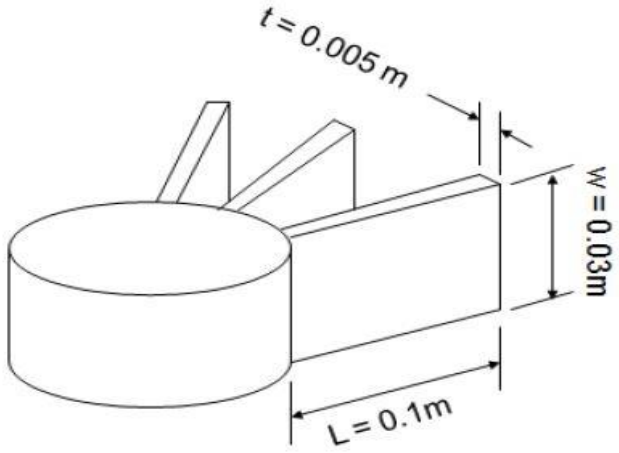
**Tut 2**

1. A steel rod (k = 30 W/m degree) 1 cm in diameter and 5 cm long protrudes from a wall which is maintained at 10 degree Celsius. The rod is insulated at its tip and is exposed to an environment with h = 50 W/m2 degree and t a = 30 degree Celsius. Calculate the fin efficiency.

2.

The figure below shows part of a set of radial aluminium fins (k = 180 W/m K) that are to be fitted to a small air compressor. The device dissipates 1 kW by convecting to the surrounding air which is at 20°C. Each fin is 100 mm long, 30 mm high and 5 mm thick. The tip of each fin may be assumed to be adiabatic and a heat transfer coefficient of h = 15 W/m$^2$ K acts over the remaining surfaces.

Estimate the number of fins required to ensure the base temperature does not exceed 120°C




3.

Water at 80°C is pumped through 100 m of stainless steel pipe, k = 16 W/m K of inner and outer radii 47 mm and 50 mm respectively. The heat transfer coefficient due to water is 2000 W/m$^2$ K. The outer surface of the pipe loses heat by convection to air at 20°C and the heat transfer coefficient is 200 W/m$^2$ K. Calculate the heat flow through the pipe. Also calculate the heat flow through the pipe when a layer of insulation, k = 0.1 W/m K and 50 mm radial thickness is wrapped around the pipe.