Earnest

How can we help you today?

Whitepaper

# Thinking beyond recycling. Sustainability and the fastener industry.

The Academy Award-nominated film "Erin Brockovich" tells the true story of a heroine, Erin Brockovich, who fought a utility company that was polluting the water supply of the surrounding community with a cancer-causing chemical-waste compound. Over two decades later, that same substance is still used as a rust-inhibiting plating on industrial fasteners.

Scrutinized by the European Union, regulated by the state of California, and labeled a "carcinogen to workers" by OSHA, zinc yellow with hexavalent chromate has become a term industrial fastener buyers must be aware of, as environmental safety and sustainability become front and center policy in most every global organization.

The story of sustainability in the fastener industry is bigger than simply recycling steel parts. We must think about the entire lifecycle of a product and how that product's end of life impacts the environment and the human race.

# Sustainability and the fastener industry.

## Key Takeaways

*Hexavalent chromate is still used as a rust-inhibiting plating on industrial fasteners.*

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*Hexavalent chromate is commonly found on fasteners plated with zinc yellow plating.*

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*Hexavalent chromate may cause lung cancer; irritation or damage to the nose, throat, and lungs; non-allergic skin irritation; lesions on the hands or in the nasal cavity.*

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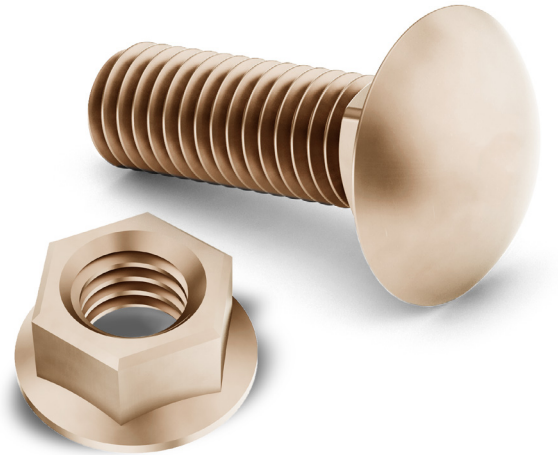
*To achieve the same corrosion protection as a hexavalent zinc yellow, a trivalent zinc yellow also needs a topcoat sealer.*

Zinc yellow fasteners with hexavalent chromate are common, as the plating has attractive anticorrosive properties that can be used for a wide variety of applications. While such fasteners are not outright banned for sale, industrial buyers are avoiding them.

According to OSHA, workplace exposure to hexavalent chromate may cause lung cancer in workers who breathe airborne hexavalent chromate. In addition, it may cause irritation or damage to the nose, throat, and lungs if ingested at elevated levels. Direct skin contact with hexavalent chromate can cause non-allergic skin irritation. Contact with non-intact skin can also lead to chrome ulcers, which are lesions on the hands or in the nasal cavity.

Much of the risk is borne by workers who are in and around the processing and plating of fasteners using hexavalent chromate. Which means that such fasteners, if restricted, may be less available, if available at all. Thus, zinc yellow fasteners may not be available if the demand for hexavalent chromate falls; buyers will need to be prepared to source alternatives.



# A wider view on recycling.

Despite renewed emphasis on recycling and the trend toward a circular supply chain, fasteners plated with zinc yellow hexavalent chromate still find their way to the landfill. The culmination of worker exposure and environmental risks from discarded fasteners has caused regulators and industry leaders to take stiffer precautions of their use and distribution.

According to Kevin Connolly, Applications Engineer at Earnest Machine, the automotive industry has moved away from buying zinc yellow fasteners. They are most concerned about the toxic effects of fastener platings and coatings if they degrade in a landfill. This is especially applicable to a vehicle's "end of life" where such degradation may take place and be toxic.

"It is easy to look at fasteners made from steel and make the correlation to scrapping and recycling when we talk about sustainability," states Patrick Ginnetti, Director of Marketing for Earnest Machine. "The story gets more complex when we start to examine the entire life cycle of the product, who comes into contact with these products, and how they are disposed of at the end of their life."

## Key Takeaways

*Worker exposure and environmental risks from discarded fasteners has caused regulators to take stiffer precautions of their use and distribution.*

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*The circular supply chain is a model that encourages companies to refurbish used parts or melt down products to turn back into their raw material form.*

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*Concerned with the toxic effects of fastener platings and coatings if they degrade in a landfill, the automotive industry has moved away from buying zinc yellow fasteners.*

# Regulating Hexavalent Chromate.

Hexavalent chromate platings contain heavy metals which the human body cannot expel. It may also contaminate food supplies and ground water. The fastener industry is likely to curb the use of such platings on fasteners and work with buyers to find viable alternatives as regulators focus on hexavalent chromate.

