$$\sigma_d = \sqrt{\frac{130 \cdot 10^{-4}}{4}} \Rightarrow \sigma_d \cong 0{,}057\,mm$$

→ Incerteza final

$$\sigma_F = \sqrt{(0{,}06)^2 + (0{,}05)^2} \Rightarrow \sigma_F = \sqrt{3{,}6 \cdot 10^{-3} + 2{,}5 \cdot 10^{-3}} \Rightarrow \sigma_F = \sqrt{6{,}1 \cdot 10^{-3}}$$

$$\sigma_F \cong 0{,}08\,mm$$

Altura

→ valor mais provável da grandeza

$$\bar{H} = \frac{13{,}45 + 13{,}3 + 13{,}5 + 13{,}5 + 13{,}5}{5} \Rightarrow \bar{H} = \frac{67{,}25}{5} \Rightarrow \bar{H} = 13{,}45\,mm$$

→ Desvio padrão

$$\sigma_H = \sqrt{\frac{(13{,}45 - 13{,}45)^2 + (13{,}3 - 13{,}45)^2 + (13{,}5 - 13{,}45) + (13{,}5 - 13{,}45)^2 + \ldots (13{,}5 - 13{,}45)^2}{4}} \Rightarrow \sigma_H = \sqrt{\frac{22{,}5 \cdot 10^{-3} + 2{,}5 \cdot 10^{-3} + 2{,}5 \cdot 10^{-3} + 2{,}5 \cdot 10^{-3}}{4}}$$

$$\sigma_H = \sqrt{7{,}5 \cdot 10^{-3}} \Rightarrow \sigma_H \cong 0{,}0866\,mm$$

→ Incerteza final

$$\sigma_F = \sqrt{(0{,}09)^2 + (0{,}05)^2} \Rightarrow \sigma_F = \sqrt{8{,}1 \cdot 10^{-3} + 2{,}5 \cdot 10^{-3}}$$

$$\sigma_F = \sqrt{10{,}6 \cdot 10^{-3}} \Rightarrow \sigma_F \cong 0{,}103\,mm$$

→ Densidade

$$\bar{\rho} = \frac{4 \cdot 12{,}82}{\pi (16{,}72)^2 \cdot 13{,}45} \Rightarrow \bar{\rho} = \frac{51{,}28}{11812{,}58} \Rightarrow \bar{\rho} = 4{,}341 \cdot 10^{-3}\ g/mm^3$$

→ Cálculo da incerteza da densidade

$$\sigma_\rho = 4{,}3 \cdot 10^{-3} \sqrt{\left(\frac{0{,}01}{12{,}82}\right)^2 + \left(\frac{2 \cdot 0{,}08}{16{,}72}\right)^2 + \left(\frac{0{,}10}{13{,}45}\right)^2}$$

$$\sigma_\rho = 4{,}3 \cdot 10^{-3} \sqrt{6{,}08 \cdot 10^{-7} + 9{,}16 \cdot 10^{-5} + 5{,}53 \cdot 10^{-5}}$$

$$\sigma_\rho \cong 0{,}000056\ g/mm^3$$