ILMA
Independent Lubricant Manufacturers Association

6TH INTERNATIONAL METALWORKING FLUIDS CONFERENCE

CHLORINATED PARAFFINS IN METALWORKING FLUIDS

AN INDUSTRY PERSPECTIVE

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JANUARY 9, 2024

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AGENDA

- WHY USE THEM?
- WHAT ARE CRITICAL USES?
- CASE FOR USING CHLORINATED PARAFFIN
- CASE AGAINST USING CHLORINATED PARAFFIN
- BRIEF CASE STUDIES
- CONCLUSION

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CRITICAL USES

- Centerless grinding of aerospace bolts, especially titanium
- Wire drawing (mostly stainless steel)
- Deep drawing stainless steel
- Machining high-nickel alloys (Inconel, Waspalloy, numerous others) in a variety of applications
- Tapping high-nickel and titanium nuts
- Certain drilling and tapping applications in aluminum parts
- Numerous Others

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WHY USE CHLORINATED PARAFFIN?

- Excellent EP ("Extreme Pressure") additive for metalworking fluids ("MWF")
- Often used in conjunction with sulfurized, phosphorus, and polar additives
- Cost effective, safe on most metals
- Clear, pleasant smelling
- Known performance, benefits, and handling characteristics
- For critical applications, no practical substitute

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THE CASE AGAINST CP

- Disposal
- Potential for Staining
- Weldability
- Cleanability
- Must be removed prior to heat treating
- "Alpha case" issue with titanium (sort of)
- Parts issues
  - Example: medical parts often require fluids to have zero sulfur and chlorine
- Regulatory challenges?
- Site-specific issues

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GENERAL OVERALL INDUSTRY REACTION?

- Give me something that works!
- Don't give me anything that will cost significantly more!
- Don't disrupt my operations!
  - Hidden cost of testing and qualifying is enormous
- I will obey any regulations that apply to me, but you just said that for the moment we are OK, with no clear guidance on when CPs will really be a problem.

CASE STUDY-AEROSPACE FASTENER MANUFACTURER #1

- Located in So. California
- Makes both bolts and nuts
- 95% High-nickel alloys and titanium, 5% other
- Primary operations
  - Heading
  - Machining (automatic screw machines)
  - Deep Drawing
  - Centerless Grinding
  - Numerous "2nd Operations" (tapping, thread rolling, many others)
  - CNC Machining

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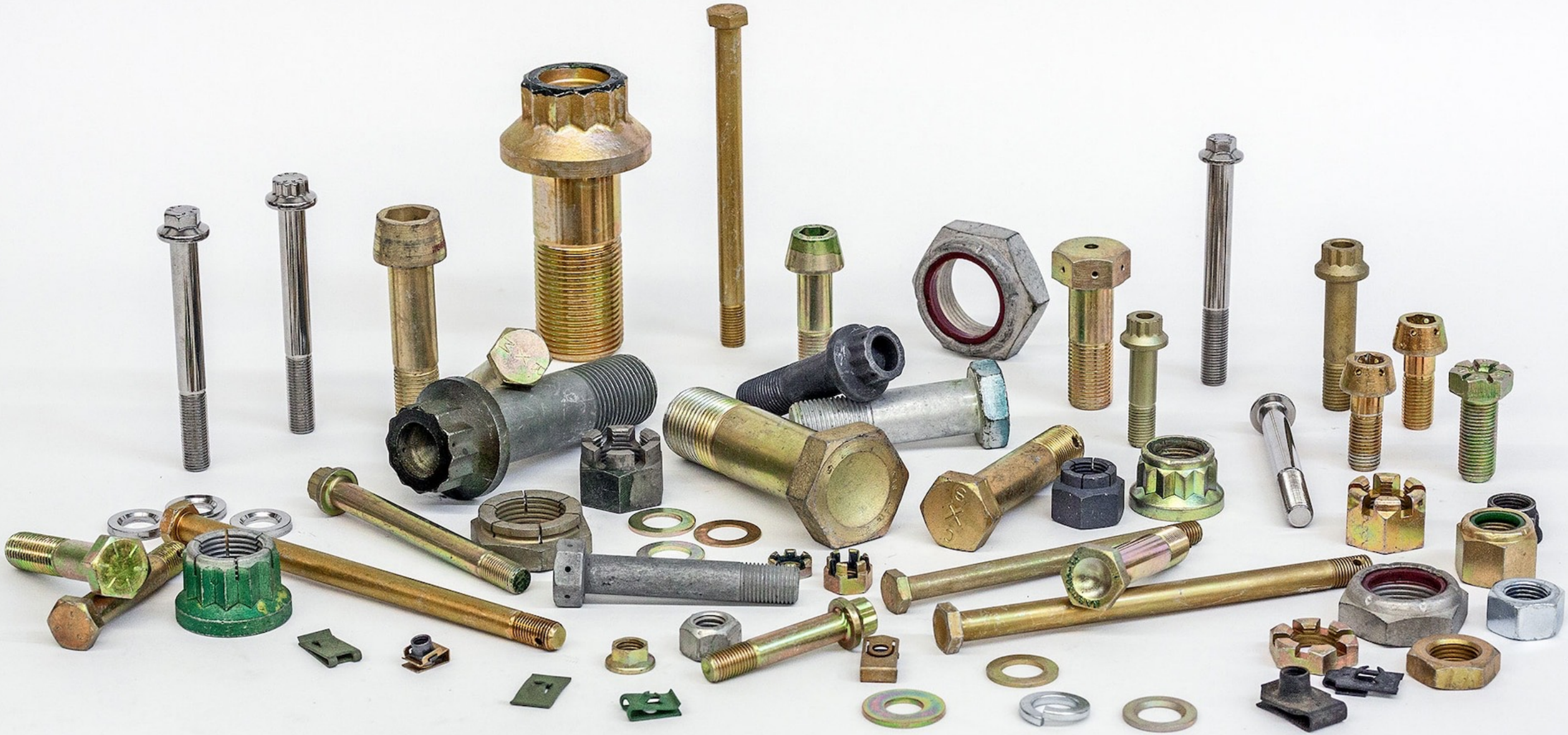

