

Markets in Wear Coatings:

Hard Chrome and Its Alternatives

Thintri Inc. announces the release of Markets in Wear Coatings: Hard Chrome and its Alternatives, 2016, a new update of its study on hard chrome wear coatings and chrome replacement. This comprehensive examination of the subject discusses the various technologies, the industries in which they will, and won't, be used, and forecasts to 2022.



Thintri Inc.

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Contents

The Chrome Plating Industry

- Health and environmental issues
- Effects of pollution control laws
- The industry today
- Economic factors
- Drawbacks in hard chrome

Chrome plating Market Analysis

- Aerospace
- Oil & gas
- Hydraulics & heavy machinery
- General industry
- Today's economy
- New legislation
- Geographic segmentation

Chrome Plating Alternatives

- Hard trivalent chrome
- Plasma spray
- High velocity oxy-fuel (HVOF)
- High velocity air-fueled (HVOF)
- Twin wire arc spray
- Electro-spark deposition
- Electroless nickel plating
- Electroless nickel boron plating
- Electroless nickel composite plating
- Electrodeposited nanocrystalline cobalt-phosphorus coatings
- Nickel-cobalt alloy coatings
- Plated tin alloys
- Explosive bonding
- Laser cladding
- Physical vapor deposition (PVD)
- Intensified plasma-assisted processing

Market Demand 2016–2022 forecasts

- ♦ Aerospace
 - Actuator hydraulics
 - Landing gear
 - Gas turbines
 - Other Components
- General industrial
 - Automotive
 - Agriculture
 - Pulp & paper
 - Transportation & roads
 - Mining
 - Heavy equipment
 - Oil & gas
 - Stamping and molding

Background on Wear Coatings

Used as a fundamental wear-resistant coating in a wide range of industries—aerospace, heavy equipment, automotive and many others—hard chrome plating has overcome increasing obstacles to market growth in recent years. Industry downsizing and consolidation following toughened legislation led to the closure or offshore relocation of as many as half of the chrome plating shops in North America, but the remaining the chrome plating industry has been stable for several years. Most chrome plating shops, having accommodated new regulations, are now thriving and profitable.

However, the situation is changing rapidly. In this, the fourth update to Thintri's original 2003 study on wear coatings, alternatives to hexavalent hard chrome are now poised to have a significant impact on hex chrome's markets to the degree that sales of hard chrome plating consumables may fall into negative territory.

A number of alternatives to hard chrome are available. The chief substitute is thermal spray, in particular high-velocity oxy-fuel (HVOF), often favored due to its high strength and wear resistance and fast turnaround time. Some of the industry has begun transitioning to high-velocity air-fueled (HVOF) and high energy plasma spray. Thermal spray as a rule, however, faces fundamental limitations such as high cost, low throughput and difficulty with complex shapes or non-line of sight situations.

Thermal spray faces growing competition from new plating solutions that easily accommodate non-line of sight and complex shapes. These include electroless nickel composite plating, which can deposit diamond-composite coatings, and electrodeposited

nanocrystalline cobalt-phosphorus alloys. Plasma vapor deposition (PVD) can make thin, high quality coatings for less cost, in some cases, than even decorative chrome.

The big news is that hard trivalent chrome, long sought as a more health- and environmentally-friendly alternative to hex chrome, is now a commercial reality. Hard trivalent chrome coatings have been demonstrated in large scale production and the technology is now available. The impact will be significant on established markets for hex chrome plating, since it's among the most economical and easily implemented hex chrome substitute. The good news for chrome platers is that they can convert to hard trivalent chrome coatings with relative ease and remain at the forefront of wear coating technology.

However, new legislative initiatives, particularly REACH in Europe, have made many nervous about any chromium content at all in their coatings, leading to growing interest in chromium-free coatings. Furthermore, REACH has also targeted cobalt salts, a prime constituent of nanocrystalline cobalt-phosphorus coatings, a very promising and economical plating alternative to hard chrome.

For wear coating markets, the picture is wildly uncertain. Users face wild swings in the cost of raw materials and uneven economic growth. Coating demand in the oil and gas sector went from frenzied to dormant in a short couple of years as a worldwide glut reduced demand for coatings. Forestry and pulp & paper continue a precipitous, long term decline. Other sectors are reporting reasonably optimistic conditions. Even players within the same industry, like small thermal spray

powder suppliers, report widely varying market conditions. It is a time of great uncertainty, but also great promise.

