Задатак:

Израдити рачунарски модел машинске стеге ширине до 100mm, највеће силе стезања 20KN уз одговарајуће прорачуне и проверу оптерећења елемената стеге.

Израдити склопни цртеж и радионичке цртеже елемената стеге.

Proračun elemenata mašinske stege

Za mašinsku stegu sa trapeznim navojem poznato je:
Najveća sila stezanja Fa=20KN – zadata vrednost

Usvajam koeficijent trenja na priteznoj povrsini μ_2=0,2.
3a materijal vijka biram ČV 4.8;
Rucna sila pri pritezanju Fr =0,15KN;

Određivanje precnika trapeznog navoja u telu stezača

Prečnik vijka odredjuje se samo pomoću uzdužne sile u vijku koja se povecava za 25%,s tim što se pretpostavlja da će pri proveri složeni napon pritiska i uvijanja zadovoljiti.

Površina jezgra vijka Al=$\frac{1,25Fa}{\sigma pd}=\frac{1,250000}{68,5}$=364mm.

gde je σ pd=$\frac{R_{eH}}{S}=\frac{240}{3,5}$=68,5N/mm.

Usvaja se trapezni normalni navoj sa sledećim podacima:
Tr 28 x 5 JUS M.BO.062, koji ima: A_l=398mm;d_l=22,5mm;
D2=25mm;Hl=2mm;a=3,58.

Stvarni napon pritiska $\sigma p=\frac{Fv}{Al}=\frac{20000}{398}$=50,25N/mm.

Moment uvijanja $M_u=M_v+M_l$=Fa tg$(\varphi+p)\frac{d2}{2}$+Fv $\mu\cdot\frac{dm}{2}$=

=20000 tg(3 58+8 32) $\frac{25,5}{2}+20000\cdot0,2\cdot\frac{25,5}{2}=106000Nmm$

Otporni moment preseka $W_0=\frac{d\pi}{16}=\frac{22,5\cdot\pi}{16}=2280mm.$

Napon uvijanja $\tau_u = \frac{Mu}{Wo} = \frac{1060000}{2280} = 46{,}5N/mm.$

Dozvoljeni napon uvijanja $\tau_{ud} = \frac{0{,}85T}{V} = \frac{0{,}85 \cdot 240}{3{,}5} = 58N/mm,$

$\alpha_0 = \frac{\sigma_{pd}}{\tau_{ud}} = \frac{68{,}5}{58} = 1{,}18.$

Slozenai napon $\sigma_i = \sqrt{\sigma_p + (\alpha_0 \tau_u)} = \sqrt{50{,}25 + (1{,}18 \cdot 46{,}5)} = 74{,}4\text{N/mm},$

Stepen sigurnosti navojnog vretena $S = \frac{R_{eH}}{\sigma i} = \frac{240}{74{,}4} = 3{,}3$ što zadovoljava jer je *jer* $S_{min}=3$.

Povrsinski pritisak izmedju navoja vijka i navrtke $p = \frac{Fv}{d2 \cdot \rho \cdot H_1 \cdot z} \leq pd,$

pa je broj navoja $z = \frac{Fv}{d_2 \cdot \rho \cdot H_1 \cdot p_d} = \frac{20000}{25{,}5 \cdot 2 \cdot 10} = 12{,}5$

gde je pd =10N/mm-usvojena vrednost za navrtku od čelika ili
Bronze.
Duzina navoja u telu stezaca m=p z=5 12,5=62,5mm.
Usvaja se $m=70_{mm}$.

Provera izvijanja navojnog vretena

Vitkost navojnog vretena ručnog stezaca

$\lambda = 8l_{max} / d_1 = 8(160+40)/23 = 69,56$, pa se provera izvijanja vrši po Tetmajerovoj jednačini:

$$S = \frac{\sigma_{KO} - \lambda \cdot k}{\sigma_P} = \frac{350 - 69,56 \cdot 0,6}{50,25} = 6,2$$

što zadovoljava, jer je stepen sigurnosti protiv izvijanja $S_{min} = 4$

Određivanje dimenzija ručice

Rucica je izložena savijanju,

Ms=Fr(l_r-$\frac{d_g}{2}$)=150(15 18-$\frac{28 \cdot 1,6}{2}$)=29600Nmm.

