

**SPECIAL
RELEASE**

INTERNATIONAL
CHROMIUM
DEVELOPMENT
ASSOCIATION



Chromium plating – a strategic end-use

80% of all chromium trioxide produced worldwide is used for plating purposes.

Most people are familiar with chrome used in decorative applications, like appliances, toys, furniture, faucets, automotive trim and wheels, and much, much, more.

Consumers like chrome plated surfaces because they have that bright, shiny, metallic finish that looks great and holds up very well over time.

However, the majority of chrome used in plating is for heavy duty purposes. In these applications, chrome is used to cover and protect steel in high wear, temperature and corrosive

environments.

In many cases the consumer can't even see the plated part, but those parts are critical to the long-term proper operation of those applications.

There is no known process that can protect steel better than chrome plating!

In this article we have interviewed some of the European surface treatment associations and their members, who will describe in more detail some of the critical applications and discuss some of the current challenges and opportunities facing the chromium plating industry ●

SECTORS FOR WHICH CHROME PLATED PARTS ARE VITAL



Aeronautic and aerospace



Architectural



Automotive



Components used in textile and printing



Engineering



Metal manufacturing and finishing



Military technology



Agricultural and mining equipment



Sanitaryware



Watchmaking



INTERNATIONAL CHROMIUM DEVELOPMENT ASSOCIATION



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INTERVIEW

1 In the light of the recent pandemic crisis, Europe has realized how strategic it can be to rely on its own industry and to have access to raw materials. How strategic is the chrome plating sector?

CETS

Chrome plated products are used in almost every manufacturing industry and in most cases the products used are critically important.

A few examples are: aerospace, defense, automotive, medical devices, food industry, transport industry, general engineering, construction, earth moving, printing, and many many more.

In many applications, one missing part can shut down an entire production line. You can't produce planes without landing gear or cars without piston rings or medical devices without a sanitary surface.

AIAS

One of the things that the pandemic has shown us is the importance of not

losing industrial processes by subcontracting them to distant countries.

Supply interruptions can also come from natural disasters, shortages of key raw materials, supply chain and transportation interruptions, and geo/political reasons. In addition, when we outsource, we lose our industrial know-how and ability to innovate and create for the future.

FPA

The chrome plating sector is very strategic to secure the manufacturing industry staying in Europe. Manufacturing is critical for high quality jobs and national security.

2 Can you please give a few examples of some applications which are considered as highly strategic and the reasons for this?

AIAS

The application of a hard chromium layer on metal is extremely important because it improves surface hardness and reduces

friction between materials, significantly extending the life and improving the performance of many critical applications.

There are too many applications to list which are strategic because the lack of one chromed part can significantly alter the performance of so many products in areas like aerospace, military equipment, automobiles and trucks, heavy duty equipment, manufacturing machinery and medical devices.

If a company can't get that one part, they might

not be able to make the product or they have to use inferior replacements which can lead to unsatisfactory performance or shorter product life.

We have seen this with many products during the pandemic, and a good example is the lack of semi-conductor chips for automobiles.

