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TECHNICAL
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DEPTH FILTRATION AT KRUEGER *Increased Tank Turnovers with Improved Plating Quality*

Adding depth filtration to precoat filters helps Krueger Co. of Green Bay, WI achieve some sparkling turnarounds in roughness plating control, maintaining plating production speed and significantly reducing the labor cost of filter media changing.

Krueger has a tough plating problem to deal with - nickel and chrome plating of tubular parts. The company plates 12,000 to 15,000 sq. ft. (1,110 to 1,390 sq. meter) of metal per day, running three shifts, five days a week (seven days in the summer). The material, used in the manufacture of metal furniture, is not cleaned prior to arriving in the plating department; it comes straight from the bending and forming operation.

Adding to the problems faced by plating supervisor Maury Kurschner and his crew is the stringent quality control requirement Krueger management levies on plating; maximum allowable rejects are 0.8 percent.

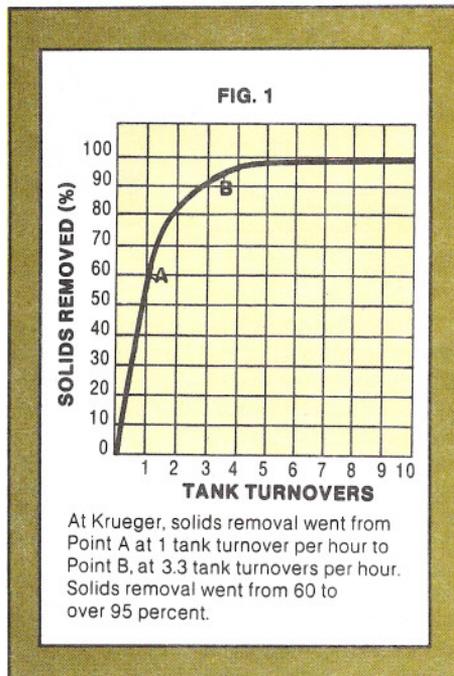
"As we modified our filtration setup to accommodate production changes," said Kurschner, "we found that the precoat filters would not give enough filtration capacity on the bright and semibright nickel tanks to keep up with plating speed. We could only get one tank turnover per hour, not enough to control roughness. To increase our tank turnovers we decided to go to depth filtration for the economy of higher flow rates per dollar invested and the labor savings of filter changes."

To get the additional filtering capacity needed, Kurschner added a 6,000 gph (22,700 l/hr) SERFILCO Sentry depth filter to his semibright plating tank, backing up a 6,000 gph (22,700 l/hr) and a 4,500 gph (17,000 ltrs/hr) precoat filter. Each depth filter is loaded with seventeen 30 in. (77 cm) micron (0.2 mil) depth cartridges with polypropylene fibers wound on a polypropylene core.

Tank Turnover

The increased filtering capacity immediately enabled the company to increase tank turnovers on the bright and semibright baths from one to three per hour. Each of these tanks is 5,000 gal (19,000 l) in capacity, and each is now served by a total of 16,500 gph (62,500 l/hr) filtering capacity. Thus,

16,500 gal. (62,500 l) filtering capacity divided by tank size of 5,000 gal. (19,000 l) equals 3.3 tank turnovers per hour.



"Increased tank turnovers enable us to remove 96 to 97% of solids from the bright and semibright tanks," said Kurschner. The effect on plating improvement can be seen in Fig. 1,

which plots solids removed versus tank turnovers. Kurschner moved plating quality from Point A to Point B on the graph.

