# Maximizing carbide grinding productivity

## Situation

A Midwest US carbide tool manufacturer was having production issues with a mineral oil-based (group II) grinding fluid. When they challenged the oil with heavy grinding, the process would generate dense smoke and oil mist. To avoid these issues, they had to reduce the grind depth by 36% which increased production time significantly.

## Solution

Castrol® proposed Product ML 0001, an advanced synthetic grinding oil with inhibitors tailored for carbide grinding. This oil is designed specifically for heavy duty grinding operations mineral oils are unable to achieve and also prevents cobalt leaching from carbide. It can extend sump life by 2 times or more, while the low volatility reduces mist and overall fluid usage.

## Outcome

Following an extended trial period, no smoke was generated while utilizing the original aggressive grind depth. The manufacturer was able to achieve maximum productivity levels while also reducing mist and improving operator acceptance.

## Savings

- Achieved high production goals
- Avoided investment in additional machine (cost savings $250,000)
- Eliminated smoke and reduced mist for operator acceptance
- Improved safety with high flash point

# Defense contractor realizes improved Swiss Machining

## Situation

A US military and aerospace machining supplier used a high-speed Swiss CNC machine for small stainless steel, copper, titanium and Inconel fasteners. They observed parts and machines had residues and some yellow metals were stained. Operators also complained about mist and smoke, and the plant had experienced fires in the past. A high amount of oil carry-off on the parts equated to vigorous parts washing with solvents and a large volume of oil make-up.

## Solution

Tight tolerances and critical RMS finishes required a high-performance fluid that would accommodate a wide variety of materials. Castrol® Performance Bio NC Ultra Lite EP was tested in two machines to prove machining performance, part finishes, cleanliness and operator acceptance.

## Outcome

In test, the machines performed exceptionally well, showed reduced mist and smoke. Tool life was as good or better than the conventional cutting oil. The lower viscosity of the Castrol fluid meant improved cooling at the point-of-cut and lower oil carry-out, which improved the parts washing process. Operator acceptance was positive and the clear and odorless fluid made it easier to see the parts through the machine window. The chip spinning operation was also improved, since the chip bins had less oil to be separated.

## Savings

- Reduced oil usage by 20%
  (cost savings $12,500 annual)
- Improved cleanliness of parts and machines
- Reduced risk of fires and improved safety
- Increased acceptance by operators and HSE

# Outstanding Saw Blade Life on Steel Tubes

## Situation

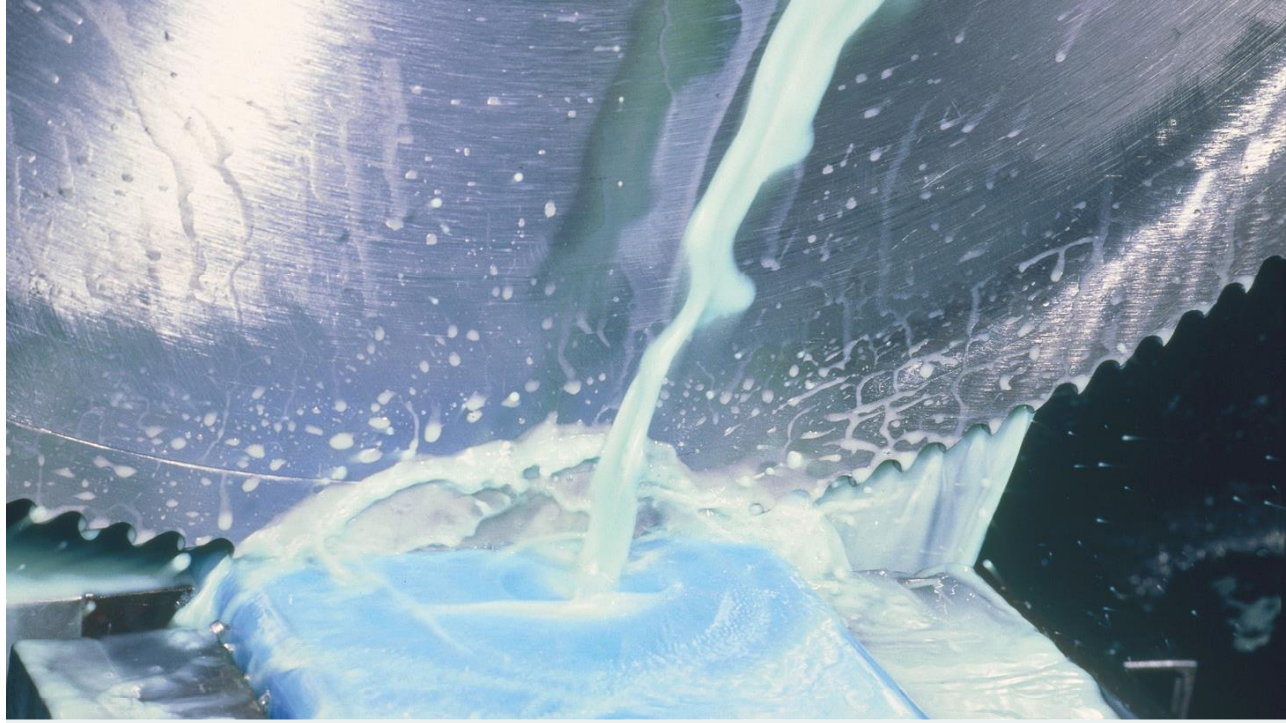
A Southern US tube manufacturer needed to increase saw blade life on HSLA (High Strength Low Alloy) steel tubes being processed with Bewo cutting systems. They planned a controlled test of multiple coolants to determine blade life and overall cost per part.