CETS / FPA

Other critical/strategic applications are

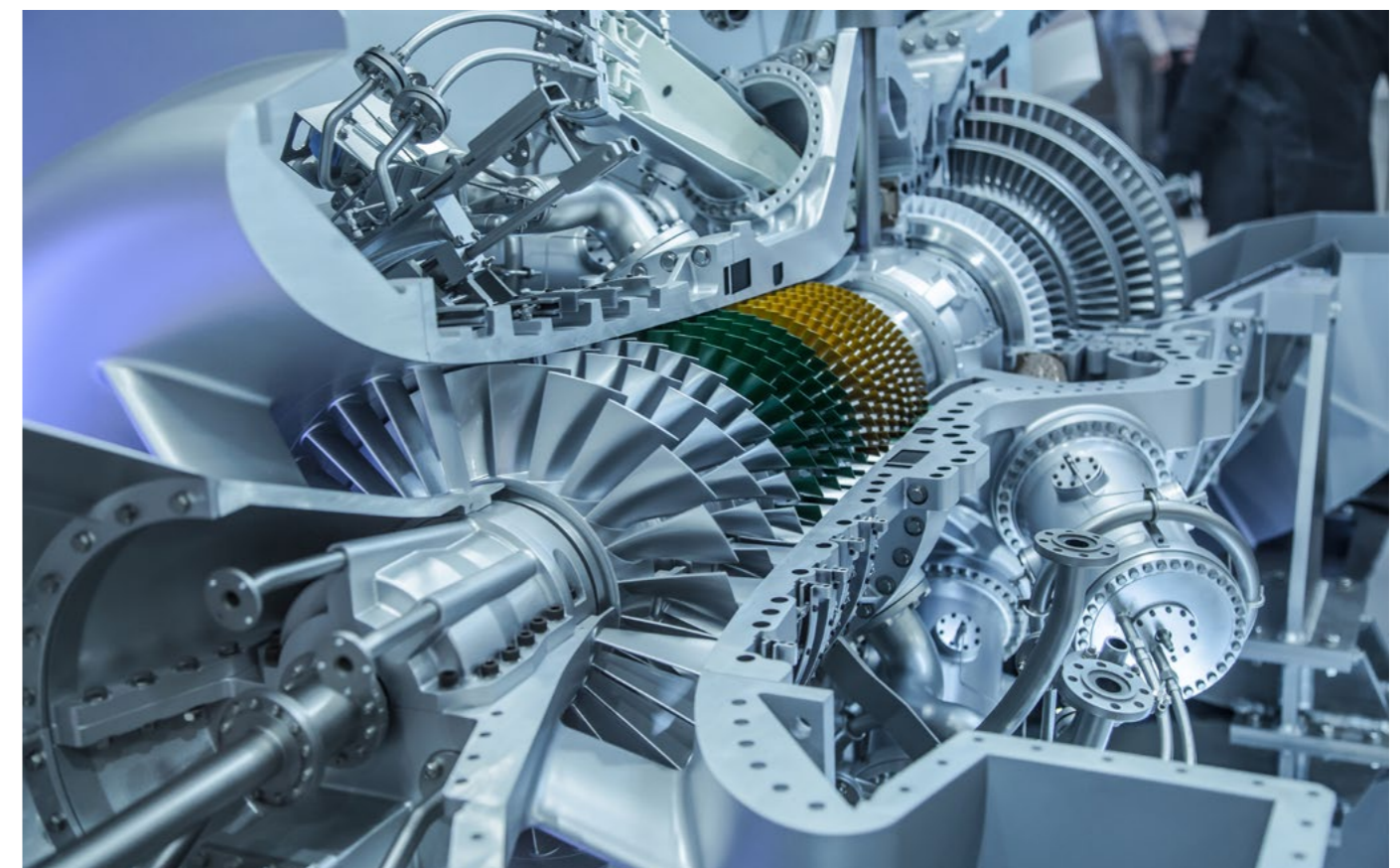
- printing rolls for newspapers and magazines;
- piston rods and rings for engines,