Dozvoljeni napon $\sigma_{sd} = \frac{R_{eH}}{S} = \frac{240}{3} = 80N/mm^2$.

Precnik ručice $d_r = \sqrt[3]{\frac{32M_s}{\pi \cdot \sigma_{sd}}} = \sqrt[3]{\frac{29000}{80}} = 15,5mm.$

Usvaja se $d_r = 16mm.$

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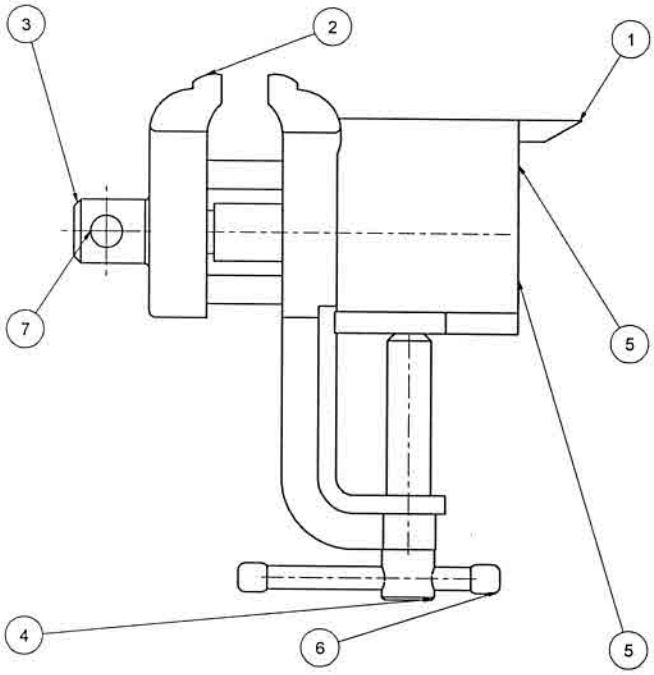