CASE STUDY-AEROSPACE FASTENER MANUFACTURER #1

- They had a major push to eliminate CP
  - Problem was their new parts washer, not regulations
- Successful:
  - Screw Machines (cost went up 15%)
  - Most tapping (cost up 40%)
  - Heading (cost up 100%, but better performance compared to CP)
  - CNC (no net cost difference)
- Unsuccessful:
  - Deep drawing stainless steel
  - Centerless grinding titanium, Inconel, A286
  - Waspalloy and some difficult Inconel tapping

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CASE STUDY-AEROSPACE FASTENER MANUFACTURER #1

- ISSUES WITH CP REPLACEMENT IN CENTERLESS GRINDING OIL
  - Cost: 5,000 gallons in use to be replaced by fluid 80 to 100% more expensive (estimated $100 to $150K)
  - Replacement will likely need routine disposal and cleanout
  - Replacement may not be compatible with filtration
  - Current replacement technology is not operator friendly

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CASE STUDY-AEROSPACE FASTENER MANUFACTURER #1

- <u>DISPOSAL OF CP NOT A THREAT TO THE ENVIRONMENT</u>
- About 1,200 gal./month waste oil generated
  - Hauled as "hazardous" waste (you have to love California!)
  - Converted to marine diesel fuel
- About 5,000 gal. water per month to sewer
  - Average daily CP component estimated to be 4 to 8 OUNCES
- Stormwater testing confirms no significant ground oil discharge of any kind.
  - The parking lot is far worse than the plant

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CASE STUDY-AEROSPACE FASTENER MANUFACTURER #2

- Division of Fortune 50 company
- Company declared an initiative to eliminate all CP worldwide
- Platarg press
  - Transfer press (also called an "Eyelet" press
    - Classic part-Liptstick Tubes
  - Each station has independent stroke length
  - Uses the principle of "reverse draw"

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CASE STUDY-AEROSPACE FASTENER MANUFACTURER #2

- Part was a severe deep draw
- A286 Stainless Steel
- Original oil contained 40% CP plus sulfur and fats
- New design, with a longer draw, had very short die life-200 pieces per sharpening
- Tried 5 different chlorine-free formulations
  - Best die life was 7 parts per sharpening
- Tested an oil with 70% CP plus sulfur and fats
- 7,000 parts per sharpening
- **Still using after 15 years**

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CONCLUSIONS

- Industry wants better performance, for less money
- Not terribly concerned with regulations off in the future
- No universal regulations at present against using CP
- Site-specific issues largely determine whether to use CP or not
- CP is not getting into the environment from modern manufacturers
- For the most part, they do not see CP as a problem

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Questions?