

Synthetic oil has four main purposes engineering essay



**ASSIGN
BUSTER**

Graphite grease is used to lubricate in high temperature environments.

Graphite can dissipate more heat than some other lubricants. For example, graphite grease can often handle more heat than natural bearing grease.

Graphite grease is often used on linkages as it can stick to them and will not evaporate like oils do. This lubricates both surfaces and reduces the amount of energy needed to move them.

Cutting fluid is used in cutting machinery to keep the cutting tool and the item being milled at a stable temperature, prevent rust forming on the item being milled or the cutting tool, to prolong the life of the cutting head by lubricating the cutting edge and prevent tip welding and to clean away shards of metal caused by the milling of the metal.

CNC routers use cutting fluid pumped to the cutting head from a reservoir of cutting fluid. This cutting fluid is usually an oil-water emulsion. The cutting fluid is applied directly at the point of cutting to reduce and keep the temperature of the cutting area stable which is critical when working to small tolerances. The addition of the cutting fluid provides lubrication which in turn lowers the amount of heat generated at the working edge reducing thermal expansion and allowing for a more accurate cut. The reduction in friction also reduces tip welding to the milled part. The application of the cutting fluid coats the head of both the cutting tool and milling area to prevent oxidation of the new surface being milled and the new surface of the cutting head caused by the wear of the cutting process prolonging the life of the cutting head. The flow of cutting fluid across the cutting surface removes the metal swarf from the area creating a better quality finish to the milled part. These metal shards get removed from the cutting fluid before it gets

<https://assignbuster.com/synthetic-oil-has-four-main-purposes-engineering-essay/>

back to the reservoir by a strainer. This prevents damage to the fluid pump and contamination of the cutting fluid heading back to the milling surface.

<http://media.insidewoodworking.com/cnc-milling-machine-a1.jpg>

Question 2

Engine of a family car

In a combustion engine of a family car, where the oil is kept is called the sump. This is where the oil pump takes the oil from to distribute it around the engine. The oil then passes through a filter to remove dirt particles from the oil before it gets to the vital parts of the engine. The oil gets distributed around the engine through oil galleries. These oil galleries have spurt holes in them which direct oil to the parts where it is needed such as cylinders and bearings. To maintain this system oil and filter change must be done when the manufacture recommends. To do this you need a new filter, around 4 litters of the correct grade of oil and a new sump plug seal. To start you need to get the engine oil warm to make it thinner. To do this you need to take the car for a drive and get it up to operating temperature. Once it is up to temperatures place it on level ground with the handbrake on and in gear, and jack the front of the vehicle up so you have access to the sump plug. Get a container for the oil to pour in to and undo the sump plug. Once removed, check the magnet on the end of the sump plug for excessive and large chunks of metal which is a sign of engine wear. While the old oil is being drained off remove the oil filter being careful not to spill the oil that will still be in it. To fit a new filter, make sure that a smear of oil is placed around the rubber seal to get a better seal and then screw on until tight. Replace the

<https://assignbuster.com/synthetic-oil-has-four-main-purposes-engineering-essay/>

sump plug gasket and screw the sump plug back into the sump, nipping up with the appropriate tool. Then start filling the engine up with the new oil checking the level on the dipstick. When the oil level reaches in between the two notches it is safe to start the engine and bring it up to temperature. Once it has been run check for oil leaks and the oil level.

Positive displacement air compressor

The lubrication system of an air compressor uses the dip and splash method. This consists of a hook cast or bolted in to the crankshaft which dips the hook into oil in the sump and brings it back out again causing it to splash oil around the inside of the engine. This system is used because it is cheap and easy to maintain. To maintain the system it is simply a process of undoing the sump plug, letting the oil drain out, putting the sump plug back in and filling up with oil. This system does not have an oil filter and pipe work which is the reason why it is cheap and easy to maintain.

http://www.dansmc.com/splash_lube2.jpg

Multi-head machining centre

Machining centres use multiple lubrication heads and nozzles to get different types of lubrication effects i. e mist and flood. A pump takes pre mixed cutting fluid from a reservoir through a filter to a nozzle which delivers it to the cutting surface. Excess cutting fluid then runs away from cutting area and into an oil catch. At the bottom of this oil catch is a strainer which takes out metal shavings and debris from the cutting fluid that the fluid removed from the milling area. The cutting fluid then falls back to the oil reservoir

<https://assignbuster.com/synthetic-oil-has-four-main-purposes-engineering-essay/>

where it becomes ready to use again. To maintain this system the cutting fluid needs to be renewed as over time it degrades and bacteria colonize within it making it smell and hence becomes a health hazard. Cutting fluid must be disposed of in the correct way because if it is disposed of incorrectly it is harmful to the environment. The reservoir, piping and pump must be cleaned out with disinfectant to kill off the bacterial colonies. The reservoir must then be topped up with the correct mixture of cutting oil and water.

Question 3

An engine in a red bull air race series plane is subjected to extreme g-force and inversions. For the engine to remain lubricated at all times they cannot use a conventional wet sump due to the inversions that the planes do throughout the course. To combat this they use a dry sump in which the oil is stored in an oil tank, not at the bottom of the engine in an open sump. This oil tank can be any size the manufacturer would like and can be placed anywhere on the aircraft. The oil is collected by a flop tube so the oil can be collected under any amount of g-force or inversion to maintain oil pressure through out the flight. The oil is pumped from the storage tank through oil galleys and spurt holes to lubricate the engines vital parts such as the cylinders, crankshaft and camshafts. The oil then falls to the base of the engine like it does in a wet sump system. The oil collects in an oil pan at the base of the engine and is then pumped to the oil storage tank via an oil cooler. The pump used for this is a special pump called a scavenger pump which has to be more tolerant of entrained gasses than a standard pressure pump as it will not be constantly sucking oil due to the small amount being used in the engine. This maintains the least amount of oil in the engine at all

<https://assignbuster.com/synthetic-oil-has-four-main-purposes-engineering-essay/>

times. A dry sump system is used in acrobatic planes for a number of reasons. If a conventional wet sump system was used during inversions and changes from positive to negative g-force the oil from the sump would flood the engine causing the engine to cut out and leaving the pilot of the aircraft in difficulties. Changes in direction on the long banked curves found on the red bull air race courses would cause the oil to move to one side of the sump in a wet sump system potentially starving the oil pump causing a drop in oil pressure increasing the risk of serious wear on the engine which could cause engine failure over time. A benefit of using a dry sump is that the engine can be mounted lower down in the aircraft due to not having a deep sump pan so the weight can be kept lower down helping with aerodynamic stability. Another benefit of using this method of lubrication is that the crank shaft cannot become immersed in oil which would reduce the power generated by the engine. This not only makes the plane safer due to there being no risk of fluctuation in power but also means more power can be developed from smaller engines, in some cases up to 15bhp. Overall the dry sump system is vital to the operation of acrobatic aircraft because without it, it would not be able to perform the stunts and acrobatic manoeuvres required in the red bull air race system.