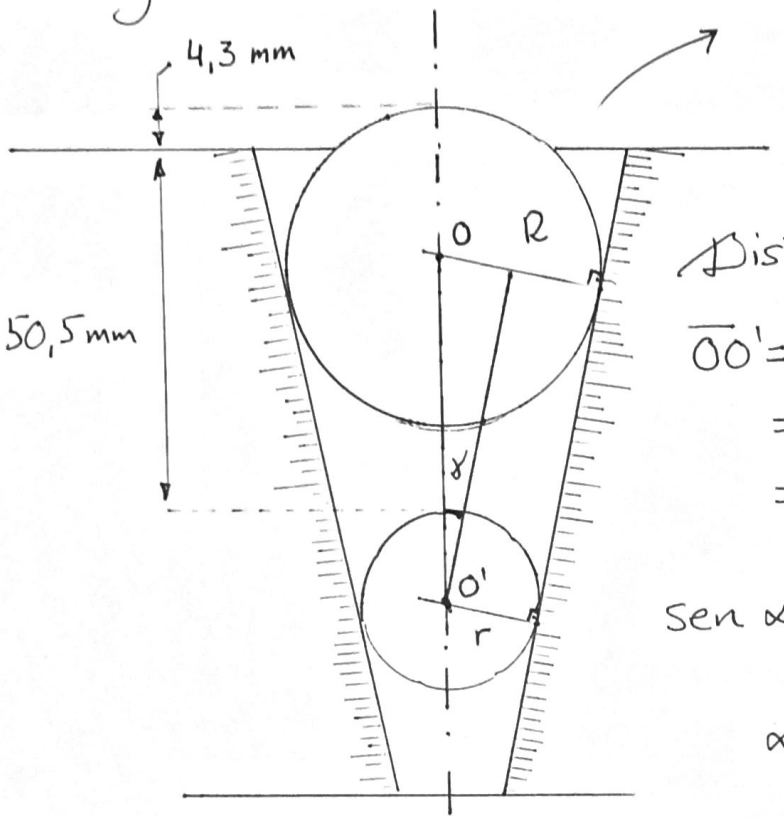
a) Ángulo del taladro



Se observa que:

$$\operatorname{sen}\alpha = \frac{R - r}{\overline{OO'}}$$

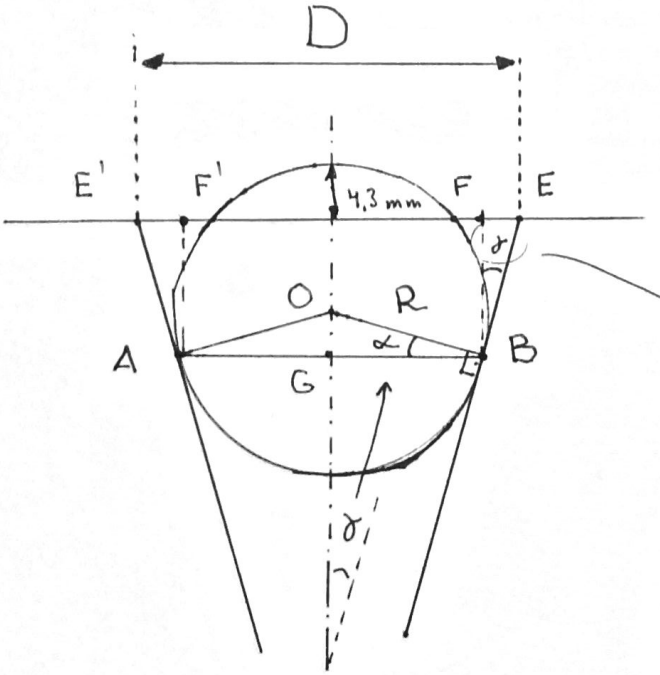
Distancia $\overline{OO'}$

$$\overline{OO'} = 50{,}5\,mm + 4{,}3\,mm + r - R$$
$$= 50{,}5\,mm + 4{,}3\,mm + 2{,}5\,mm - 5\,mm$$
$$= 52{,}3\,mm$$

$$\operatorname{sen}\alpha = \frac{2{,}5\,mm}{52{,}3\,mm} = 0{,}0478$$

$$\alpha = \operatorname{arcsen}(0{,}0478) = 2{,}74°$$

b) Diámetro mayor del taladro cónico.



