Plating high pressure gas cylinders

A new process from **Houston Plating & Coatings** brings costs down and availability up

By **Agnes H. Baker**

From its facilities in South Houston and Humble, Texas, Houston Plating & Coatings (HP&C) differentiates itself from the typical job shop operation by employing supply chain principles for its customers.

Founded in 1988 to provide electroless nickel plating services to energy equipment manufacturers, today the company's 155 employees offer an assortment of corrosion and wear protection finishing service lines to a diverse set of equipment OEMs. Looking to grow its non-energy business, HP&C recently developed a plating process for industrial gas cylinders. In January, the company announced its new, proprietary electroless nickel (EN) process and equipment to plate the internal surfaces of high pressure (HP) gas cylinders. Marketed under the Ni-side™ brand, the process achieves complete coverage with a uniformly thin (0.001in) layer of plated nickel.

© HP & C | **William Howard, CEO**

To learn why this process is of interest to the Industrial Gas Industry, **gas**world spoke with William Howard, HP&C's President and CEO.

We understand that HP&C is a 'one-stop-shop' for customers' corrosion and wear protection needs and offers an exceptionally broad range of plating and coating services. What brought your attention to the industrial gas industry?

William Howard: About six years ago Gas Innovations, our neighbor here in Houston, brought up the idea of HP&C getting into the business of plating cylinders for the industrial gas industry. We visited Norris Cylinders to explore that prospect, but the timing was off and plating cylinders didn't fit into our standard plating processes. We were in the middle of an energy boom and HP&C was at full capacity serving its energy OEM customers. So, we put the idea aside. Then, in late 2020 Norris approached us, as their plater had gone out of business, and asked if we would be interested. Knowing that our standard plating process wouldn't be efficient, we started thinking outside the box and came up with our patent pending Ni-side process.

Why EN plating?

Howard: We understand that certain gases suffer significant degradation when in contact with carbon steel, thus reducing their effectiveness. An EN plated carbon steel cylinder provides a barrier between the steel and the gas, which prevents degradation. A plated carbon steel cylinder is considerably less expensive than other options, such as stainless steel, or nickel cylinders. HP&C's high-phosphorus EN plating process also provides excellent corrosion protection.

Do you expect cylinder plating to be a growing part of your business?

Howard: Absolutely. Discussions with industry executives indicate that there is a large volume of cylinders that need to be plated annually, so we expect cylinder plating to become a significant part of our production in the coming years.. We also understand that, in previous

years, the availability of plated cylinders has been very limited, which has limited their application. Our Ni-side process changes that dramatically. In addition to plating cylinders, we believe other vessels used for storing gases, some many times the size of HP cylinders, would benefit from nickel plating. Interestingly, our very first job for the industrial gas industry does not involve a cylinder, but is to plate several very large gas storage tanks. While we developed our Ni-side process for plating HP cylinders, it could theoretically be used to plate virtually any size vessel used in the industry. We look forward to working with industrial gas industry companies to explore how nickel plating can enhance the effectiveness of industrial gases in all phases of storage or transport.

HP&C strives to take the 'friction' (delays) out of the finishing process through supply chain based customer services tailored to specific customer needs. How does your new plating process take the friction out of the high pressure cylinder supply chain?
Howard: We create solutions to match customer needs, and we expect to implement specific industrial gas supply chain principles as we begin working with industry companies. For instance, one supply chain idea that saves time and money would be for HP&C to store a large quantity of customer cylinders and supply them with just the number of plated cylinders that are actually needed each month. We are in discussions with an OEM about other supply chain principles, which would speed up the process and cut overall costs. Ultimately, we believe that it makes sense for an OEM or major distributor to inventory a supply of plated carbon steel cylinders so there is no delay in getting them into service.

