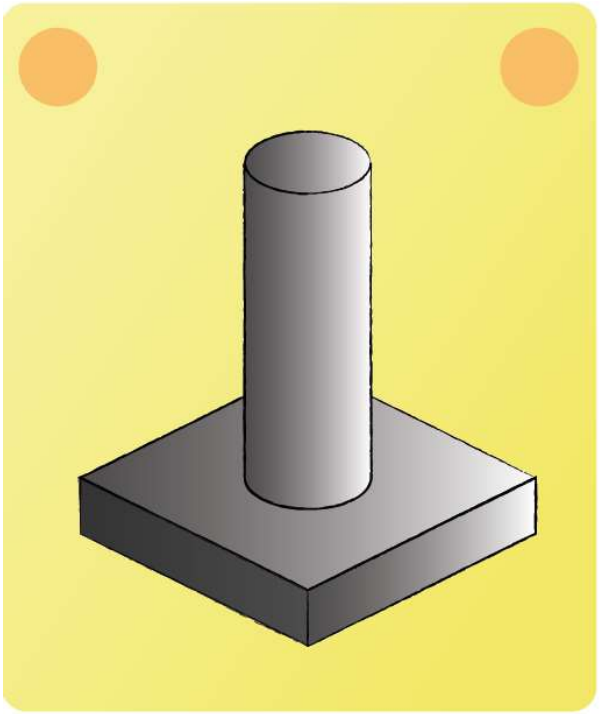
Lecture 9 - Question 3



What are the disadvantages of fins?

Higher material consumption
Increased pressure loss
Additional weight and volume
When fins are used an increase of the rate of heat transfer is desired. When using fins the surface area increases. The rate of heat transfer by convection is described as:

$$\dot{Q} = \alpha \cdot A_s \cdot (T_\mathrm{w} - T_\mathrm{a})$$

Thus heat is better transferred. Making the higher surface area to be an advantage indirectly causing the higher rate of heat transfer.
This additional surface area causes the weight and volume of a design to increase as well, which is undesirable. Due to the increase in volume the material consumption will rise and so will the production costs, which is a disadvantage.
The increased pressure loss is a disadvantage because it is a loss of energy, which can not be recovered. Due to the energy lost, more energy will be required to move the same volume of fluid when no fins are used.