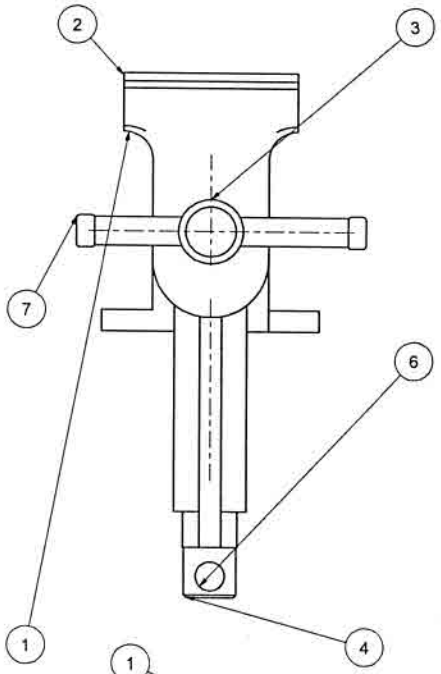

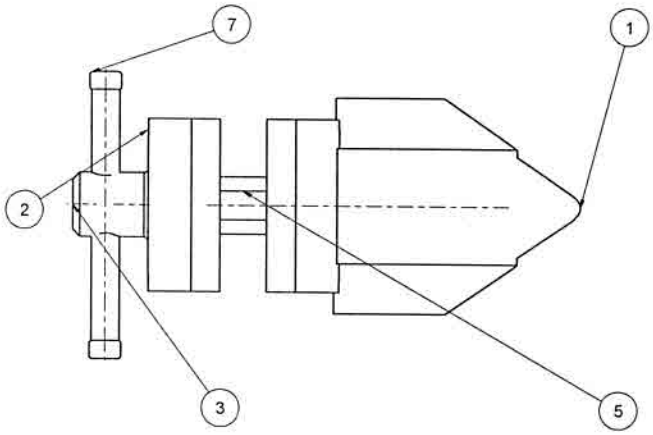

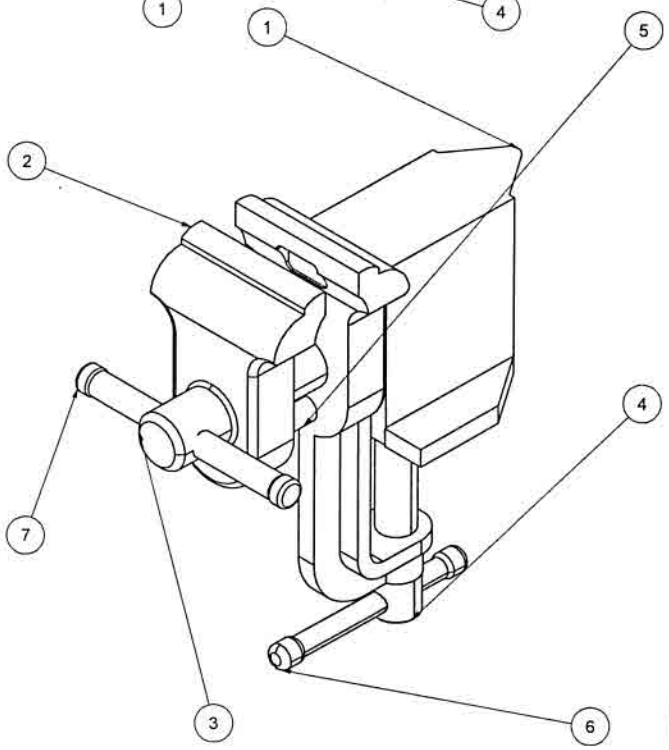

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4	1	vreteno M24	
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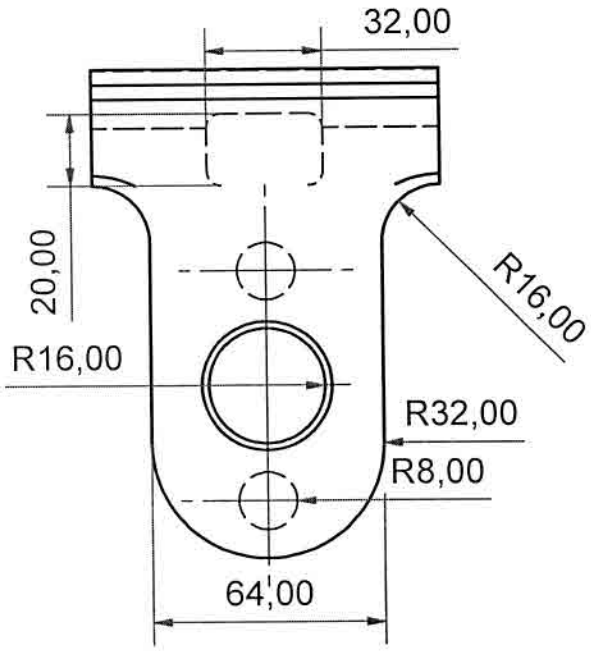