We understand that HP&C has some of the largest EN tanks in the industry and can dedicate a full production line to the new cylinder plating processes. Can you break this down in more detail?
Howard: We have been told that historically, using standard plating processes, the number of cylinders that could be plated was limited to about five or six per day. Plating high pressure gas cylinders is difficult because the very narrow opening into the cylinder, as well as the HP cylinder configuration that inhibits necessary solution flow. The processes and fixtures that we have developed can plate up to 72 cylinders in a standard eight hour day, however, the process is very scalable and can be expanded exponentially. Theoretically, we could supply a virtually unlimited number of plated cylinders to the industry. We believe that the lack of availability of plated cylinders has inhibited their overall use and that once industrial gas industry companies understand that we can provide an unlimited supply of plated cylinders, their use and application will dramatically expand. Ni-side plated cylinders eliminate the need to purchase more expensive stainless steel cylinders or cylinders constructed entirely out of nickel. A plated cylinder should cost less than half the cost of a stainless steel cylinder, and less than one-tenth the cost of a cylinder made entirely of nickel.

© Houston Plating & Coatings | **Electroless Nickel plating provides superior resistance to corrosion and significantly increases the life of carbon and stainless steel parts**

"We look forward to becoming a valued and trusted member of the industrial gas industry's supply chain"



© HP & C | **HP&C is the only company in Houston authorized to provide the salt bath nitriding/quench-polish-quench finishing process (left) and, with the largest EN tanks, can handle even the largest parts**

What are the advantages of your process over existing plating processes?
Howard: Our information on alternative plating is anecdotal, but we understand that there have been significant quality issues with plating results from alternative processes, and of course the production number has been very limited. The Ni-side process uses the same nickel chemicals and processes that we have used successfully for over 33 years in plating energy industry equipment, and we have done destructive testing to verify the quality, thickness, and uniformity of our plating. We have no reservations as to the quality of our plated products.

What is your geographic reach?
Howard: Our customer base includes companies from all over the US and Canada, but of course the vast majority of them are in the energy producing states of Texas, Oklahoma, and Louisiana.

What is the competition like in the US EN plating business?
Howard: There are many companies that offer nickel plating, both electro plating and electroless plating, but typically their tanks are relatively small, which limits the volume and the size of the parts that can be plated. With some of the largest tanks in the country, HP&C offers unique advantages for many of its customers. For instance, a power generation company in Pennsylvania was experiencing a 70+% failure rate of its plated parts, which are very large and difficult to plate. The HP&C plating team devised new fixtures and procedures and achieved 100% plating accuracy. The large tanks enable us to complete very large projects with very short turn-around times.

We understand that HP&C is in the process of patenting various aspects of the Ni-side process. When do you expect to be in full production of EN plated cylinders?
Howard: Yes, our patent application has been filed and we expected to be in full production once we were satisfied with the plating quality. However, several major users of plated cylinders have raised the issue of polishing the cylinders before plating. This is a new issue to us and we are evaluating whether a polishing step is necessary. I say "necessary" because we have received mixed messages from different companies. One company told us that they thought polishing was required to get proper adhesion of the nickel, and another told us that polishing was needed to facilitate moisture removal.

From our 33 years of plating, we know that polishing is not necessary for adhesion, but to respond to the moisture removal question, we are running tests to see if an unpolished plated cylinder facilitates moisture removal as easily as a polished cylinder. It may be that the entire polishing step was introduced to the industry to mask poor plating results in the first place.

If it turns out that moisture removal is benefitted from a polished cylinder, then one possible solution could be to increase the nickel thickness which would smooth out some of the inherent roughness. We are evaluating this, as well as looking for the cheapest and fastest way to get polishing done at HP&C if it is concluded that it is necessary. In any event, we believe this issue will be resolved in the near future and we will be ready to start full production.

What is the most important thing you would like industrial gas producers and distributors to know about HP&C and your new plating technology?
Howard: HP&C is recognized as one of the best plating companies in the country and we were honored to be recently named as such by *Products Finishing Magazine* (pfonline.com). For over 33 years we have been successfully plating energy equipment and other manufactured parts for every major energy OEM, including Baker Oil Tools, Schlumberger, Halliburton, SPX, and Cameron. We are confident in our ability to deliver not only the highest quality, but a significantly increased volume of plated cylinders. We look forward to becoming a valued and trusted member of the industrial gas industry's supply chain. gw