## Solution

The manufacturer designed a comparison test to measure the saw blade life using seven replacement coolant options. Of the fluids tested, three failed for not meeting the minimum criteria of 15,000 parts per blade. The Hysol MB 50 proved excellent results attaining 60,000 parts per blade, which was 1.7 times greater than the next best fluid tested and 2 times higher than the fluid currently in use. Due to the outstanding blade life performance of MB 50, the customer ceased further testing and converted to the Castrol® fluid.

## Outcome

The customer ran a tool life test and found that Hysol® MB 50 achieved the longest life, correlating to 25% lower cost per part for tooling, as compared to the next best fluid. In addition to the tool life study, the customer also tested the coolants for rust protection. Hysol MB 50 passed their 90-day test with no corrosion while running at a lower concentration than the other fluids.



## Savings

- Longer blade life resulted in few replacements (cost savings $15,125 per machine)
- Minimized downtime and improved productivity
- Lowered total cost per part

# Tool life extended by over 200% helps boost productivity

## Situation

A leading US engine manufacturer faced numerous challenges in their operations - from frequent tool breakage to substantial rework while drilling and reaming heat-treated low carbon steel engine components. Their current metalworking coolant required a 20% concentration and they struggled to achieve a mere 12 minutes of tool life.

## Solution

The manufacturer contacted Castrol® with the goal of finding a fluid that would extend tool life while also reducing coolant usage. The solution, Castrol Hysol AMG, an emulsion-based coolant boasting a high oil content and an enhanced EP (Extreme Pressure) package, specifically tailored for optimal steel machining. The recommended trial concentration for Castrol Hysol AMG was 9%, representing an immediate 50% reduction in coolant usage.

## Outcome

Following the trial period, the tool life increased substantially to 40 minutes, equating to a remarkable 233% increase. Additionally, coolant usage was reduced by nearly 70%. The decrease in rework volume was equally noteworthy as fewer tools broke during machining, translating to reduced downtime and heightened production efficiency.

## Savings

- Reduced operating costs
  (cost savings $54,400 annually)
- Extended tool life by three times the current operation
- Reduced coolant usage by 69% due to lower concentration required

# Improved rust protection and elimination of foam for cast iron parts

## Situation

A large Southern US commercial wheel manufacturer was experiencing foaming and residue issues when using an alkaline cleaner to provide rust protection with cast iron rotor and drum brake components. Excessive foaming led to slowed production and a white residual film upon drying required an additional manufacturing step to clean and prepare parts for installation.