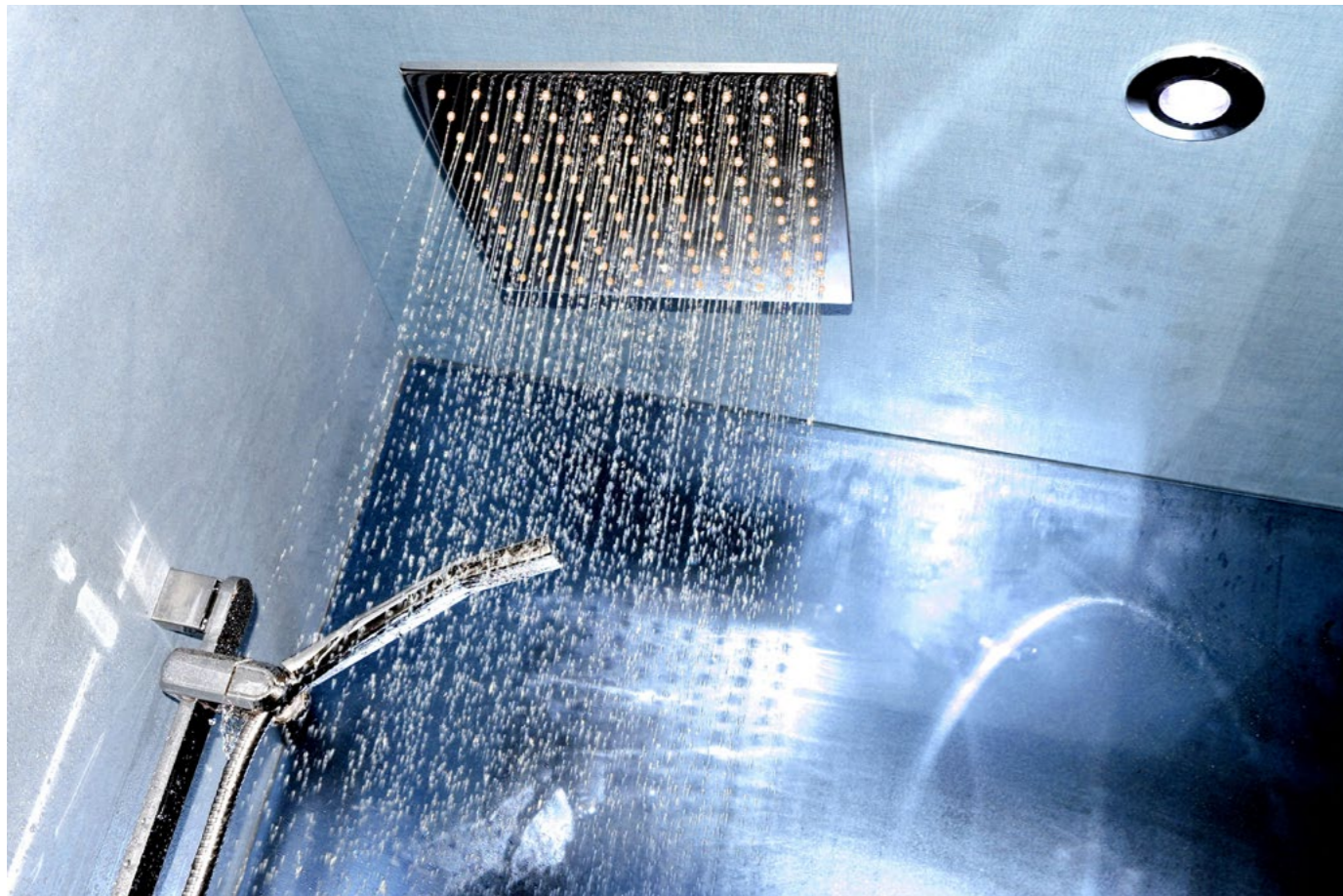
- shock absorbers in earth moving machines;
- bearings for bridges; and many other applications.

3 Any substitute to chrome for these applications? Why would it be risky to replace chromium by another alternative overnight for these applications?

CETS

Companies have been developing chrome substitutes for over 30 years. Many have been in the market for decades, mainly for decorative coatings for faucets, appliances and automotive trim.





These substitutes typically have lower technological performance and/or significant higher costs

and are accepted or rejected based on consumer aesthetic preferences. The risk of changing critical, high performance and/or strategic chrome plating before substitutes can be thoroughly tested could be catastrophic. Doing so may result in higher resource consumption (material and energy), significantly reduced product lifetime, higher maintenance costs, and most importantly, the loss of safety for consumers.

AIAS

Today,

there are no viable alternatives that can replace hexavalent chromium technology in industrial and high-security applications like aerospace, aeronautics, automotive, hydraulic elements and rotogravure cylinders.

However, many projects are underway to develop replacement technologies, but these projects could take 6-10 years or more. So, it is very important to continue to invest in this

research, but

it would be foolish for regulators to ban the use of chrome until these potential technologies are thoroughly developed and tested.

However, if the government does ban the use of chrome prior to having viable and thoroughly tested alternatives, companies will make the logical and simple choice: to shut down their production and outsource it to a country where the use of chrome is not banned.

FPA

Most substitute technologies involve the use of trivalent chromium products versus the traditional use of hexavalent chromium.

The end result of both products is an inert chrome metal plated on metal or plastic, and neither pose any risk to consumers. The difference between the two is strictly related to the plating process. Although, theoretically the trivalent manufacturing process poses less risk to employees in the production environment, its process is much more complicated and costly to operate and requires significant amounts of capital investment to transform hexavalent plating lines or to build new facilities.

However, over the past 20 years, hexavalent chromium plating plants have significantly improved all aspects of health, safety and the environment; and conform to very strict governmental regulations.

4 The “threat” of substitution is part of today’s reality, are the existing known

alternative applicable on an industrial scale? Are these hazard-free?

CETS

As discussed above,

the main technology under consideration to substitute for hexavalent chromium plating is trivalent chromium plating.

We would like to point out that trivalent chromium may be safer for workers at plating operations, but trivalent products are actually made from hexavalent chromium products at other production sites. Bottom line, there will always be risk in industry as part of modern life, not only by using chemicals,

the key to any chemical or industrial manufacturing is making sure regulations are being strictly followed equally everywhere, and people and the environment are being protected

The plating industry has made tremendous improvements in health, safety and environmental issues over the past 30 years.

