

Coolant conundrums

Health and safety issues solved; grinding sludge successfully removed; minimal quantity lubrication; and a breakthrough, 'safe' coolant product. Andrew Allcock reveals all

Lone Star LWD Precision Engineering, Leeds, a leading provider of precision engineered components and specialised surface coatings to the oil, gas and petrochemical industries throughout the UK, machines exotic materials including heat-treated super alloys.

The company is a long-standing user of the Rocol range of lubricants, predominately using the Tri-Logic System. This includes Tri-Logic EP maximum life extreme pressure cutting fluid which is a heavy duty cutting fluid designed for arduous operations and difficult materials. In addition, Tri-Logic EP has been carefully formulated to resist bacterial and fungal degradation in the sump. Indeed, the system has been shown to significantly increase sump life, in most cases to at least 12 months.

Lone Star LWD also uses Tri-Logic VG68, a high performance, patented slideway lubricant. Tri-Logic VG68 slideway lubricant incorporates special additives which prevent the oil being degraded by bacteria and fungi when it drains into the cutting fluid system.

But getting the right coolant also means addressing health and safety issues. Following the introduction by the HSE of new guidelines for the management of cutting fluids, Lone Star LWD contacted Rocol for further advice – Lone Star LWD makes use of Rocol's Ultracare service (see later).

In practice, the guidelines require more stringent risk assessments, checks and controls, taking in: weekly monitoring of bacteria levels in metalworking fluids; strict cleaning cycles and record keeping; implementing a

health surveillance programme; and providing best practice training for staff working with metalworking fluids.

Terry Leach, quality director and responsible for health and safety at Lone Star LWD, comments: "Rocol already provided Lone Star LWD with an excellent service each month through its Ultracare programme and our cutting fluid usage/monitoring more than fulfilled the HSE needs. However, the new health and safety legislation required us to further improve our cleaning and housekeeping. Rocol and Lone Star LWD worked

together to devise a tailor-made service to ensure every HSE requirement was met. We have a long history of working together – it is a partnership and the relationship is beneficial to both companies."

Filtering coolant was the issue to be tackled at Turner Powertrain Systems, Wolverhampton, a global leader in the design and manufacture of off-highway transmissions for backhoe loaders, telescopic material handlers and 4 to 9 tonne site dumpers.

The challenge was to remove sludge



Rocol stepped in to help Lone Star LWD meet latest HSE coolant management guidelines

from coolant used on its high throughput Jones & Shipman grinders. To solve the problem, the company has installed an Ebbco SludgeMaster filtration system from Hirschmann UK.

Now reaping the many benefits of the new Ebbco system, Steve Cooper, Turner Powertrain Systems' operation support manager, reports: "Our new filtration system has proved to be an overwhelming success. With its rapid maintenance procedure and extended service cycle of 20 weeks, as opposed to eight weeks on our previous paper-



Master Chemical formulated its new 'safe' coolant in its UK laboratories

hydrocore system, the SludgeMaster unit has enabled us to slash down-time.

"In addition to increased productive machine time, our payback on investment calculations were highly influenced by the fact that, unlike similar systems, the SludgeMaster does not require any consumables. Despite the unit's small footprint, the improved ability of the Ebbco system in removing contaminants from our coolant has ensured improved surface finish, less time is spent dressing our grinding wheels and it has also created a much improved working environment for our operators."

The key component of each SludgeMaster System is the patented Lakos centrifugal-action, liquid-solid separator. Its continuous operation and

Master Chemical claims 'unique' breakthrough coolant

Master Chemical's recently introduced UK-developed Trim E925 concentrate for metalcutting is claimed to be unique because it is vegetable ester-based yet uses no registered biocides. "That is something that every coolant manufacturer is looking to achieve," says the company's technical manager, Peter Blenkinsop. "Basically, vegetable ester provides lots of food for bacteria, but we have discovered a 'package' that is unfriendly to bacteria yet contains no boron, chlorine, formaldehyde donors or isothiazolinone – no registered biocides, in other words."

In fact, Trim E925 contains no 'nasties' whatsoever, so in addition to the above, no sulphur or borene either, yet it performs like an EP emulsion while also delivering equivalent or even superior performance, the latter particularly in aluminium machining where 'excellent' surface finishes are being achieved. But it also delivers high performance in aerospace alloys such as titanium and Inconel, says Mr Blenkinsop. Indeed, in the company's US machining laboratory he says it achieved the highest machineability rating of any product in recent years.

Because the Trim E925 uses none of the above additives, it is marketable anywhere in the world. In Europe, for example, while there are no regulations to prevent their use there are national and regional variations. In Spain boron is disliked because of its potential to contaminate fruit growing through disposed waste, while in France there is talk of action against formaldehyde donor chemicals, for example.