Understand the Markets

Success in wear coating markets will depend almost completely on a balance of cost and performance that will be highly application-specific. Many, if not most, chrome substitutes like thermal spray will require higher up-front costs, usually in the form of equipment purchases. However, longer component lifetimes and reduced frequency of repairs can lead to significant long-term savings, not to mention the benefits of improved performance. Other alternatives offer a crossover benefit that depends on the scale of implementation or other factors. For example, PVD is more expensive than chrome for small lots but can be significantly less expensive in large-scale production. Most alternatives also offer a large advantage in reduced hazardous waste management costs compared to hexavalent chrome.

Thintri's study **Markets in Wear Coatings: Hard Chrome and its Alternatives** examines each of the leading alternative technologies in detail: its capabilities, limitations and most promising applications. The report also explores their potential in major market segments and forecasts markets to 2022.

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Report Contents

Executive Summary	1		
E.1 Introduction	1		
E.2 Hard Chrome Wear Coatings.....	2		
E.2.1 Health & Environmental Hazards, Legislation	2		
E.2.2 The Hard Chrome Industry Today.....	3		
E.2.3 Hard Chrome Markets.....	3		
E.2.4 The Need for Chrome Alternatives in Wear Coatings.....	7		
E.3 Primary Chrome Alternatives.....	8		
E.3.1 Thermal Spray	8		
E.3.1.1 HVOF/HVAF.....	8		62
E.3.1.2 Plasma Spray.....	9		65
E.3.1.3 Twin Wire Arc Spray.....	9		66
E.3.2 Thermal Spray Consumables	10		66
E.3.3 Plated and PVD Alternatives to Chrome.....	10		67
E.3.3.1 Trivalent Chrome.....	11		69
E.3.3.2 Electroless Nickel and its Variations.....	11		71
E.3.3.3 Nanocrystalline Alternatives	13		72
E.3.3.4 Physical Vapor Deposition	13		73
E.3.5 Electrospark Deposition.....	14		74
E.3.6 Explosive Bonding	14		75
E.4 The Market Outlook for Alternatives	14		76
Chapter 1: Introduction	18		
Chapter 2: Today's Hard Chrome Plating Industry.....	21		
2.1 Chromium	21		
2.2 Chrome Plating	22		
2.3 Health and Environmental Effects.....	24		
2.4 Effects of Pollution Control Legislation	25		
2.4.1 OSHA's PELs.....	25		
2.4.2 EPA Rules.....	27		
2.4.3 Europe	30		
2.5 The Industry Today.....	30		
Chapter 3: Hard Chrome Markets and Market Drivers.....	35		
3.1 Overview: Chrome's Dominance in Wear Coatings.....	35		
3.2 Today's Hard Chrome Plating Markets	36		
3.2.1 Aerospace Markets for Hard Chrome Plating.....	39		
3.2.1.1 Aircraft Actuator Hydraulics	40		
3.2.1.2 Landing Gear	41		
3.2.1.3 Gas Turbines	41		
3.2.1.4 Other Aircraft Components	43		
3.2.1.5 Overhaul & Repair.....	44		
3.2.2 Oil Field, Heavy Equipment, and General Industrial Markets for Hard Chrome.....	44		