## Solution

The Castrol® team examined the parts, process, and packaging to determine that Rustilo® 4175 was the right solution. The additives in the current fluid caused excessive foam. By switching to the Castrol water-soluble rust inhibitor, production delays were greatly reduced.

## Outcome

In addition to improved rust prevention, Rustilo 4175 eliminated the foaming during wash cycle and residual white film issues were eliminated. The Castrol fluid was able to provide adequate cleaning to meet the customer's standards, requiring no additional steps or wash cycle.

## Savings

- Increased rust protection up to 9 months
- Increased productivity with fewer interventions and elimination of extra wash step

# Water-soluble performance exceeds neat oil and improves HSE

## Situation

A top Midwest US bearing manufacturer faced coolant turnover and HSE issues from misting and surface accumulation with straight oil in their central system. They sought a water-soluble fluid matching or surpassing straight oil's performance in surface finish, pitch diameter, and grinding speeds.

## Solution

Castrol® Hysol® SL 36 XBB matched the surface finish quality of neat oil while maintaining grinding speeds at an 8% concentration, surpassing competitors unable to achieve similar results even at 30%. Castrol recommended monitoring with SmartControl to detect low pH conditions caused by tramp oil, ensuring real-time resolution without production interruptions.

## Outcome

After demonstrating its effectiveness, two central systems switched to water-soluble Hysol SL 36 XBB, cutting coolant usage by 30%. This change notably reduced oil mist and HSE risks while meeting grinding performance targets. SmartControl's real-time monitoring swiftly identified and resolved issues, ensuring uninterrupted production flow.

## Savings

- Reduction in coolant usage of 30%
  (cost savings $108,122 annual)
- Improved plant HSE with reduction of misting, slips
- Relieved safety concerns using boron- and biocide-free coolant
- Improved fluid maintenance and faster problem resolution with SmartControl real-time monitoring

# Water soluble performance exceeds neat oil and improves HSE

## Situation

A top Midwest US bearing manufacturer faced high coolant turnover and HSE issues from misting and surface accumulation caused by straight oil in their central system. They sought a water-soluble fluid to match or surpass the performance of straight oil in surface finish and pitch diameter without compromising grinding speeds.

## Solution

Castrol® Hysol® SL 36 XBB outperformed multiple competitor fluids, delivering equivalent surface finish quality to neat oil without compromising grinding speeds. Remarkably, it achieved this at an 8% concentration, whereas competitors struggled even at 30%. Castrol recommended monitoring the fluid with SmartControl, enabling real-time detection and resolution of low pH conditions caused by tramp oil, without disrupting production.

## Outcome

Two central systems were switched to water-soluble Hysol SL 36 XBB due to its impressive performance, resulting in a 30% reduction in coolant usage. This change significantly decreased oil mist and HSE risks while meeting grinding performance targets. SmartControl's real-time monitoring enabled swift identification and resolution of issues, ensuring uninterrupted production flow.

## Savings

- Reduction in coolant usage of 30%
  (cost savings $108,122 annual)
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# Castrol® Robot Grease Matches Performance without the Long Delivery

## Situation

A major US automotive manufacturer was experiencing long delivery times from Japan for their grease - typically 6 weeks to 3 months. The long lead times would upset the maintenance schedule designed to service 300+ robots in the weld shop.

## Solution

Castrol® proposed to replace the existing grease with Tribol® GR 100-00 PD. To prove performance, Castrol conducted a side-by-side lab analysis with the existing grease. The analysis showed that Tribol GR 100-00 PD performed at least equivalent to the existing grease, and actually better in some key areas.

## Outcome

Tribol GR 100-00 PD proved superior to the existing Japan produced grease in fighting friction. According to SRV testing, the coefficient of friction was lower and the ball scar diameter was much smaller, both of which help increase performance.

## Savings

- Improved delivery from US warehouse
- Helped maintenance schedules to stay on-track
- Achieved 60% cost savings
- Improved grease performance

# Tribol® GR 100-0 PD Success in Fanuc Robots

## Situation

A large US automotive supplier of axles was using an expensive grease from Japan for their Fanuc robot gear lubrication. In addition to the high cost, the delivery time from overseas was extremely long and often disrupted their re-lubrication schedule. As a supplier of other fluids in the facility, Castrol® was asked for a suitable replacement.