Many plating shops use robotics, sealed enclosures, and air scrubbers to minimize any exposure.

Workers are further protected with PPP (personal protective equipment). And as a whole, regulatory requirements are strict and well monitored.

Once again,

the key to any chemical or industrial manufacturing is making sure regulations are being strictly followed, and people and the environment are being protected.

AIAS

Once again, potential alternatives to hexavalent chromium plating for high wear, high temperature and highly corrosive environments do not meet the requirements of these critical applications.

More research and long-term testing are needed to ensure performance and safety requirements are being met.

This could take 6-10 years or more. One technology that

has gained some traction is the use of trivalent chrome in combination with an underlayer of nickel. Costs are much higher, but performance is inadequate for critical applications. However, the use of nickel also presents HS&E concerns, and it is questionable whether this is an improvement over using chrome alone.

In addition, potential substitutes, mainly trivalent chrome products, require a completely different process from the current one, so significant amount of capital will be needed to retrofit existing facilities or to build new ones.

FPA

Currently, hard chrome plating facilities are able to carry out varied and complex plating applications in the same installation.

Hexavalent chromium plating technology is well understood, but more importantly, it is efficient and very flexible to meet the wide variety of products needed in today's environment. Alternatives, like trivalent chrome plating, are less

efficient, don't meet the stringent performance standards, and have much less versatility in producing a variety of plated products.

5 What remain of the European industrial sector is always given as an example in terms of best practices and hazard management, would an even more stringent legislation rather push industry outside of Europe instead of leading to R&D development?

CETS

Regulations are absolutely needed to protect people and the environment.

As stated above, the plating industry has made tremendous improvements over the years. Certainly, more can be done. But

any new regulations need to consider available technology, cost, competitiveness and speed of implementation.

A lot of manufacturing in Europe has already shut down and moved overseas. If more regulations are

implemented without taking these factors into account, eventually all manufacturing may migrate elsewhere.

The best way to ensure new regulations are implemented properly is for industry and regulators to work closely together and to develop common goals and objectives. As discussed above,

plated products are used in so many applications and industries of national importance.

We must find the right balance of risk, cost, competitiveness, employment and national security.

AIAS

As mentioned above, the plating industry is critical for so many applications and industries. Without doubt, the industry is of strategic and national importance.

Once you come to that conclusion, the question becomes, how do we continuously improve in the areas of safety, environment, efficiency, competitiveness and technology.

Without a comprehensive approach and plan, the industry will wither and will move overseas.

FPA

Regulations and technology must move in sync.

Regulations cannot move faster than the development of new substitute technologies.

Incentives should be in place for companies to spend more on R&D to accelerate development efforts. And finally, environment regulations should not move faster than limits and cost constraints of manufacturing processes or environment mitigation technologies. Without the synchronization of regulations and technologies, this critical industry will surely shut down.

6 Could we say that we are transferring issues rather than working together with other global leaders? What would be your recommendation to European leaders?

CETS

If we put regulations in place that are unattainable, unreasonable or uncompetitive, then companies will have no choice to outsource or move their production overseas.

From a global perspective, this is not solving an issue, it is just moving it to another world area that doesn't protect its people or the environment as well as we do in the EU. Net global pollution will increase, not decrease.

Ignoring this issue or taking the "not in my backyard" approach is irresponsible to the global community.

Operating the plating industry in the EU with world class technology and environmental protections and focusing on development of newer and better technologies over time is the most responsible approach.

AIAS

If you agree that maintaining a manufacturing base in the EU is strategically important to employment, national wealth, infrastructure,

defense, and so many more areas, then our goal should be to determine the best path forward.

Unfortunately, environmental issues have become mostly political issues and not scientific ones. Before we lose all of our manufacturing base,

we must reverse this trend and make decisions based on reasonable technical and scientific data.

FPA

Moving manufacturing to third world countries that do not have the same safety and environmental standards as the EU is just wrong.

Essentially, we are incentivizing countries to allow companies to reduce costs and cut corners that are bad for the people and the environment.

Instead, we should be working with all countries to make sure their standards are the same as ours.

INTERVIEWEES



AIAS is located in Sabadell (Barcelona, Spain) and is looking after the needs of the surface treatment sector in Spain. The organization was established in 1982 upon local industry initiative with the aim of sharing best practices and continuously improved processes in the field of technology and health, safety and environment.