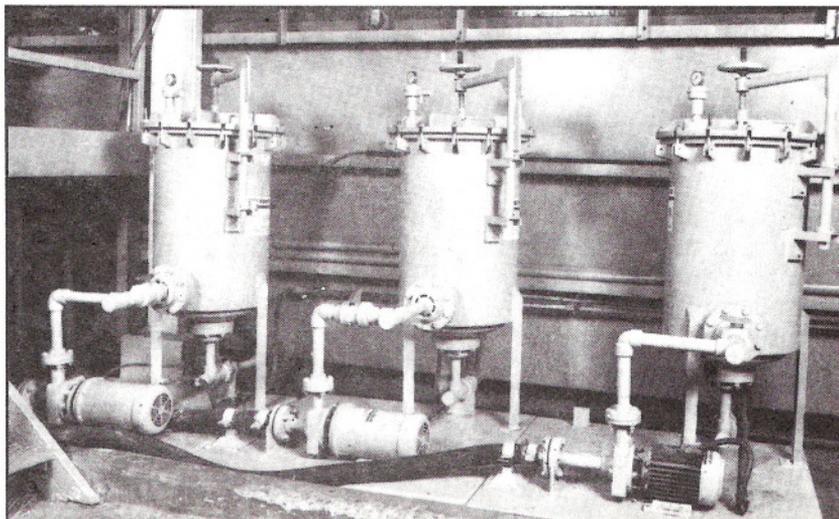
"Our objective was to improve plating quality on an order consistent with cost," said Kurschner. "To improve plating quality beyond a certain point would not be economical, because the curve tends to flatten on the high end. Beyond this point, there is a diminishing return effect; increased tank turnovers will not produce a corresponding increase in plating quality".

The bottom line is music to management's ear as well. Krueger's plating department now consistently has a reject rate of only 0.4 to 0.5 percent, comfortably below management's mandate.

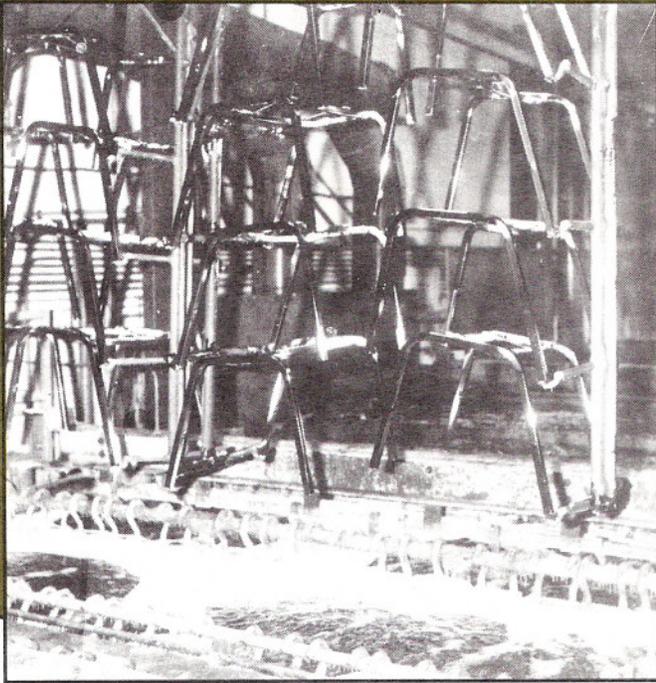
Reduced Labor Costs

The labor cost to change filter media has been markedly reduced. Before the addition of depth filtration, the two precoat filters required a media change every two weeks, on a schedule of one filter per week on an alternate basis. Time required to do this was four man-hours.

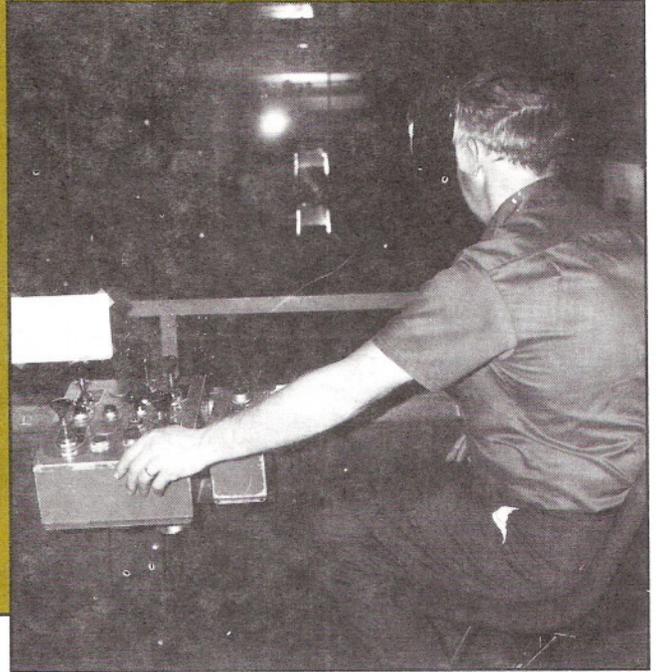
The depth filters last six to eight weeks, and, because they trap particulate matter so effectively, the precoat filters also get longer service



Depth filters increase semibright and bright plating quality at Krueger Co.