One regulation established by the European Union is REACH (which stands for Registration, Evaluation, Authorization, and Restriction of Chemicals). It is intended to protect human health and the environment from the hazards of hexavalent chromate. However, it applies to all chemical substances, not just those used in industrial processes.

For example, REACH regulates hazardous chemicals found in cleaning products, paints, and ingredients found in clothing, furniture, and electrical appliances. REACH stipulates those materials containing hazardous substances

must be labeled so suppliers can act appropriately in handling them.

In addition to REACH is another global regulation, RoHS (Restriction of Hazardous Substances). RoHS is also known as Directive 2002/95/EC. It restricts specific hazardous materials found in electronics. This direction ensures that any products containing hazardous substances be properly disclosed to facilitate their proper disposal at the end of their useful life.

## Key Takeaways

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*REACH intends to protect human health and the environment from the hazards of hexavalent chromate.*

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*RoHS ensures that any products containing hazardous substances be properly disclosed to facilitate their proper disposal at the end of their useful life.*

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# Key regulations to know.

## REACH: Registration, Evaluation, Authorization, and Restriction of Chemicals

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## California's Prop 65 Regulation

Prop 65 in the United States is also requiring clear labeling of products with hexavalent chromate. Prop 65 is a law in California which originated in 2018 and requires any product sold within the state of California known to contain a carcinogen, or can cause reproductive harm, be appropriately labeled as such by their manufacturers or distributors.

As part of the Safe Drinking Water and Toxic Enforcement Act, Prop 65 only applies to products sold in California. At present, about 900 chemicals and substances are on this list. Zinc yellow with hexavalent chromate is a substance subject to regulation by Prop 65.

The law does not restrict the sale of items that contain these substances, but instead establishes warnings about their presence in products so those exposed to them may respond appropriately in controlling their storage, use, and disposal.

## OSHA's Hexavalent Chromate National Emphasis Program

OSHA has established "National Emphasis" programs to focus on specific high-risk hazards by establishing initiatives to curtail the risks such hazards pose. Of the handful of OSHA directives, one is dedicated specifically to address hexavalent chromate.

They specifically mention the application of hexavalent chromate as an anticorrosive agent used to electroplate chromium onto metal parts to provide a decorative or protective coating.

Recently, OSHA fined an aircraft parts manufacturer in Bloomfield, Connecticut, $308,168 in penalties after discovering they did not take necessary steps to identify potential exposures and protect employees from hexavalent chromate and cadmium.

# How to transition away from Hexavalent Chromate.

As demand for zinc yellow fasteners diminishes, the supply chain economics for them will ultimately change and restrict supply. However, it will be a long road to rid the industry of hexavalent chromate.

The increase in regulations should act as a prompt for anyone accustomed to purchasing zinc yellow fasteners to consider an alternative procurement strategy.

The good news is Earnest Machine can help you specify and source alternative platings to ensure equivalent anticorrosive properties to meet your customers' application specifications. It is essential that fastener manufacturers, distributors, and buyers are aware of alternatives as there could be a mandatory transition to alternative platings.

Three key features need to be taken into consideration when deciding on the alternative: corrosion protection, cost, and plating or coating thickness.

An alternative plating or coating must be able to replicate the properties that are possible with zinc yellow plating.

Alternative platings to zinc yellow with hexavalent chromate include trivalent zinc yellow. It provides a similar yellow color but does not meet the same corrosion protection as a hexavalent yellow. To achieve the same corrosion protection as a hexavalent zinc yellow, a trivalent zinc yellow also needs a topcoat sealer, which makes it more expensive than hexavalent zinc yellow.

Trivalent zinc clear is another alternative and provides less corrosion protection compared to zinc yellow with a hexavalent chromate but is food safe and environmentally friendly. Summarily, zinc yellow fasteners are not banned or overtly prohibited. However, there are some austere regulations against hexavalent chromate, worldwide, that are driving large buyers of fasteners to avoid them. This will affect the industry and give ample reason for fastener buyers to have an alternate procurement strategy.

## Key Takeaways

*As demand for zinc yellow fasteners falls, the supply chain economics for them will ultimately change and restrict supply.*

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*Three key features need to be considered when deciding on an alternative: corrosion protection, cost, and plating or coating thickness.*

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*Trivalent zinc yellow and Trivalent Zinc Clear are safe alternatives to Zinc Yellow with Hexavalent Chromate.*

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*To achieve the same corrosion protection as a hexavalent zinc yellow, a trivalent zinc yellow also needs a topcoat sealer.*

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How can we help you today?

# Let's continue the conversation

For questions or to discuss alternatives to zinc yellow plating and platings containing hexavalent chromate, visit our website or contact an Earnest representative today.


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