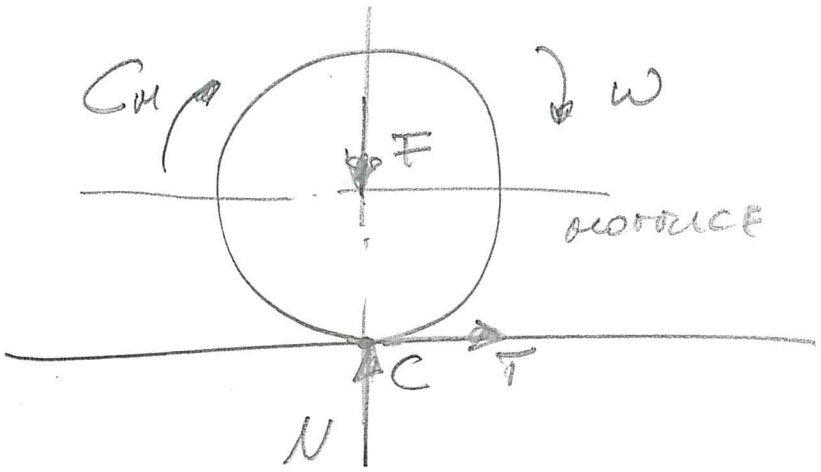
LOCOMOTORE D445 | TRATTORE SORRENTINE

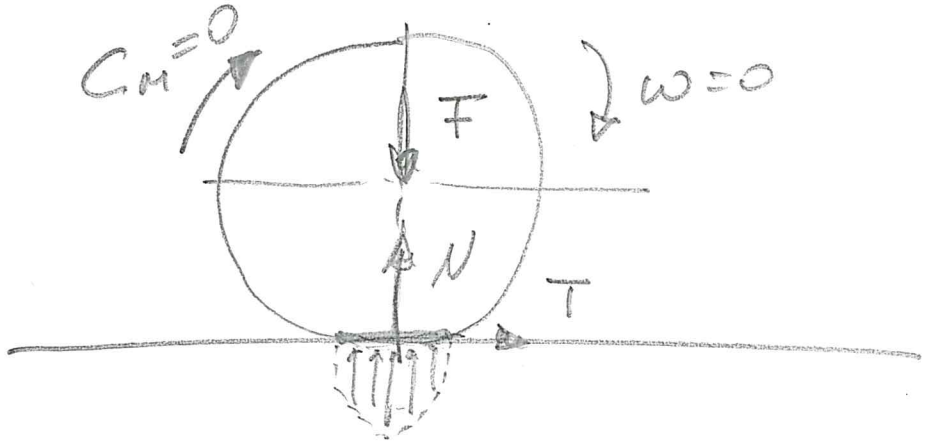
Pot 1400 kW | 600 kW

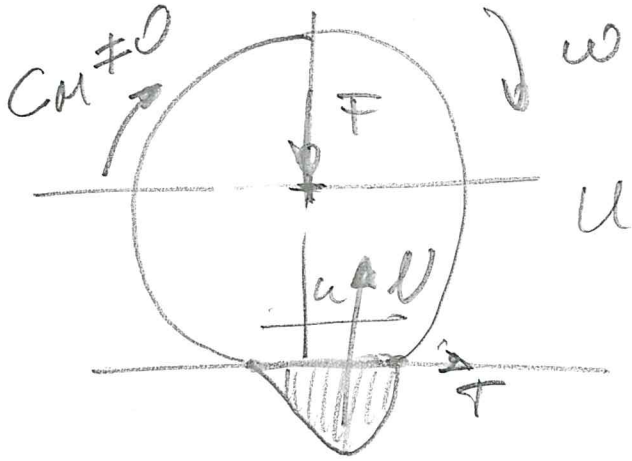
1:3 | POTENZE

10 VAGONI | 1 RIMORCHIO BILICO

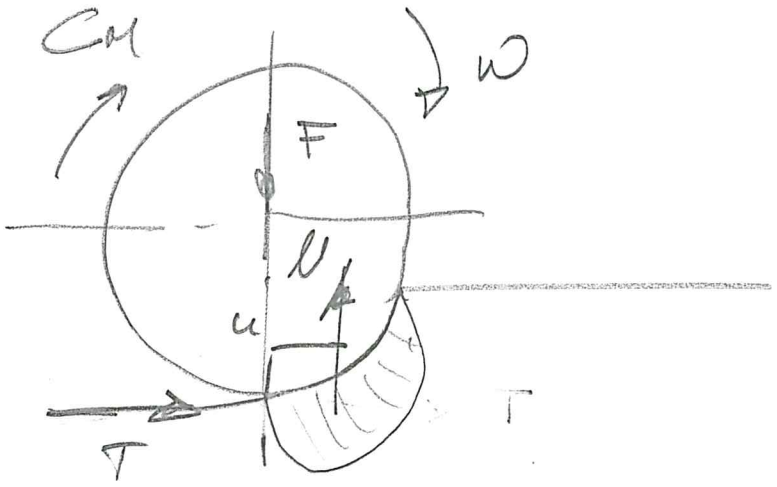
150 kW/VAGONE | 300-400 kW/VAGONE



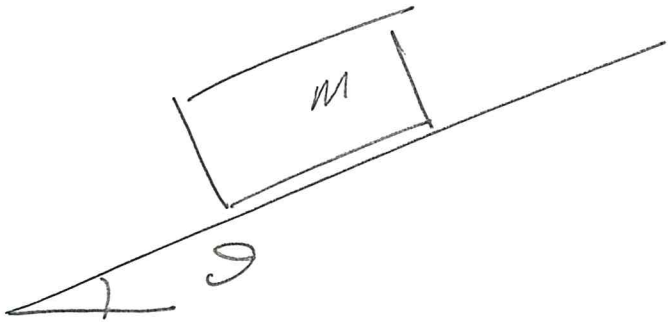