"There are other products which are boron, formaldehyde donor, borene, and sulphur free," says Mr Blenkinsop, "but what is unique about ours is that it is not fully vegetable based, but is instead a hybrid. Typically a soluble oil would contain 60 per cent mineral oil. Ours is 40 per cent vegetable esters, 20 per cent mineral oil, and the rest is additives. So we are not claiming that it is mineral-oil-free but you have a product which has the benefits of having vegetable esters that offer fantastic lubrication, without chlorine and sulphur EP additives. Performance equates to a very, very high EP, heavy duty soluble oil from yesteryear."

It took Master Chemical some three years to develop, two of those to discover a way to control bacteria. But having discovered this secret, Mr Blenkinsop says Master Chemical has "discovered a backbone of product from which we can develop fully vegetable ester-based products with zero mineral oil."

Trim E925 is considered to fall into the same family as a soluble oil concentrate – soluble oils typically have 45/60 per cent mineral oil in the concentrate. The company will develop a semi synthetic – these typically have 40 per cent or below mineral oil in the concentrate – and will also develop a full vegetable ester product.

And because the products feature multiple benefits, it won't be necessary to expand the range beyond this. "Normally you have to develop different products such as a high EP formula, or a product without such and such an additive, and so on. This product already has high EP and no unwanted additives in the same formula."

Take up in Europe has been "fantastic", much of this in aerospace, elsewhere in automotive where high surface finishes on aluminium products are required. The company is now targeting the UK's aerospace sector.



Cutting oil contamination at Airbus, Broughton threatened the company's investment in an automated drilling, countersinking and riveting process. Minimal quantity lubrication provided the answer

ability to automatically control /concentrate sludge prevents the bacteria-forming consequences of sludge build-up within the coolant reservoir.

At Airbus, Broughton, coolant contamination in an automated drilling and riveting process threatened to upset the company's investment in sophisticated automated machinery. Upgrading to the Bielomatik MQL (Minimal Quantity Lubrication) two-channel system has, however, paved the way for more efficient automated manufacture of wing panels for the A380.

It enables components to pass through various drilling, countersinking and riveting operations without any tool cutting lubricant residue remaining. In so doing, it has proved to be a major advance over the previous lubrication operation that was messy, requiring the wings to be cleaned down after drilling and countersinking.

Bielomatik's MQL system, with its high speed valve solution, enables oil deliveries as low as 3-5 ml/hour to be achieved. So while the drilling, countersinking and spot facing operations are lubricated, the

lubricant used is totally lost and the metal chips are dry, falling away from the component surface more readily, precisely the type of delivery required on the Airbus wing assembly line where no oil can be allowed to remain in a drilled hole prior to riveting.

The original machine tool lube system comprised an air feed, drawing oil from a simple oil reservoir attached to the head which 'sprayed' lubrication on to the area to be drilled. The amount of oil being applied could not be controlled and so too much oil was being left in and around each hole.

QUICK VALVE CONTROL

The solution was to incorporate the Bielomatik 2-CH MQL system, where a pressurised, small bore ring main delivers oil from a reservoir simultaneously, but separately, with a controlled air supply to a special Bielomatik rotary transmission unit. A specially designed 'quick valve' attached to the rotary transmission unit then controls precisely the amount of lubricant released for optimum cutting performance, quality of finish and extended tool life.

On the A380 Airbus assembly line, lubrication is delivered via Bielomatik's MQL system through the cutting and countersinking tool while it is applied externally for the spot facing operation. Not only optimising tool life and cycle times, it has the added benefit that metal cuttings are oil-free and can be recycled more easily and at lower cost.□

HSE guidelines prompt test kit launch

In response to the latest HSE guidelines relating to the control of bacterial contamination in used water-soluble metalworking fluids, and to coincide with the launch of the Ecocool Ultralife range of coolants, Fuchs UK has introduced a new Mobile Coolant Testing Kit.

The HSE's revised guidelines, including a new document for metalworking fluid users titled *MWF5: Managing sumps and bacterial contamination*, states that manufacturers should:

- Carry out a suitable and sufficient risk assessment to evaluate the potential risk of occupational asthma and extrinsic allergic alveolitis
- Maintain fluid quality and control bacterial contamination in fluids
- Minimise skin exposure to fluids
- Prevent or control airborne mists
- Where there is exposure to fluid or mist, carry out health surveillance.

The testing kit is an ideal way for machining companies to monitor bacteria levels in used coolant and act accordingly, helping them to protect their employees, ensure compliance with HSE guidelines and improve the commercial performance of their business, says Fuchs UK.