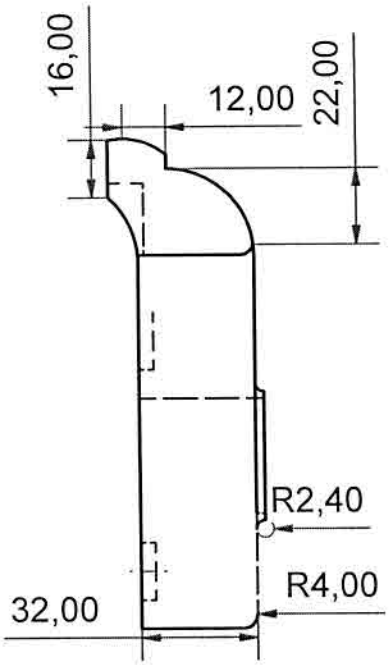

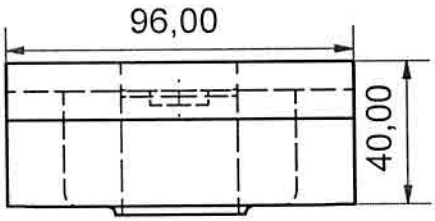

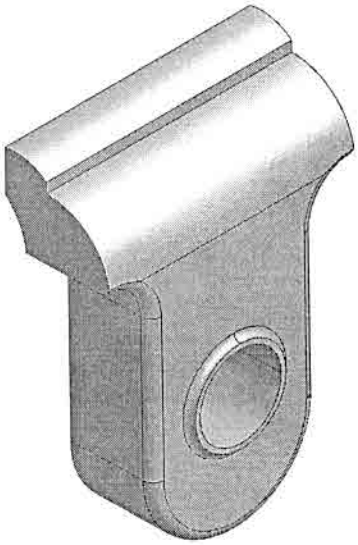

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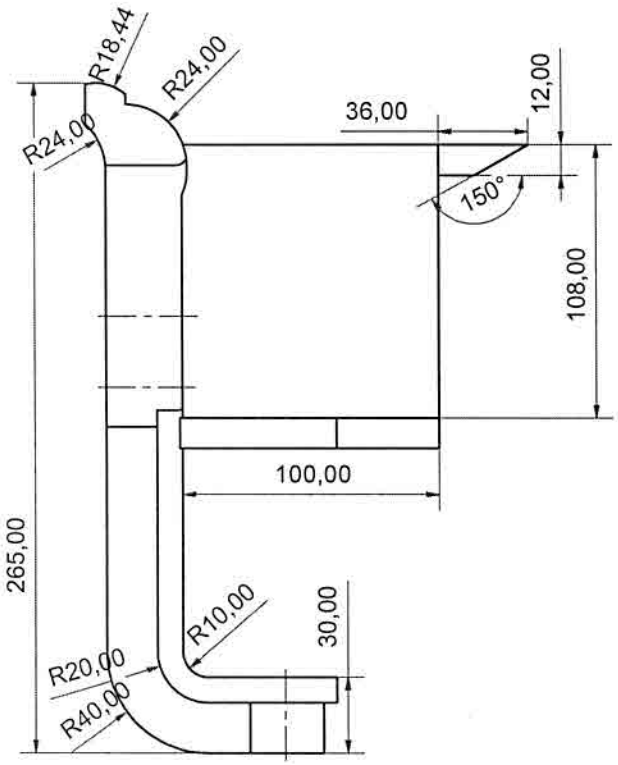

