The Merit Partnership is a joint venture between U.S. Environmental Protection Agency (EPA) Region 9, state and local regulatory agencies, private sector industries, and community representatives. This partnership was created to promote pollution prevention (P2), identify P2 technology needs, and accelerate P2 technology transfer from various industries in Southern California. One of these industries is metal finishing, which is represented in the Merit Partnership by the Metal Finishing Association of Southern California (MFASC). Together, MFASC, EPA Region 9, and the California Manufacturing Technology Center (CMT) evaluated the Merit Partnership P2 Project for Metal Finishers. This project involved implementing P2 techniques and technologies at metal finishing facilities in Southern California and documenting the results. The project is funded by the Industrial Technology Initiative (ITI) and EPA Region 9.

This fact sheet provides a summary of the major emission reductions accomplished over the project period. The project focused on plating solutions, reduced water use, reduced labor cost, and reduced material costs. The project also focused on improving the plating solution's efficiency and reducing energy consumption. The project was successful in achieving its goals and in reducing the environmental impact of the metal finishing industry in Southern California.

The Development of Hard Chrome Air Emission Regulations

Regulation of both temperature and mixing of the plating solution is essential for successful hard chrome electroplating. The hard chrome electroplating process involves long plating times and in-depth heat generation. Failure to both control the heat and maintain a uniform solution temperature impairs plating quality. In the past, hard chrome electroplaters maintained constant solution temperatures (typically within 2°F of the target temperature of 135°F) by circulating fluid bubbles upward through the plating solution. Typically, the solution temperature is controlled by the solution's temperature and the heat generated from the solution. By keeping the solution temperature constant, the heat generated from the solution is removed by the circulation of the solution. The heat generated from the solution is then removed by circulating the hot solution through a water-cooled heat exchanger. This process ensures that the solution temperature remains constant, and the heat generated from the solution is removed by the circulation of the hot solution through the heat exchanger. This process ensures that the solution temperature remains constant, and the heat generated from the solution is removed by the circulation of the hot solution through the heat exchanger. This process ensures that the solution temperature remains constant, and the heat generated from the solution is removed by the circulation of the hot solution through the heat exchanger.

The U.S. EPA introduced the National Emission Standards for Hazardous Air Pollutants (NESHAP), which became effective in January 1995, to regulate industrial air emissions. One part of NESHAP mandates that all hard chrome electroplating facilities meet several requirements established to minimize chrome emissions in plating operations involving chrome. Hard chrome electroplaters have been able to meet these requirements by discontinuing the use of air bubbles and implementing and incorporating suppression systems made up of plastics balls or foam that float on the surface of the plating solution.

COOLING HARD CHROME ELECTROPLATING SOLUTIONS

To maintain plating solutions that are well mixed and at the correct temperatures without use of air bubbles, most facilities have opted to install cooling coils on the interior walls of their plating tanks. Figure 1 shows an internal cooling system of this type. These internal cooling systems have drawbacks. For example, slower plating rates, increased downtime, and higher reject rates have been reported after installing such systems. Fats are considered to be the most prominent factors leading to elevated reject rates; after plating, they do not meet specification requirements for color, appearance, and hardness, nor high porosity.

Figure 1: An Internal Cooling System

The rise in reject rates can cause costs to rise (see Figure 2) and increase operation and maintenance (O&M) activities and repair costs. These increased costs can be a significant burden on hard chrome electroplaters' bottom lines.