CETS is the European Committee for Surface Treatment and established in 1981, it is an international federation of national associations engaged in the supply of technology, chemicals, and paint products to the surface treatment industry. Its purpose is to provide a scientific and engineering voice at the European Union on proposals for environmental, health and safety legislation.

FPA

FPA Finnish Plating Association was founded in 1967 with the aim to serve its membership through technology courses, research publishing and information sharing. It has 100 Members and is currently the only voice for the Finnish surface treatment sector.

■ USERS VIEWPOINT

■ MANUFACTURING PISTON RODS AND MACHINE COMPONENTS

■ MANUFACTURING LANDING GEAR COMPONENT FOR AIRCRAFTS

MANUFACTURING PISTON RODS AND MACHINE COMPONENTS

1 Your company expertise is relying on chromium plating, what is its main business?

Our company is a system supplier for ready-to-install piston rods and machine components.

Functional hard chrome plating using chromium trioxide is an essential production technology for our company to manufacture completely ready-to-install machine components for our customers

from a wide range of industries.

Our company uses functional hard chrome plating for the following products: piston rods for mobile hydraulics, rollers and guide columns for machine systems in the food industry, rollers for the printing industry, guide columns for plastic injection machines, machine components for general plant and machine construction,

rollers for the film industry, containers for process engineering, etc.

2 Any alternative so far in your sector?

Due to the wide range of possible applications for hard chrome plating,

functional hard chrome plating is a strategic manufacturing process that currently offers no alternative for products in a wide range of industries.

Hard chrome plating is vital for our company.

3 What are the strategic benefits of hard chrome plating?

Functional hard chrome plating has numerous advantages for the various applications: high wear resistance, good corrosion resistance, chemical resistance, high temperature resistance, hydrophobic behaviour, low coefficient of friction as well as achievable hardnesses of up to 1100 HV.

In addition, there is the possibility of carrying out repair chrome plating for wear components, which increases their cost-effectiveness. Furthermore, we also manufacture large components up to a part length of 10,000 mm.

Hard chrome plating is a cost-effective coating process with a wide range of coating properties that cannot be replaced by a single alternative process. Also, many alternative processes are limited to smaller component sizes and are also much more expensive.

4 Are you aware of any alternative?

Currently, there are no manufacturing alternatives on the market that can achieve the numerous advantages of functional hard chrome plating.

Hard chrome plating with electrolytes containing CrIII is also not an adequate substitute for large parts.

The necessary base coating with nickel for extremely large components and the resulting production costs

will hardly be realizable in the market.

5 What are the hazards related to chromium plating, are these manageable?

Due to the already prevailing restrictive specifications about environmental regulations, emissions, exposures at workplaces as well as occupational health and safety specifications, the consistent compliance with which is checked at regular intervals by the responsible authorities,

the hazard potential with regard to the use of this manufacturing process is reduced to an absolute minimum.

6 What would be the strategic consequences of a ban?

The ban on chromium trioxide will lead to a relocation of manufacturing processes based on chromium trioxide to countries outside the EU.

Due to the lower regulatory requirements with regard to occupational safety and

environmental protection, a higher risk potential for the environment and humans can certainly be assumed when using these manufacturing processes. In addition, there is of course an increased risk that the production of entire product ranges - especially components in series production - will be relocated to countries in which functional hard chrome plating based on chromium trioxide will still be permitted.

7 Will it make EU even more dependent in case of high restrictions?

The ban on chromium trioxide would generally increase the dependence on external suppliers with regard to external processing "coating".

Particularly in the case of components which, due to customer specifications, must be coated with a functional hard chrome layer based on chromium trioxide.

MANUFACTURING LANDING GEAR COMPONENT FOR AIRCRAFTS



We are manufacturing landing gear components for aircraft,

using properly chromium plated part is very important in terms of safety and stability of components (protection of human life during take-off and landing),

chromium will provide hardness, wear protection, machinability, gas tightness, repairability. Our company is based in Germany and due to German regulations and rules BImSCHG/ TRGS etc. many safety standards are already in place and ensure safe handling.

If any relocation because of increasingly non rational stringent legislation

customers may relocate in countries where safety standards are probably not as high as in the EU.

It will also lead to operations closing down, many applications will become more expensive for the customer, availability would be severely limited and unemployment throughout the supply chain will soar.

Safe processes are the best option to safeguard jobs and to keep a highly strategic sector within the EU.