3.3 Drawbacks in Using Hard Chrome.....	46		
3.4 Hard Chrome Market Conditions Today	48		
3.5 Hard Chrome Market Forecasts	49		
3.5.1 Introduction.....	49		
3.5.2 Aerospace.....	50		
3.5.3 Industry.....	51		
3.5.3.1 Oil & Gas.....	51		
3.5.3.2 Hydraulics & Heavy Machinery.....	52		
3.5.3.3 Other General Industry.....	56		
Chapter 4: Alternative Technologies to Hexavalent Chrome Plating... 60			
4.1 Introduction	60		
4.2 Thermal Spray.....	60		
4.2.1 Thermal Spray Technologies Today.....	60		
4.2.2 High Velocity Oxy-Fuel (HVOF).....	61		
4.2.2.1 D-Gun.....	62		
4.2.2.2 HVAF.....	62		
4.2.2.3 HVOF vs. Chrome	65		
4.2.3 Plasma Spray	66		
4.2.3.1 Conventional Plasma Spray.....	66		
4.2.3.2 High Energy Plasma	67		
4.2.4 Twin Wire Arc Spray.....	69		
4.2.5 Thermal Spray Metal Powder/Polymer Combinations.....	71		
4.2.6 Cold Spray	72		
4.2.7 Powders	73		
4.2.8 Stripping and Grinding Issues.....	74		
4.2.9 Health, Safety & Environmental Issues in Thermal Spray	75		
4.3 Plating Alternatives to Hard Chrome	76		
4.3.1 Trivalent Chromium	76		
4.3.1.1 Faraday Technology	77		
4.3.1.2 Atotech	80		
4.3.1.3 ECOCHROM	81		
4.3.2 Electroless Nickel Plating.....	82		
4.3.2.1 Electroless Nickel Boron.....	85		
4.3.2.2 Electroless Nickel Composite Coating.....	87		
4.3.3 Electrodeposited Nanocrystalline Coatings	91		
4.3.3.1 Integran's Electrodeposited Nanocrystalline Cobalt-Phosphorus	91		
4.3.3.2 US Chrome/USC Technologies	97		
4.3.4 Plated Tin Alloys	99		
4.4 Electrospark Deposition	99		
4.5 Explosive Bonding.....	101		
4.6 Laser Cladding.....	103		
4.7 Vacuum Techniques.....	104		
4.7.1 PVD.....	104		
4.7.2 Intensified Plasma-Assisted Processing	106		
4.8 Line of Sight, Inner Diameter Issues	107		
Chapter 5: Markets for Chrome Alternatives.....	109		
5.1 Target Hard Chrome Markets, Penetration by Alternatives	109		
5.2 Markets and Forecasts for Non-Chrome Plated and Vapor Deposition Solutions.....	110		
5.3 Commercial Demand and Market Forecasts, Thermal Spray	112		
5.3.1 Background: Industrial Thermal Spray in Today's Economy... 112			
5.3.2 Oil Field Applications.....	117		
5.3.3 Hydraulics and Heavy Equipment.....	119		
5.3.4 Other General Industry	123		
5.4 Aerospace Demand and Forecasts	127		
5.4.1 Commercial vs. Defense Demand	129		
5.4.2 Opportunities in Overhaul and Repair vs. Manufacture	132		
5.4.3 Landing Gear.....	133		
5.4.4 Aircraft Hydraulics	137		
5.4.5 Gas Turbines.....	138		
5.4.5.1 Aircraft Gas Turbines.....	139		
5.4.5.2 IGTs.....	140		
5.4.6 Other Aerospace Applications	142		
5.5 Thermal Spray Supplier Markets and Forecasts.....	143		
5.5.1 Wear Coatings Markets	144		
5.5.2 Markets for Services.....	145		
5.5.3 Cost Issues.....	146		
5.5.4 Geographic Segmentation	150		
5.5.5 Powder Providers and Markets	152		
5.5.6 Equipment Providers and Markets.....	155		
5.5.7 HVOF vs. Plasma vs. Wire Arc	159		