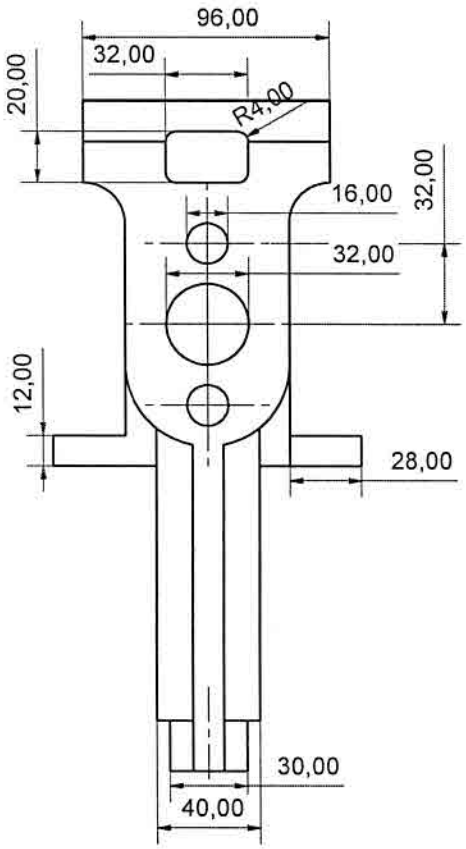

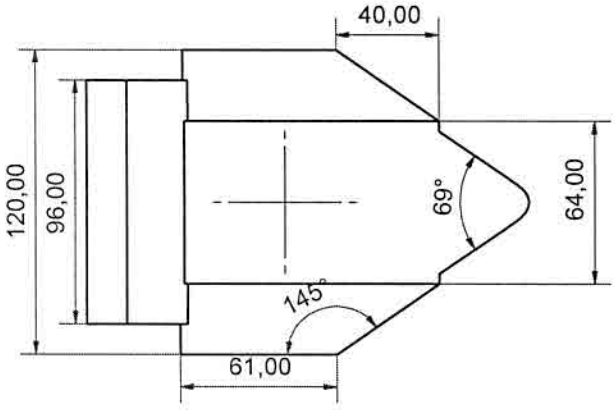

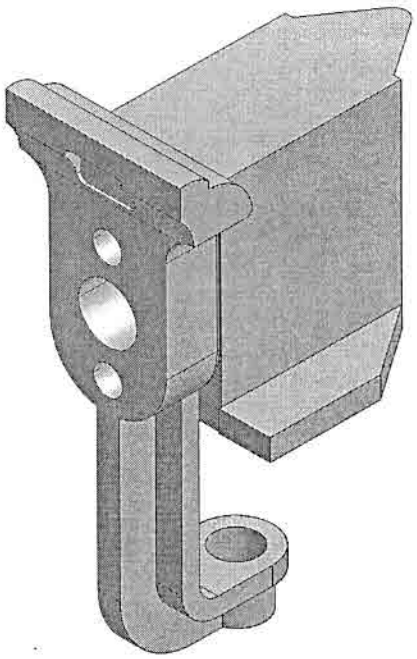

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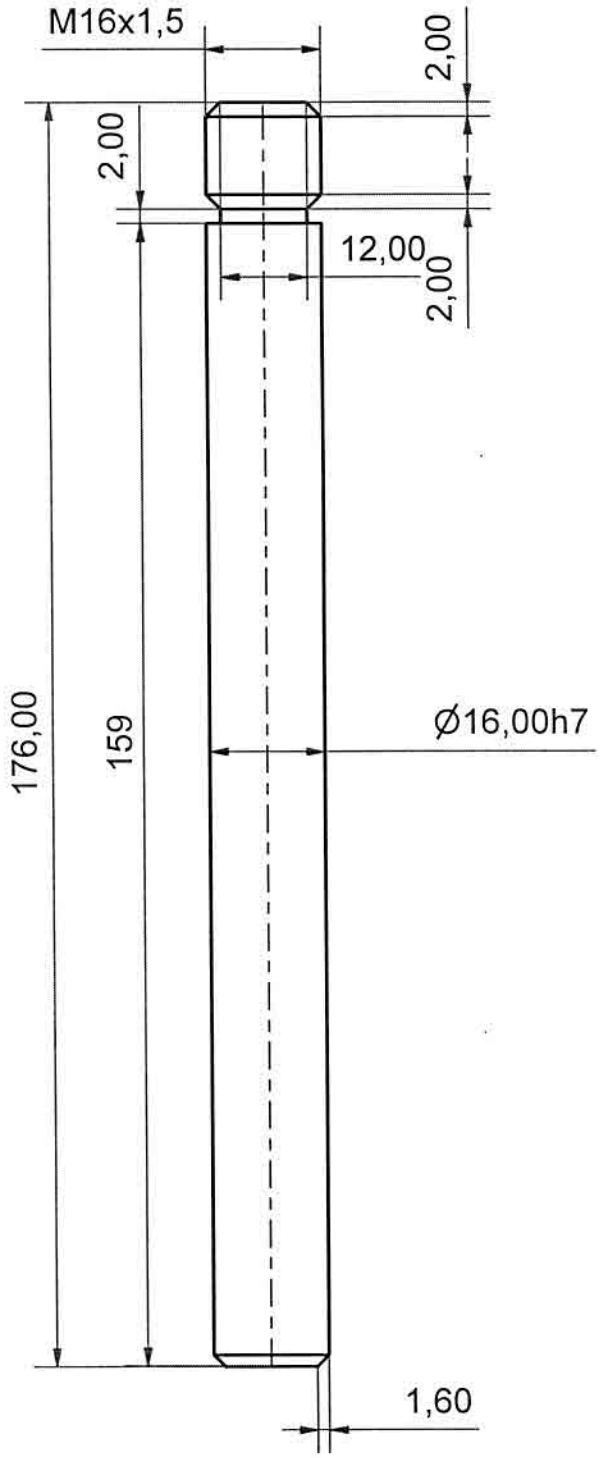

