



ENERGY & GENERAL COST SAVINGS FROM THE USE OF SYNTHETIC FOOD GRADE LUBRICANTS



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Introduction

The food, beverage and pharmaceutical industries use many types of machinery lubricant. These fall into one of two classifications: either “food grade” or “non-food grade”. Food grade lubricants are generally classified as lubricants that are registered with the NSF to H1 or 3H standard.

Typically, food manufacturing companies will use “food grade” lubricants in all process areas and non-food grade lubricants in other areas, such as warehouses, transport depots and effluent plants.

Food grade lubricants come in many forms from simple rape seed and vegetable oils, through white oils to semi-synthetic and fully synthetic oils and greases.

FUCHS offers two food grade lubricant ranges: the CASSIDA range, based on fully synthetic oils; and the FM range based on semi-synthetic white oils.

These notes relate to the use of CASSIDA fully synthetic food grade lubricants and include examples of how they can bring savings in both energy and maintenance costs.

Why synthetics?

Fully synthetic oils are tailor-made for high performance, and will offer superior performance over conventional mineral oils, vegetable oils and white oils. Synthetic oils:

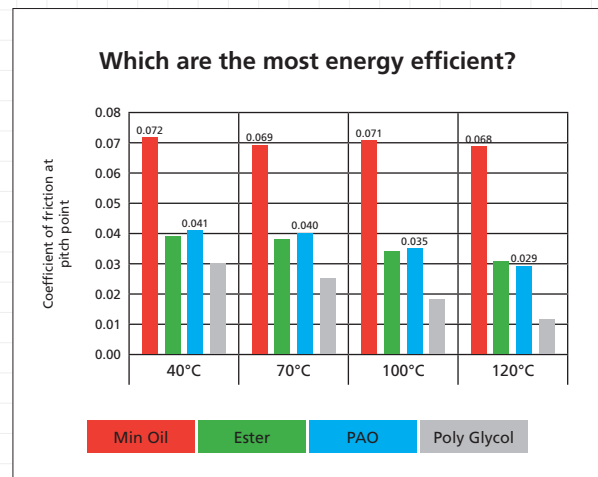
- Are less susceptible to temperature changes, due to their higher viscosity indexes.
- Are cleaner in use, especially at the elevated temperatures found in engines etc.
- Accept additive packages more readily than mineral oils, and their refining process allows them to retain natural anti-oxidants and sulphur compounds with anti-wear characteristics.
- Generally offer significantly increased service life over mineral oils. For example, a synthetic compressor oil can provide an 8,000+ hour life compared with the 2,000-4,000 hour life of mineral or semi-synthetic oils. (Figures quoted are from actual test results for a Hydrovane Rig Oxidation Test at 120°C.)
- Offer much better “sludge protection” than mineral oils, especially in gearbox applications.

What is synthetic oil?

The types of synthetic oil used in the production of CASSIDA food grade lubricants are:

- Polyalphaolefin (PAO) – used in hydraulic, chain and gear oils and as a base oil for most CASSIDA greases.
- Polyglycol (PAG) – used specifically in the CASSIDA FLUID WG series of worm gearbox lubricants.
- Ester (POE) – used in conjunction with PAO in products such as the CASSIDA FLUID FL and CASSIDA FLUID HFS hydraulic oil ranges.

The chart below details typical data for the various oil types in relation to energy efficiency. Using synthetic oils can provide significant energy saving benefits compared to mineral oils.



How do lubricants save energy?

For any machine to move, energy has to be provided to overcome friction. Lubricants reduce friction, but some lubricants reduce friction more than others. Therefore careful selection of the lubricants can provide tangible savings in energy requirements.

Why energy savings?

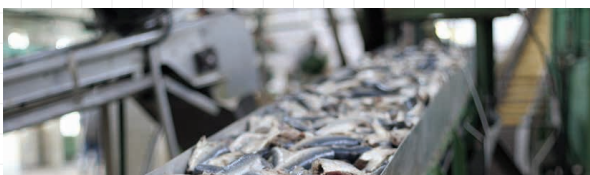
- EEC Directives are targeting industry to reduce energy usage.
- Reduced energy usage = less pollution from power stations.
- Reduced energy usage = lower manufacturing costs.
- Climate Change Levy (April 2001). Companies are encouraged to reduce energy consumption through a levy of 0.43p per KWh. This means companies need to reduce energy consumption by 12% to offset this levy.

