CUTTING FLUIDS


Metalworking

QUESTIONS

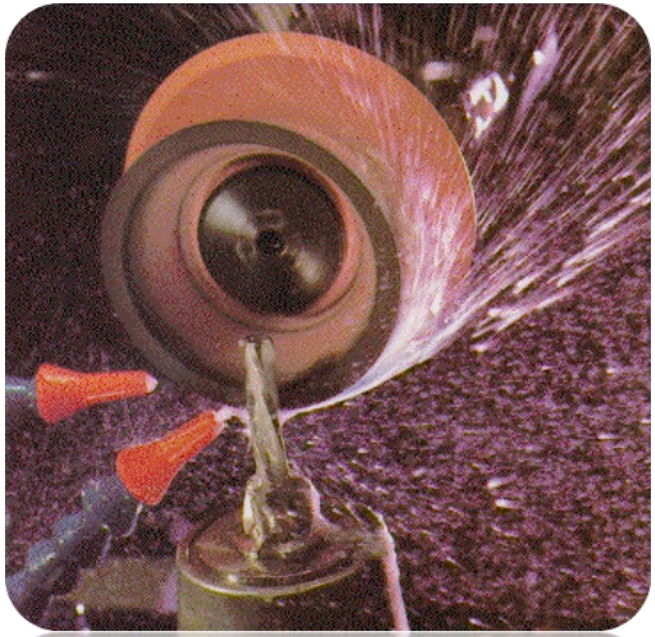
1. What is cutting fluids?
2. What are the functions of a cutting fluid ?
3. How are they categorised ?
4. How should the fluid be applied to the work area ?
5. What are the properties?

THE PRIMARY FUNCTIONS OF CUTTING FLUIDS IN MACHINING ARE…

- Lubricating the cutting process at low cutting speed.
- Cooling the work piece at high cutting speed.
- and flushing away chips from the cutting zone.

SECONDARY FUNCTIONS INCLUDE…

- Corrosion protection of the machined surface
- enabling part handling by cooling the hot surface



4 CATEGORIES

1. Straight oils
2. Soluble oils
3. Semi-synthetic fluids
4. Synthetic fluids

STRAIGHT OILS

- are the oldest class of engineered metal removal fluids
- used in machining operations in an undiluted form.
- They are composed of a base mineral or petroleum oil and often contains polar lubricants such as fats,
- vegetable oils and esters as well as extreme pressure additives such as Chlorine, Sulphur and Phosphorus.
- Straight oils provide the best lubrication and the poorest cooling characteristics among cutting fluids.

SOLUBLE OIL

- form an emulsion when mixed with water.
- The concentrate consists of a base mineral oil and emulsifiers to help produce a stable emulsion.
- They are used in a diluted form (usual concentration = 3 to 10%)
- provide good lubrication and heat transfer performance.
- They are widely used in industry and are the least expensive among all cutting fluids.

SYNTHETIC FLUIDS

- contain no petroleum or mineral oil base
- are formulated from alkaline inorganic and organic compounds
- They are generally used in a diluted form (usual concentration = 3 to 10%).
- Synthetic fluids often provide the best cooling performance among all cutting fluids.

SEMI-SYNTHETIC FLUIDS

- are essentially combination of synthetic and soluble oil fluids
- and have characteristics common to both types.
- The cost and heat transfer performance of semi-synthetic fluids lie between those of synthetic and soluble oil fluids.

PROPERTIES OF CUTTING FLUID..