IL PASSEGGERO FORZUTO VOLVENTE


C_M
ω
F
l
T
T

m. f_a
ϑ?



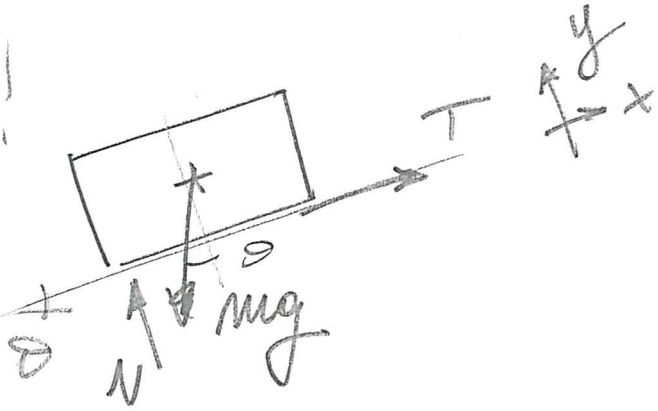
x) $T - mg \sin\vartheta = 0$

y) $N - mg\cos\vartheta = 0$

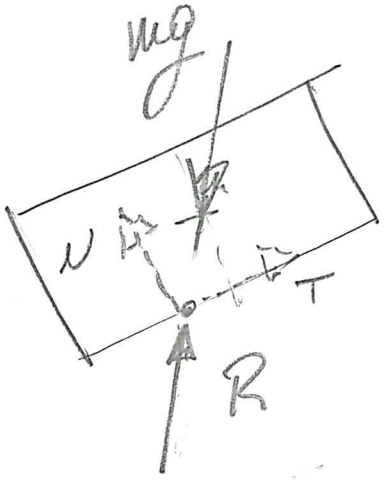
$T_{MAX\ AD}$

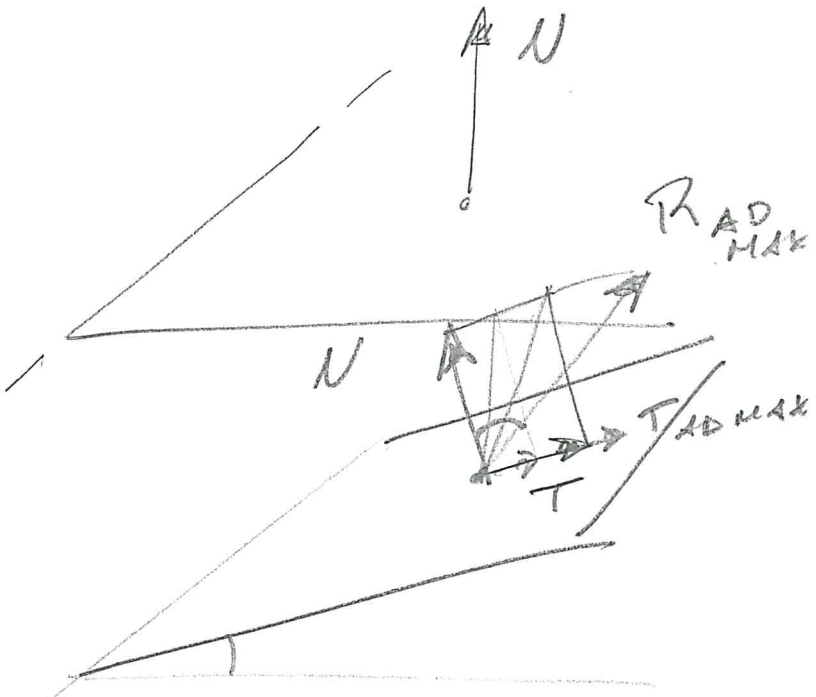
$T = f_a N$

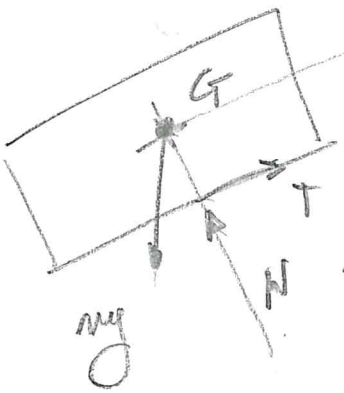
$f_a \cdot mg\cos\vartheta - mg\sin\vartheta = 0$



