint particles break down each time they pass through a reclaim system. Smaller particles do not hold the electrostatic charge as well as first-pass powder. This decreased attraction reduces the system's transfer efficiency—with more overspray and less paint on the parts.

## Incentives for Change

K-Bar wanted to improve the first-pass transfer efficiency of its coating operation. Nearly 35 percent of the paint purchased in 2001 became waste. Reject parts and fixture stripping cost over \$87,000.

The company established Kaizen teams to begin looking at various improvement options. Then, K-Bar requested a MnTAP intern to help reduce the volume of waste paint and reduce the number of parts and fixtures sent out for paint stripping. The goal was to reduce paint waste by 25 percent.

## Reject Parts

Coated and cured parts that did not pass visual inspection were placed in a scrap bin and sent out for paint stripping then returned for recoating. In 2001, burnoff of these parts cost \$42,600.

After the intern analyzed reject parts in the scrap bin, K-Bar determined that some parts should not be stripped. Dented and defective parts could be pulled out and scrapped for recycling. Inadequately covered parts could be sent through the powder paint line again and repainted without stripping.

Inspecting parts with greater scrutiny and raising operator awareness about sorting scrap helped reduce the volume of parts sent for burnoff, saving \$25,000.

## Paint Booth Operation

The intern analyzed paint booth operations. Operators manually adjusted the movement of the four automatic paint guns to get the best possible coating coverage. Guns were not switched on-and-off between parts or runs. When coating longer parts, operators often used the guns' maximum settings to ensure proper paint coverage. Coating thickness/mil build was visually assessed but not measured.

The intern reviewed the system's settings and found that tuning the existing four-gun system was

inadequate. Vendors were asked to propose changes to the paint system. With their input, K-Bar chose a new six-gun system with digital controllers and a light curtain, costing approximately \$36,000.

Using a lower pressure, the three new guns on each side of the booth produced a more-uniform coating. Because more paint is attracted to the part on the first pass less becomes overspray that needs to be reclaimed. Depending on the part, not all guns trigger.

The system's lower operating pressure minimizes the amount of powder that bounces back, which decreases the need for booth cleaning. With better first-pass coverage, manual touch up is needed only for difficult-to-reach part recesses or unusual shapes.

The light curtain is linked to a controller on the guns which turns them on-and-off between large parts and between part runs. This results in powder and energy savings.

To better monitor mil build, K-Bar started more closely tracking and evaluating coating use so it can further fine tune and optimize its system. Documenting painting parameters in greater detail for similar part families helped K-Bar set digital paint programs and helped operators become more consistent.

## Fixtures

In K-Bar's conveyORIZED paint lines, multiple part fixtures were used to suspend parts—parts were hung on hooks that hung on bars suspended by conveyor hooks. These fixtures carried parts along conveyors that passed through the metal pretreatment washers, entered a drying oven then the powder coating paint booth.

**Rack design.** The fixture racks were made of one or two hollow, square steel-tubes with rings for hanging hooks. On occasion, rinse water stayed in the fixture then would drip as the parts were powder coated, streaking the finish and causing rejects.

The MnTAP intern worked with K-Bar engineering staff to redesign the rack fixture. A thinner, shorter, single solid bar with racking holes was designed. By eliminating the hollow bar, and the ridges and gaps of the weld seams that could hold water, finish defects attributed to drips were eliminated.

**Rack burnoff.** Coatings build up on part fixtures over time and need to be stripped off periodically

to maintain a proper electrical ground for attracting paint to the parts.

One big advantage of K-Bar's new paint system was computerized digital controls, which allowed the company to save computer programs with all the operating parameters for coating specific part configurations. Computer programs facilitate setup and continuous improvement. In order to get repeatable coating results from a program, a consistent ground is needed. K-Bar had to significantly increase the frequency of burnoff for fixtures and hooks, increasing costs by \$8,000 a year.

K-Bar planned to continue optimizing fixture rack design and loading, and to look at air jets to reduce the coating build-up on fixtures.

## Overall Results

Using the research of the MnTAP intern, K-Bar decreased paint use and waste significantly, while improving quality, first-pass transfer efficiency and throughput.

Burnoff costs decreased a total of \$17,000. Paint use was reduced from 3.75 to 3.20 pounds per hour, saving \$17,400 through July 2003. Paint system improvements cost \$36,000, with a projected payback of one and a half years. K-Bar estimates it will save \$27,000 annually in powder paint costs.

## New Equipment Hints

Keep vendors informed of how your system is operating so they can make improvement suggestions. Maintaining a relationship with your paint system vendor gives you access to troubleshooting advice or information on equipment improvements.

## For More Information

MnTAP has a variety of technical assistance services available to help Minnesota businesses implement industry-tailored solutions that maximize resource efficiency, prevent pollution and reduce costs. Our information resources are available online at [mntap.umn.edu](http://mntap.umn.edu). Or, call MnTAP at 612/624-1300 or 800/247-0015 from greater Minnesota for personal assistance.

*This project was conducted in 2002 by MnTAP intern Justin Saeger, a mechanical engineering junior at Minnesota State University, Mankato.*