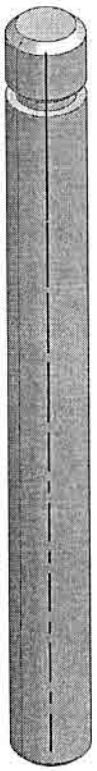

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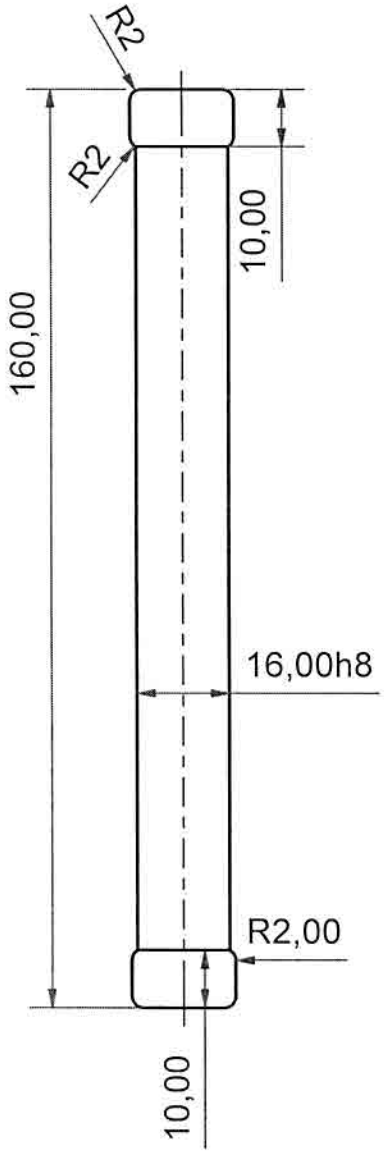

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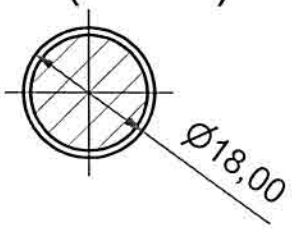

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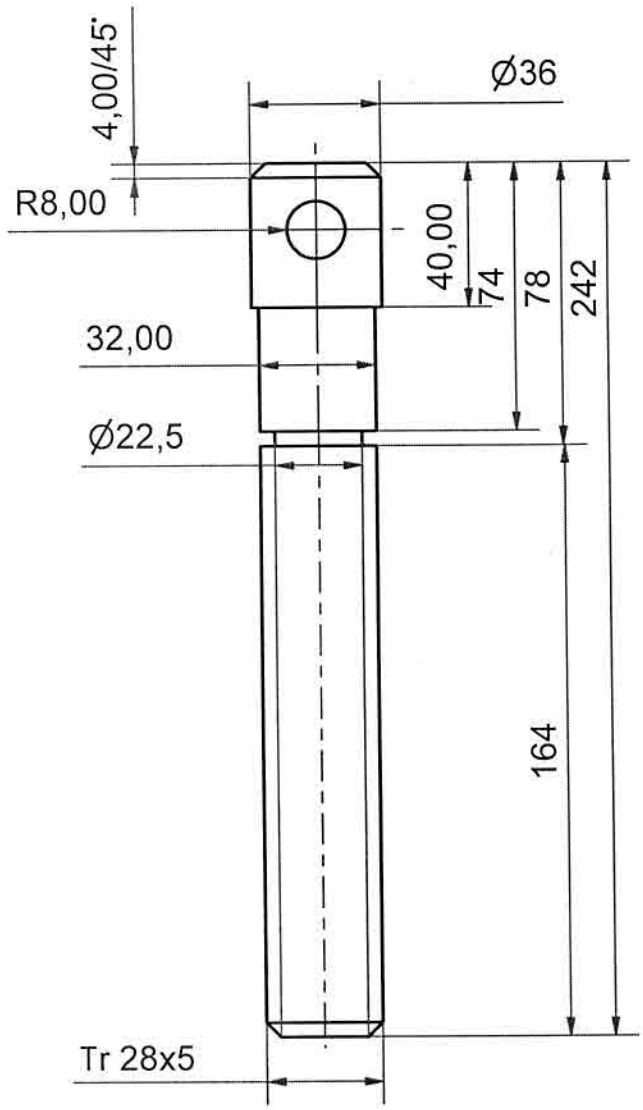