## Solution

Castrol Tribol® GR 100-0 PD was identified and presented to the customer based on its high performance and experience in similar assembly robot applications. Testing was conducted in different robots at the site with excellent performance demonstrated.

## Outcome

The customer converted to Castrol Tribol GR 100-00 PD grease and continue to follow the recommended lubrication interval schedule by Fanuc. The plant's preventive maintenance activities are no longer interrupted by lack of grease due to long delivery times. Since the Castrol grease formula does not contain barium(unlike the original grease), meeting EPA requirements for waste disposal was simplified.

## Savings

- Reduced cost and inventory of grease (savings of $75,000 per year)
- Reduced lead times and helped the customer maintain their maintenance schedule
- Demonstrated performance consistent with robot OEM grease

# Magna® SW D 68 Reduces Oil Usage

## Situation

A major US industrial equipment manufacturer was looking for recommendations to reduce their overall operating spend. The customer was utilizing a competitor's slideway oil which was contaminating their full synthetic metalworking fluid. They had been experiencing elevated fluid usage and poor coolant sump life.

## Solution

Castrol® Magna® SW D 68 was recommended as a slideway lubricant replacement. Compared with the existing competitor oil, the Magna SW D's increased tackifier helped to minimize wash-off and coolant contamination was reduced. This resulted in reduced way oil output per lube cycle which extended coolant life and increased machine uptime. At the same time, waste disposal was reduced and preventive maintenance intervals extended.

## Outcome

The Magna SW D 68 slideway oil demonstrated increased adhesion to the slideways, resulting in better lubrication and reduced usage. There was a noticeable reduction in tramp oil entrainment into the metalworking fluid and therefore, the coolant sump life increased.

## Savings

- Extended coolant sump life
- Reduced lubricant usage
- Reduced issues and extended machine preventive maintenance intervals
- Lowered fluid waste

# Multi-metal performance without the compromise on safety

## Situation

A major US aerospace and bearing manufacturer conducted a year-long trial of cutting fluids in order to identify one that would best improve their total operating costs. The minimum fluid requirements were: aerospace approval, global availability, and semi-synthetic chemistry. The suppliers chosen by the customer were: Castrol®, Blaser, Chemetall, Fuchs, and Qualichem. The requirements for performance included multiple machined materials, Inconel, stainless steel, Stellite, titanium, tungsten, and aerospace aluminum.

## Solution

Castrol surveyed the plant and determined that Hysol® SL 45 XBB would be the best choice for their process. Castrol provided a fluid control plan to monitor and maintain the coolant systems. Concentrate usage was monitored and optimized throughout the trial period and machining operations were closely monitored for improvements in part quality and tool life.

## Outcome

The customer implemented fluid-related best practices with their current coolant and used this as a baseline for all of the fluids tested. Castrol Hysol Sl 45 XBB successful ran at the lowest concentration of all the fluids, 4% on aerospace aluminum and 8-10% on all other metals. It’s bacteria-resistant formula eliminated the need for tankside biocide treatment. The result was an average savings realized equal $0.21 per production hour per material, for a net overall cost reduction of nearly 73%.

## Savings

- Eliminated operator safety and dermatitis concerns using a biocide-free metalworking fluid
- Increased tool life by 35%
- Reduced fluid usage by 53%

# Faster machining speeds without the neat oil risks

## Situation

A large US aerospace engine customer had three manufacturing plants using heavy duty, chlorinated neat oils to broach a variety of difficult to machine alloys, including Hastelloy, Inconel, Rene and various stainless steels. They sought a solution that would help to avoid the disposal and environmental issues that accompany using traditional neat oils as well as gain more throughput due to faster cut times. It was also desirable to improve the workplace environment by avoiding the mist and related health and safety issues.

## Solution

Castrol® has successfully worked with customers seeking to change horizontal and vertical broaches from neat oil to water based cutting fluids. The lubrication properties of Syntilo® 9954 allowed faster cutting speeds which resulted in greater parts throughput and reduced cycle times. The broach life also increased, providing more parts per regrind and longer uptime.