$$D = \overline{AB} + 2\overline{FE}$$

$$\overline{AB} = 2 \cdot R \cdot \cos\alpha$$

$$\overline{AB} = 2 \cdot 5\,mm \cdot \cos(2{,}74°) = 9{,}988\,mm$$

$$tg\,\alpha = \frac{\overline{FE}}{\overline{FB}}$$

$$\overline{FE} = \overline{FB} \cdot tg\,\alpha$$

$$\overline{FB} = R - 4{,}3\,mm + \overline{OG}$$

$$\operatorname{Sen}\alpha = \frac{\overline{OG}}{R}$$

$$\overline{OG} = R \cdot \operatorname{sen}\alpha$$

$$\overline{OG} = 5\,mm \cdot \operatorname{sen}(2.74°)$$

$$\overline{OG} = 0{,}24\,mm$$

$$\overline{FB} = 5\,mm - 4{,}3\,mm + 0{,}24\,m$$

$$\overline{FB} = 0{,}94\,mm$$

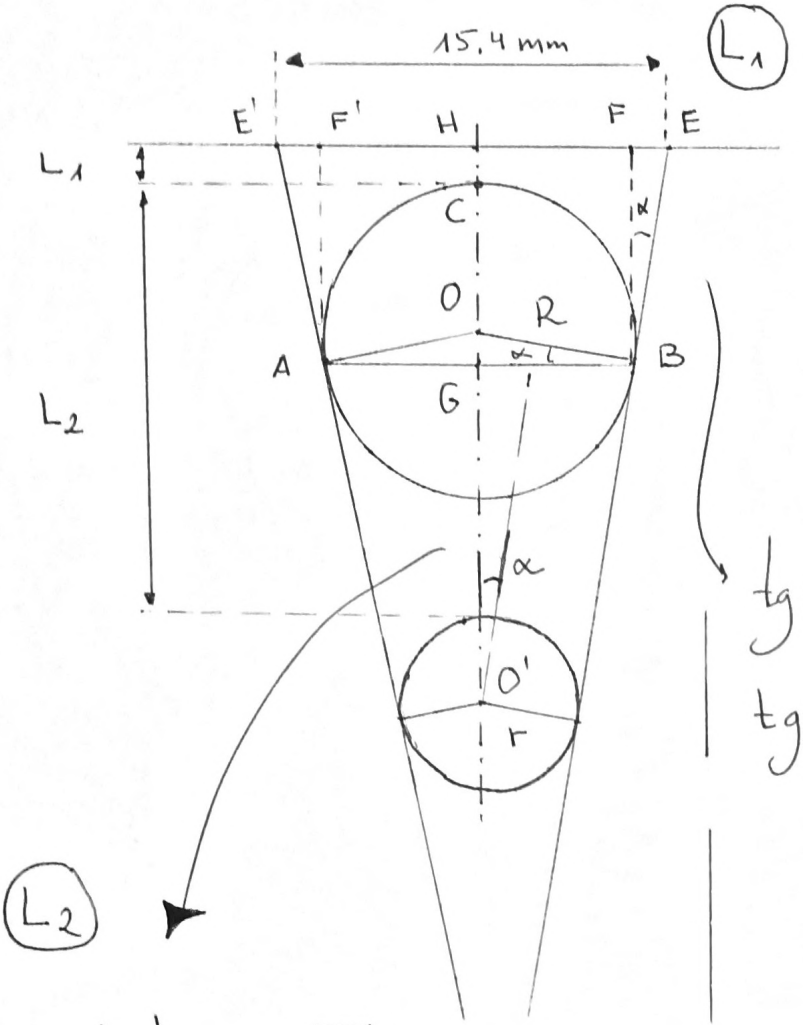
$$\overline{FE} = 0{,}94\,mm \cdot tg(2{,}74°)$$

$$\overline{FE} = 0{,}045\,mm$$

$$D = 9{,}988\,mm + 2 \cdot 0{,}045\,mm$$

$$D = 10{,}078\,mm$$

c) Si D fuese 15,4 mm y $\alpha = 2° 30' = 2,5°$
¿cuáles serían las cotas a medir sobre las esferas?



$\overline{FE} = \dfrac{15,4 - \overline{AB}}{2}$

$\overline{AB} = 2 \cdot R \cdot \cos(\alpha) = 2R\cos(2,5°)$

$\overline{AB} = 2 \cdot 5\,mm \cdot 0,999 = 9,99\,mm$

$\overline{FE} = \dfrac{15,4\,mm - 9,99\,mm}{2} = 2,70\,mm$

$tg\alpha = \dfrac{\overline{FE}}{\overline{FB}}$

$tg\alpha \cdot \overline{FB} = \overline{FE}$

$\overline{FB} = \dfrac{\overline{FE}}{tg\alpha} = \dfrac{2,7\,mm}{tg(2,5°)}$

$\overline{FB} = 61,84\,mm$

Calculamos $\overline{OO'}$

$\operatorname{sen}\alpha = \dfrac{R - r}{\overline{OO'}}$

$\overline{OO'} = \dfrac{R - r}{\operatorname{sen}\alpha} = \dfrac{5mm - 2,5mm}{\operatorname{sen}(2,5°)}$

$\overline{OO'} = 57,31\,mm$

$OG = R \cdot \operatorname{sen}\alpha = 5mm \cdot \operatorname{sen}(2,5°)$

$OG = 0,218\,mm$

$\overline{HC} = \overline{FB} - \overline{OG} - R$

$\overline{HC} = 61,84\,mm - 0,218\,mm - 5\,mm$

$\overline{HC} = 56,622\,mm = L_1$

$L_2 = \overline{HC} + \overline{OO'} + R - r = 56,622\,mm + 57,31\,mm + 5\,mm - 2,5\,mm$

$L_2 = 116,432\,mm$