Where can lubricants save energy?

Process industries that convert raw materials into usable goods require energy. In a food plant, vast amounts of electricity are required to drive gear drives, hydraulics, compressors and bearings.

Electricity is a major cost overhead, but lubricant costs by comparison are minimal. The selection of the correct lubricant for an application can reduce power consumption and therefore reduce energy requirements. It will also extend lubricant life, reduce downtime and improve overall efficiency.

FUCHS offers a full range of CASSIDA fully synthetic products to meet the requirements of the food, beverage, pharmaceutical and related industries.



Power savings

What sort of power savings can we achieve with the correct synthetic lubricant?

The following power savings can be achieved when using synthetic oils compared with standard non-food grade mineral oil based lubricants of the same viscosity:

- Gearboxes
Worm Drives: 12-30% using PAG based gear oils
- Spur Drives
1-5%
- Hydraulics
1-3%
- Compressors
2-7%
- Bearings
1-5%

How do we measure energy savings?

- Select suitable plant machinery
- Measure power consumption and temperatures
- Check condition of plant (CENT Condition Monitoring)
- Change oil to new product
- Measure power consumption and temperatures
- Calculate power saving





Cost savings achieved by the use of synthetic CASSIDA lubricants

Below are real cost savings that the CASSIDA products have delivered to our customers.

Equipment	Problem	Solution
Bakery ovens and wheel-bearing lubrication on oven trolleys.	Oven temperature up to 300°C, normally 270°C. Trolley in oven 5-10 min. Customer had tried several greases including a silicone grease but grease leaked causing bearing failure.	Changed to CASSIDA GREASE HTS 2. Bearing lubricated every 2-3 weeks during maintenance. Grease turns black and soft, but no bleeding/leak and no bearing failure.
Oven-drive worm gear used to feed a bakery operation.	Experienced continual failures on a semi-synthetic gear oil. Failure as often as 6 times a year, which caused severe downtime, costing US\$ 300,000 per year in lost production, labour and parts.	After switching to CASSIDA FLUID GL 460 (PAO-synthetic ISO 460 gear oil), gear did not fail and operating temperature dropped. Now oil changed every 12 months.
Rotary blower in bulk powder handling.	Constantly over-heating (temp ranges from 99 to 141°C) causing the gear oil to deteriorate and grease running out through the seals. Bearing & gear malfunctioned – spalling, stress marking and carbon deposit. Gear box rebuilt every 6 months costing US\$ 5,000 per unit.	Through use of CASSIDA FLUID GL 220 (PAO-synthetic ISO 220 gear oil) and CASSIDA GREASE EPS 2 (Aluminium complex NLGI 2 grease) the temperature dropped. Now been operating for 18 months without failure. Total cost saving: US\$ 10,000 per unit per year.
8-inch thrust-loaded SKF bearings on a 3.25-inch diameter shaft, under 2500 lb pressure in powder mill.	Bearing overheated despite daily lubrication. The processor ran the bearing until failure (welded to the shaft) and forced operation to stop.	CASSIDA GREASE EPS 2 (PAO-based aluminium complex grease). No bearing failure for 18 months and only weekly lubrication required. Total cost saving: US\$ 40,000/year.
Coffee bean roaster.	Bearing couldn't retain grease, due to extreme temperature (232°C) reached in direct fire roasting. Out-board bearing temperature regularly reached 149°C, which the mineral grease could not endure. 4-6 bearings needed replacing each month.	CASSIDA GREASE HTS 2 (PAO-based grease) with weekly lubrication. No more bearing failure. Total cost saving: US\$ 25,000 over 18 months.

Total cost benefit of using CASSIDA fully synthetic lubricants

- Reduced energy charges
- Reduced lubricant usage
- Improved plant efficiency
- Reduced maintenance requirements and replacement costs
- Less manpower required to change oils
- Reduced waste generated
- Reduced costs for your production plant