Tables and Figures

Figure E-1	Overall Worldwide Hard Hex Chrome Consumables Market Forecast.....	4
Figure E-2	Markets, Hard Hex & Trivalent Chrome Consumables, Wear Coatings	6
Figure E-3	Forecast, Total Hard Chrome Consumables Markets, Wear Coatings	6
Figure E-4	Overall Market Forecast, Thermal Spray Consumables, Wear Coatings	15
Table 2-1	Domestic Sodium Dichromate & Chromic Acid Production, US.....	22
Table 2-2	Typical Process Parameters for Chrome Plating, Conventional Baths	23
Table 2-3	Symptoms of Hexavalent Chromium Exposure Among Chrome Plating and Chromium Chemical Workers	24
Figure 2-1	Sources of Hexavalent Chromium Emissions, 2005.....	29
Figure 3-1	Worldwide Chrome Plating Demand, Consumables, Equipment, Services, Hard vs. Decorative, 2016	36
Figure 3-2	Geographic Distribution, Hard Chrome Production, 2016	38
Figure 3-3	Projected Geographic Distribution, Hard Chrome Production, 2022	38
Figure 3-4	Global Hard Chrome Consumables Market Breakdown, 2016	39
Figure 3-5	Aerospace Chrome Plating Consumables Market Segments, 2016	39
Figure 3-6	Aerospace Hard Chrome Consumables Markets, Commercial vs. Defense, 2016.....	40
Figure 3-7	Hard Chrome Demand Segmentation in Gas Turbines, Aerospace vs. IGT, 2016	42
Table 3-1	Industrial Hard Chrome Applications	45
Figure 3-8	Overall Hard Hex Chrome Consumables/Equipment/Services Market Forecast.....	50
Figure 3-9	Aerospace Hard Hex Chrome Consumables Market Forecast...51	51
Figure 3-10	Hard Hex Chrome Consumables/Equipment/Services Market Forecast, Oil & Gas	52
Figure 3-11	Overall Hydraulics & Heavy Equipment Hard Hex Chrome Market Forecast.....	53
Figure 3-12	Hydraulics Hard Hex Chrome Markets: Mining & Earth Moving vs. Forestry & Logging.....	54
Figure 3-13	Market Forecast: Hard Hex Chrome in Agriculture, Waste & Recycling.....	54
Figure 3-14	Market Forecast: Hard Hex Chrome in Construction, Concrete & Asphalt.....	55
Figure 3-15	Market Forecast: Hard Hex Chrome Consumables in Defense & Government, Freight Transport.....	55
Figure 3-16	Hard Hex Chrome Consumables Market Forecast: General Industry.....	56
Figure 3-17	Market Forecast: Hard Hex Chrome Consumables in General Industry by Market Segment	57
Figure 3-18	Hard Hex Chrome vs. Hard Trivalent Chrome Markets.....	58
Figure 3-19	Overall Hard Chrome Consumables Market Forecast	59
Figure 5-1	Overall Market Forecast, Consumables & Equipment, Plated and PVD Alternatives	111
Figure 5-2	Market Forecast, Consumables and Equipment, Plated and PVD Alternatives by Segment	112
Figure 5-3	Thermal Spray Equipment vs. Consumables Market, 2016.....	117
Figure 5-4	Thermal Spray Powder Market Forecast, Oil and Gas Sector.....	119
Figure 5-5	Thermal Spray Services Market Forecast, Oil and Gas Sector	119
Figure 5-6	Forecast, Thermal Spray Powder, Mining & Earth Moving, Forestry & Logging.....	121
Figure 5-7	Forecast, Thermal Spray Powder, Agriculture, Waste & Recycling.....	121
Figure 5-8	Forecast, Thermal Spray Powder, Construction, Concrete & Asphalt.....	122
Figure 5-9	Forecast, Thermal Spray Powder, Defense & Government, Freight Transport	122
Figure 5-10	Forecast, Thermal Spray Powder, Overall Hydraulics and Heavy Equipment	123
Figure 5-11	Forecast, Thermal Spray Services, Overall Hydraulics and Heavy Equipment	123
Figure 5-12	Forecast, Thermal Spray Powder, General Industry by Segment.....	126
Figure 5-13	Forecast, Thermal Spray Powder, Overall General Industry.....	126
Figure 5-14	Forecast, Thermal Spray Services, Overall General Industry ...	127
Figure 5-15	Defense vs. Commercial Aerospace Demand, Thermal Spray Powder, Wear Coatings, 2016.....	131
Figure 5-16	Defense vs. Commercial Aerospace Demand, Thermal Spray Services, Wear Coatings, 2016.....	131
Figure 5-17	Aerospace Thermal Spray Powder Demand, Manufacture vs. Repair.....	132
Figure 5-18	Aerospace Overhaul & Repair, Thermal Spray Outsource vs. In-House, 2016	133
Figure 5-19	Thermal Spray Powder Demand Forecast, Landing Gear	137
Figure 5-20	Thermal Spray Powder Demand Forecast, Aircraft Hydraulics	138
Figure 5-21	Thermal Spray Powder Demand Forecast, Aircraft Gas Turbines.....	140
Figure 5-22	Thermal Spray Powder Demand Forecast, IGTs	141
Figure 5-23	Thermal Spray Powder Demand Forecast, Other Aerospace ...	142
Figure 5-24	Thermal Spray Services Forecast, Overall Aerospace	143
Figure 5-25	Overall Thermal Spray Wear Coatings Consumables Market Forecast.....	144
Figure 5-26	Overall Market Forecast, Thermal Spray Services	146
Table 5-1	Time Study Results, HVOF vs. Chrome Plating on a Landing Gear Piston: Hours to Plate 737-300 NLG IC Landing Gear Piston: HVOF vs. Chrome Plating.....	147
Figure 5-27	Geographic Segmentation Forecast, Thermal Spray Powders, Wear Coatings	150
Figure 5-28	Geographic Segmentation Forecast, Thermal Spray Equipment, Wear Coatings	150
Figure 5-29	Thermal Spray Powder Market Segments by Coating Type, 2016	153
Figure 5-30	Overall Thermal Spray Wear Coating Powder Market Forecast	153
Figure 5-31	Market Share, Carbide Powder Producers, 2016	155
Figure 5-32	Overall Thermal Spray Wear Coating Equipment Market Forecast.....	156
Figure 5-33	Market Share, Thermal Spray Equipment Producers, 2016	156
Figure 5-34	Market Share, Plasma Spray Equipment Producers, 2016.....	157
Figure 5-35	Market Share, HVOF Equipment Producers, 2016.....	157
Figure 5-36	Market Share, Wire Arc Equipment Producers, 2016	158
Figure 5-37	Thermal Spray Segmentation and Forecast, Consumables.....	159
Figure 5-38	Thermal Spray Segmentation and Forecast, Equipment.....	160