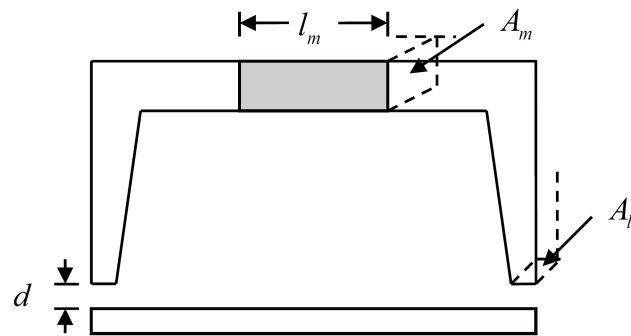


## Exercise 5: Permanentmagnet

In the given apparatus there is placed a neodymium-iron-boron (NdFeB) magnet. The permanent magnet has a magnetization  $m = 1\text{ T}$ . The magnetization can be considered constant for the operatingpoint. The lifting force should be 48 N. The airgap length  $d$  is 1 mm. The maximum fluxdensity in the iron is  $b_{Fe,max} = 1,1\text{ T}$ . (The magnetic resistance is  $R_{Fe} \approx 0\text{ A/Vs}$  ( $\mu_r = \infty$ )).



- Calculate the cross section  $A_l$  in that way, that the requested lifting-force is reached without exceeding the maximum flux-density. What is the resulting flux  $\phi_l$  in the airgap?
- Calculate the minimal magnet volume with the resulting flux  $\phi_l$  from task a). The air gap length  $d$  as well as the cross section  $A_l$  have to be kept constant.