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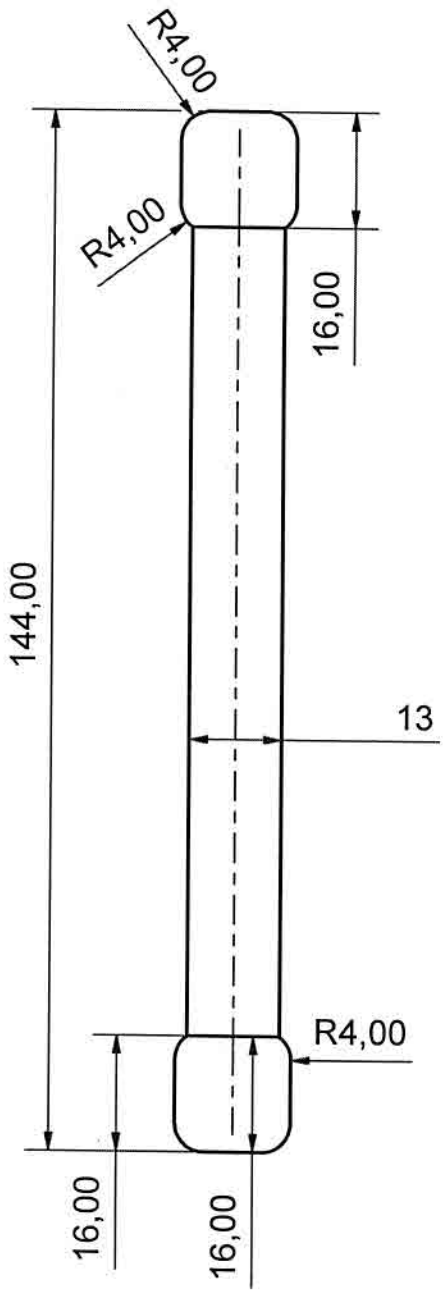

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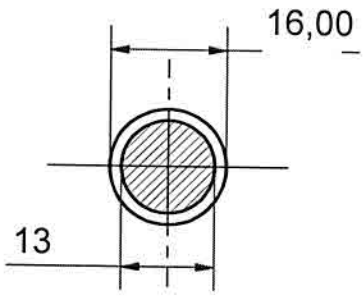

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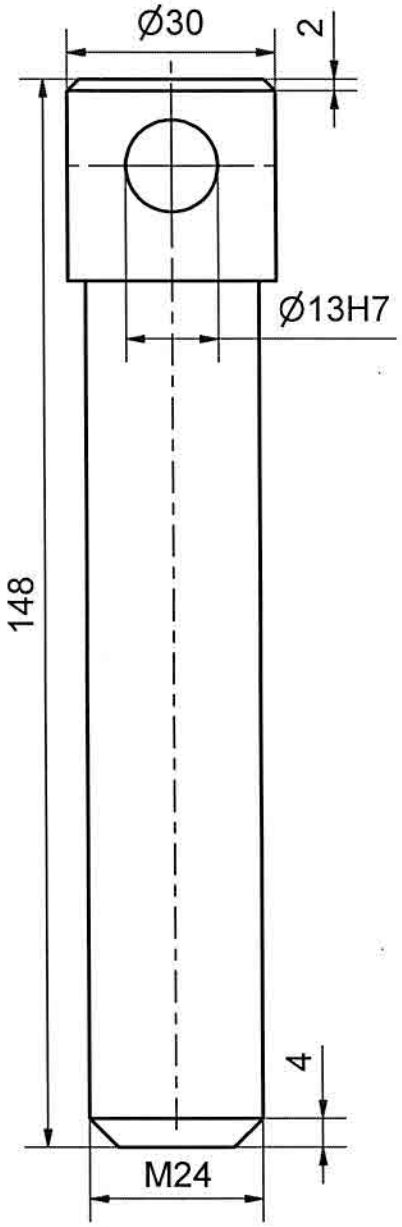

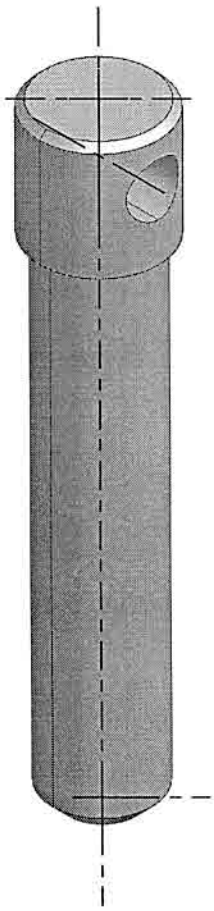

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