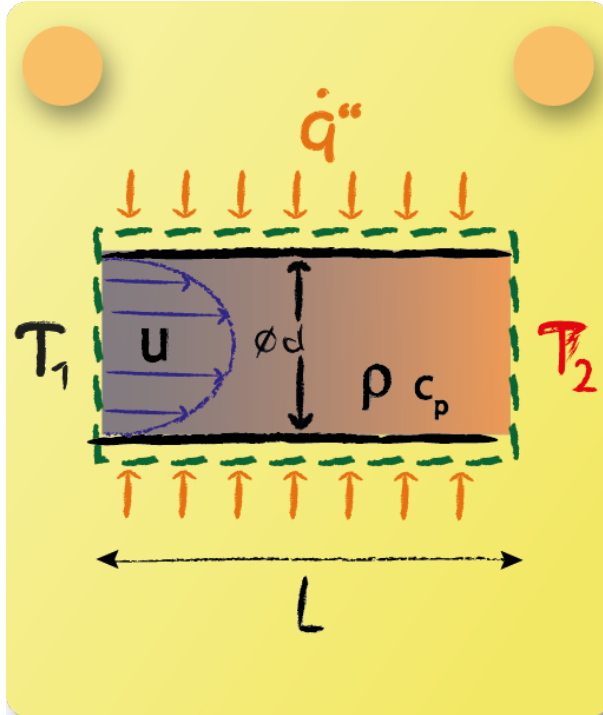


## Energy Balance: Task 14



Derive an equation to determine  $T_2$

An energy balance of the entire pipe section is suitable to determine  $T_2$ . The steady energy balance consists of energy fluxes due to heating with  $\dot{q}''$ , incoming water with temperature  $T_1$  and outgoing flux of water with increased temperature  $T_2$ . The energy balance reads:

$$0 = \rho u \pi \frac{d^2}{4} c_p (T_2 - T_1) + \dot{q}''_{\max} \pi d L$$

and rearranged for the outlet temperature:

$$T_2 = T_1 + \frac{4 \dot{q}'' L}{\rho u d c_p}$$

1