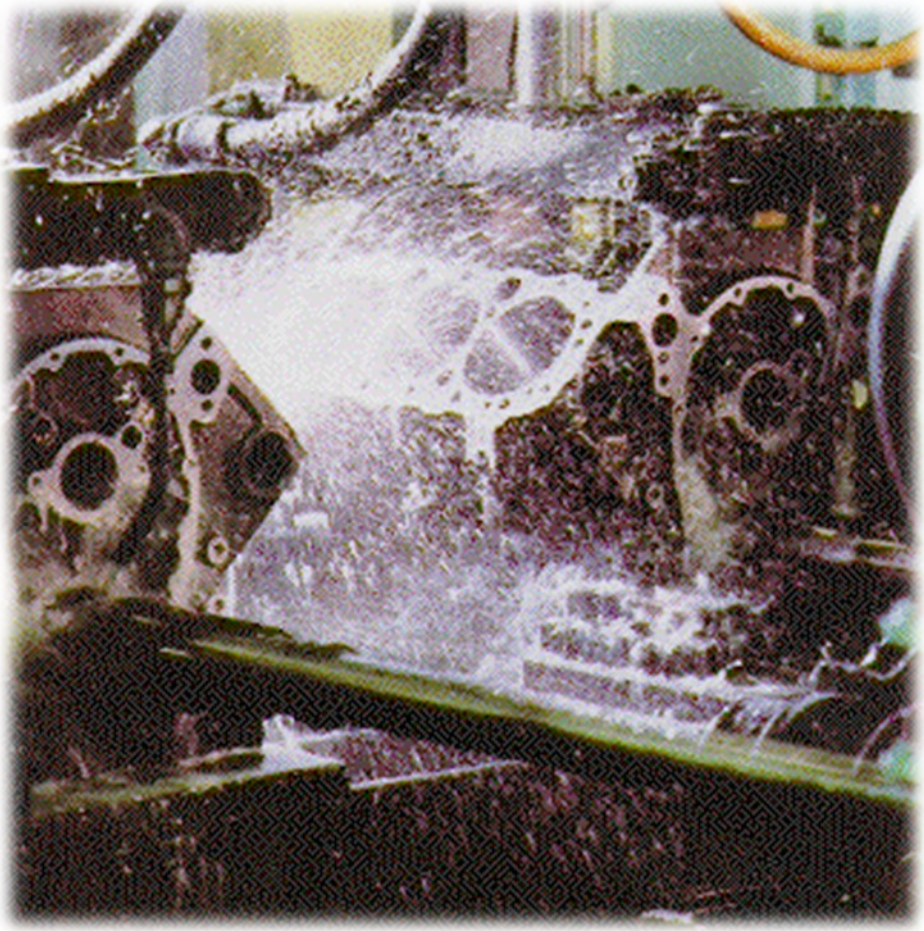
- It should posses good lubricating properties to reduce the frictional force
- It should be non-toxic.
- It should be chemically inactive.
- It should not very easily flammable.
- It should be stable in use and storage.
- High heat conductivity.