## Outcome

Castrol Syntilo 9954 is a water-based coolant that has successfully been used to bring substantial cost savings to customers. This technology allows manufacturers to avoid some of the negatives associated with neat oils while also experiencing savings in tooling, increased through-put, decreased cycle times, and fewer tool changes. The work environment and cleanliness issues were overcome and operator acceptance increased significantly.

## Savings

- Increased RAM speeds >35 ft/min
- Decreased stroke time <15 seconds
- Reduced disposal costs and provided a cleaner work environment
- Improved HSE and operator acceptance

# Boron-free, synthetic steps up rim rolling operation

## Situation

A major North American wheel manufacturer was looking to reduce manufacturing costs by lowering usage of their rim rolling fluid. The fluid used was a chlorinated soluble oil at 8 -10% concentration. Their usage was about 20 drums / month and an additional washing step was required to remove oily residues prior to welding.

## Solution

Castrol® Syntilo® 9974 BF is a mineral oil, boron and formaldehyde releasing agent free synthetic coolant. It contains an additive package that provides good corrosion protection to machine tools and parts. The fluid also provides excellent product stability which helps to lower the overall operational costs. Although initially skeptical, the customer replaced the existing soluble oil after finding that the Syntilo provided numerous benefits and importantly, could perform well in their rim rolling operation.

## Outcome

Syntilo 9974 BF performs well when heat is generated in the operation. Its unique, chlorine free lubricant is attracted to the heat and coats the part to prevent galling and roll marks. The Syntilo 9974 BF could also be filtered much easier and tramp oil skimmed from the fluid, keeping it running very clean and long. In addition, the coolant had much lower carry-off, providing a huge reduction in usage.

## Savings

- Improved safety and EPA goals using a boron-free synthetic
- Reduced usage from 20 drums/month to 10 drums/month
- Eliminated the need for an extra washing step
- Eliminated residues and improved the cleanliness of the work environment significantly

# Castrol® Optigear® Synthetic Eliminates Failures of Cooling Bed Gearboxes

## Situation

The cooling bed at a major US steel mill is operated by three carryover worm gear drives that were experiencing frequent failures. One of the causes was significantly increased load on the cooling bed to meet the production schedule. Based on maintenance data, the average life of these gearboxes varied from 1.4 years for the South gearbox to 3.5 years for the North gearbox. One gearbox repair cost is approx. $30,000.

## Solution

Castrol® worked with the customer's reliability department to conduct root cause analysis and to make recommendations to significantly increase the life of the gearboxes. Conventional mineral gear oils were designed only for gearboxes running under normal load and temperature conditions. In this case, the higher loads and temperatures could not be handled by the current oil, leading to frequent failures. Castrol engineers recognized the conditions and chose Optigear® Synthetic 800/2200.

## Outcome

Castrol Optigear Synthetic 800/2200 is a fully synthetic polyglycol gear oil. It provides an exceptionally low coefficient of friction and extremely high viscosity index for maximum protection under heavy loads like those experienced in this mill. The fluid did not break down and was able to provide the appropriate film thickness for the gearboxes. The change resulted in longer life for the reducers.

## Savings

- Eliminated failures experienced (3 to 6 gearboxes yearly)
- Achieved >3.5 years without cooling bed gearbox failure
- Extended gear life and eliminated need for monthly oil changes previously used to preserve gear function

# Coolant usage greatly reduced with long-lasting semi-synthetic

## Situation

A large US manufacturer of agricultural components was using a semi-synthetic coolant to machine cast iron (and small amounts of steel). The manufacturer was seeking to reduce overall costs to become more competitive in the marketplace. They were reviewing all aspects of the machining process including cutting fluid improvement.

## Solution

Castrol® Hysol® MB 10 was recommended due to it's ability to run very clean and prevent build-up at the tooling edge. For this customer, Hysol MB 10 met all the requirements of their machining operations which included milling, turning, boring, drilling, cut tapping, and form tapping. Additionally, it provided excellent bio-resistance needed for the fluid to be recycled in the customer's batch recycling system.