Tubular Work over nickel plating tank.



Operator views plating line through control booth.

between media changes - the same six to eight weeks. At media change time, it requires the same four man-hours to change the precoat filter media, but only one hour to re-cartridge the depth units. Thus, using an arbitrary seven-week change interval as an example. Krueger spends 11 man-hours every seven weeks compared to four man-hours every week for media changes, a savings in labor that can easily be translated into dollars by any plater.

"An additional advantage to the depth filters is no solution loss," Kurschner points out. *"The depth units have a removable top lid, and spent cartridges are removed and fresh ones installed from the top with no need to empty the filter chamber."*

Filters are changed according to pressure; when system pressure builds up to 40 psi (277 kPa), the media are changed. Kurschner stresses: *"We don't delay making the media changes, plating quality drops very rapidly if you don't change as soon as that point is reached."*

Product Variety

Krueger is one of the largest U.S. producers of contract and institutional furniture, the largest producer of folding chairs and one of the largest makers of folding tables. Its volume exceeds some better known furniture manufacturers. Products include chairs, settees, lounges and modular beam type seating. Products are sold to many markets - schools, colleges, theaters, auditoriums, convention halls, insurance companies, airports, offices, sports arenas and shopping centers.

It has pioneered new designs, and its Vertebra line of upright seats have the ability to move with the position of the occupant, providing better back support in all body positions.

In addition to steel, Krueger craftsmen work in polypropylene, upholstered, fiberglass, aluminum and wood furniture. With the exception of some of the wood and aluminum products, all furniture seating goes on steel legs or steel beams. Although the company does wet painting and black powder coating, plating is still the preferred

finish, specified for about 70% of production.

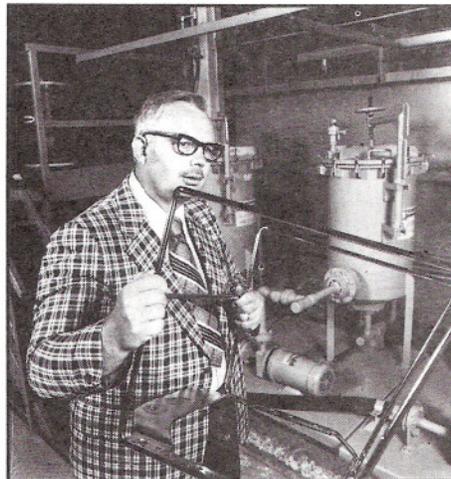
Most of the seating comes from the 195,000 sq ft (18,000-sq m) plant in Green Bay, where half a million chairs per year are manufactured. A second plant in Tupelo, MI of 250,000 sq ft, (23,000 sq m) makes tables, steel folding chairs and other items. The Green Bay facility plates items made in Tupelo and Krueger's fleet of 19 semitrailer trucks constantly move between the plants.

Thorough Operation

Plating straight tubular products is difficult enough; at Krueger the chair frames and legs are usually bent into sharp corners and turns. Kurschner has persuaded the company designers to provide vent holes at bends and corners for easier expulsion of oil and other manufacturing residue, but the parts still pose a tough plating job.

To make sure the company's high standards are met, the plating department is large, extensive and thorough. Parts go through 23 cleaning, plating and rinsing operations.

Parts exiting these operations are ready for final assembly. The entire operation is computer-controlled. An observation deck above the tanks on one end of the plating room is equipped with manual controls so an operations monitor can manually override any operation.



Maury Kurschner, plating supervisor, inspects a chair frame for surface roughness



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