CUTTING FLUID APPLICATION

- The principal methods of cutting fluid application include…

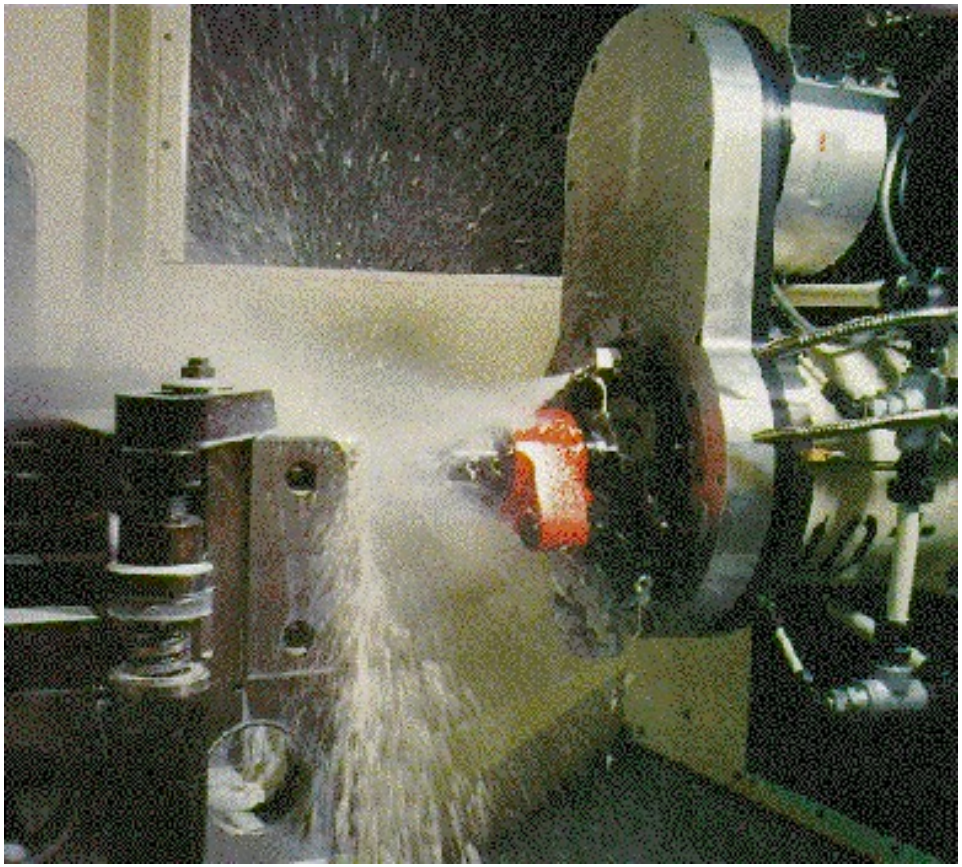
FLOOD APPLICATION OF FLUID

- *a flood of cutting fluid is applied on the workpiece*



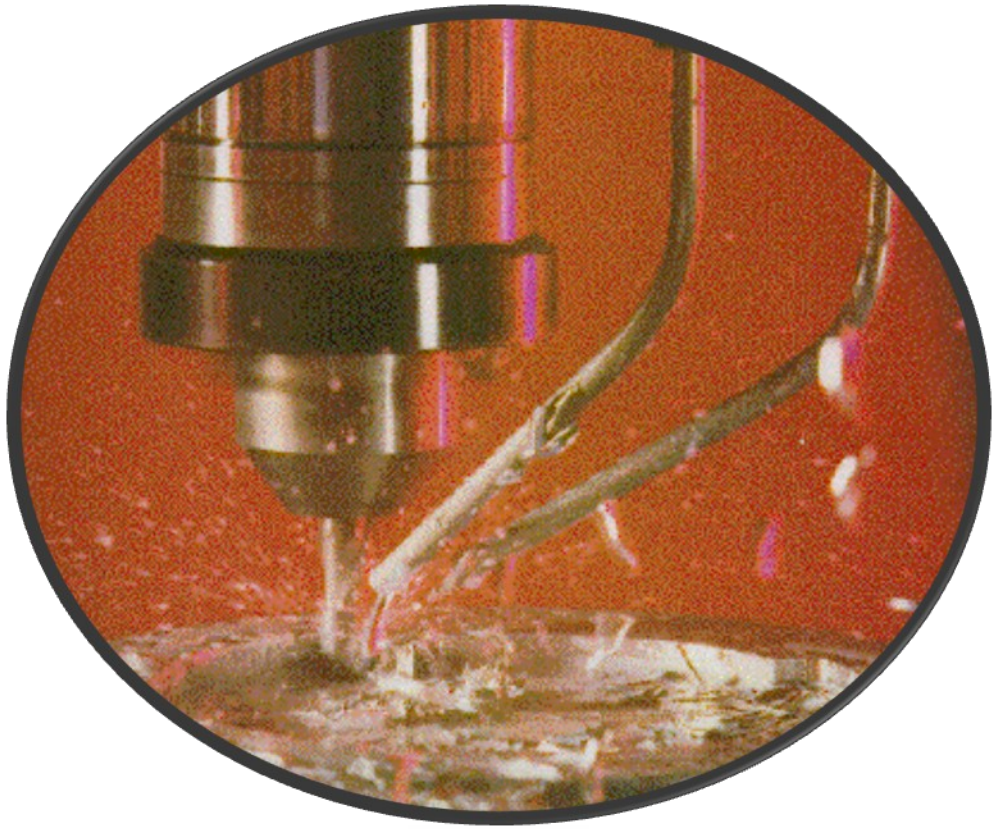
JET APPLICATION OF FLUID

- *a jet of cutting fluid is applied on the workpiece*



MIST APPLICATION OF FLUID

- ***cutting fluid is atomised by a jet of air***



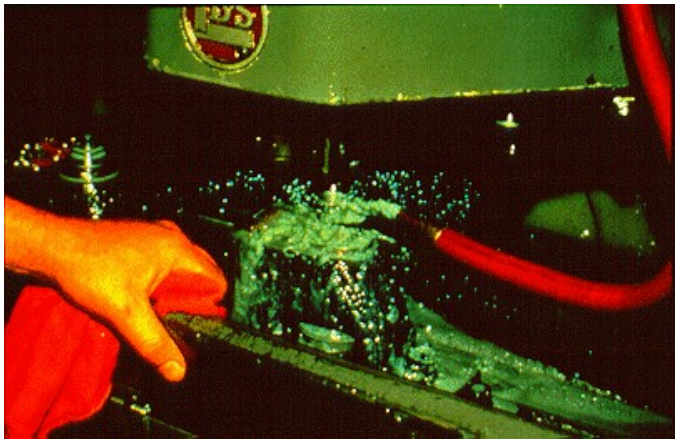
BENEFITS ACHIEVED WITH THE USE OF CUTTING FLUID

- improving tool life,
- Lower tool force ,
- improving surface finish,
- Finished surfaces are protected from corrosion

CUTTING FLUID HEALTH HAZARDS

- Workers are exposed to metal cutting fluids via three routes

1. Skin exposure
2. Aerial exposure
3. Ingestion



- Skin exposure is the main problem – 80%
- Main cause of occupational contact dermatitis

Solution ????

- Avoid prolonged contact
  e.g. Splash guards…
- we can use face protectors,

Thank you