## Outcome

The introduction of Castrol Hysol MB 10 showed significantly improved machine cleanliness. No coolant odor developed in the shop and tool life was equal or better than the previous semi-synthetic fluid. The cleanliness of the tools were noticeable when the inserts were turned to employ a new cutting edge. They could achieve 45 to 60 parts per insert edge. Coolant usage was reduced by 33% (concentration of 6-7%) due to less carry out on chips and parts, due to the wetting properties of Hysol MB 10.

## Savings

- Reduced residues in machines
- Reduced usage by 33%
  (savings of 15,360 gal/yr)
- Realized noticeable cost savings per gallon vs. previous fluids
- Increased operator acceptance

# Machining Exotic Metals with Hysol® MB® 50

## Situation

A US aerospace engine manufacturer faced operator complaints about residues and washer contamination from the neat cutting oil used on Titanium and Inconel jet engine components. On the Fellows spline center, cutters required regrinding after just 2 parts, and inspections took over an hour due to part finishes. They sought an alternative to improve cutter life, part finish, and machine cleanliness, all of which hampered productivity.

## Solution

Hysol® MB 50 effectively replaces neat oil in critical spline operations for jet engine drive shafts. Castrol® adoption has improved tool life, operator acceptance, and eliminated chlorinated paraffins. This transition yields substantial cost savings and creates a better work environment for operators.

## Outcome

With Hysol MB 50, cutter life doubled to 4 parts, reducing production loss for tool changes by 1 hour per 2 parts. This saved 260 hours/year of reduced tooling costs. Inspection time dropped from 1 hour to 15 minutes, and part washing was eliminated, saving another 15 minutes/part for a total savings of 1 hour/part and gaining 520 production hours.

## Savings

- Increased cutter life by 2 times
- Saved 780 hours total production time per year
- Improved parts finishes significantly
- Reduced the amount of inspection time and eliminated additional washing

# Hysol® MB 50 replaces competitor coolant to reduce usage by 50%

## Situation

A US rifle and handgun manufacturer with 24/7 operations was experiencing short sump life and operator complaints of odor and skin irritation. Machinery residues were occurring and the shop had cleanliness issues. As the customer prepared to move into a new facility, they sought a solution to their fluid related issues.

## Solution

After a thorough plant survey, the Castrol® team discovered the customer had poor housekeeping practices, no tramp oil removal, and inconsistent concentration controls. Hysol® MB 50 was recommended as a more forgiving metalworking fluid that, when combined with implementation of a formal fluid management program, would help them to maximize fluid performance while minimizing fluid costs.

## Outcome

After converting to Hysol MB 50, the manufacturer lower TCO (total cost of ownership).  Castrol implemented proper coolant management practices resulting in a decrease of usage and disposal by 50%. Operator morale improved greatly as odors and residues were eliminated.

## Savings

- Reduced current coolant usage (350-400 gallons/month) by 50%
- Eliminated pump-outs and costly downtime (savings of 4 hours per week at $100 per hour)
- Improved fluid management practices and delivery methods
- Improved operator morale and facility cleanliness

# Alusol® SL 61 XBB – One coolant for the entire shop

## Situation

A US metal goods manufacturer providing precision machining and grinding for power generation markets was experiencing issues with their coolant. The issues included poor bio-stability, sump life and part quality. The customer was interested to standardize on one metalworking fluid for the entire shop and where possible, to improve tooling performance. The metals machined include Inconel, stainless steel, and aluminum.

## Solution

After a thorough investigation, the Castrol® team recommended Alusol® SL 61 XBB due to it's performance characteristics and versatility in multiple metal applications. By comparison, overall usage was reduced by 15% and operator acceptance significantly increased.

## Outcome

Conversion to Alusol SL 61 XBB eliminated sump odors and sump life has increased from 9 months to at least 12 months or longer. This has eliminated almost 4,000 gallons of diluted coolant going into the waste stream. Machine cleanliness also improved, allowing operators to now easily see through the machine windows for part visibility.

## Savings

- Eliminated additive usage
- Improved tool life by 31%
- Reduced coolant usage by 15%
- Improved part quality with reduction of copper staining