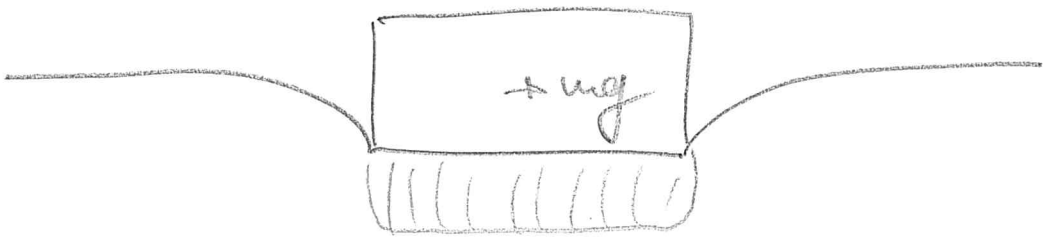
$tg\vartheta = f_a$

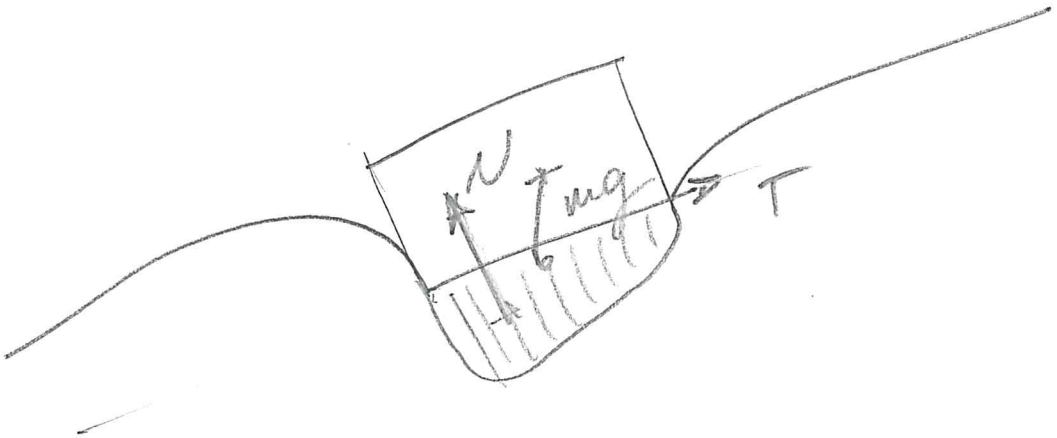


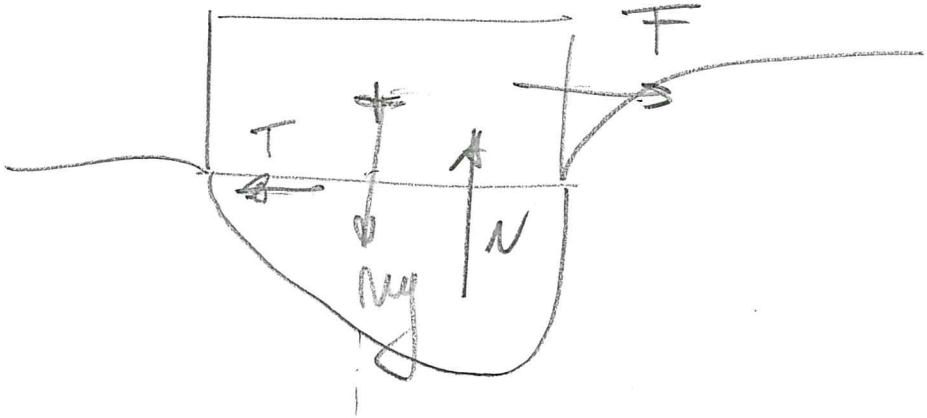




NO!


+ mg

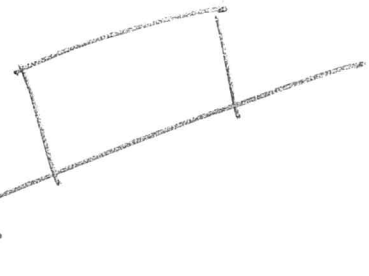

N
mg
T


F
T
N
Ng

$m = 100\ kg \quad f_a = 0,2 \quad f = 0,1$

ϑ ?

$\vartheta = \operatorname{atan} f_a = 11,31°$

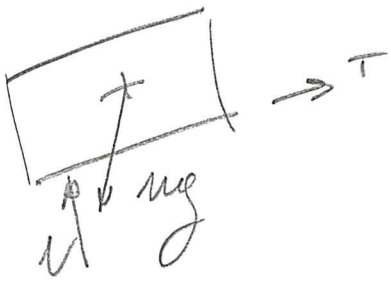


- DISTURBO → STRISCIAMENTO

+) $T - mg \sin\vartheta + m\ddot{x} = 0$

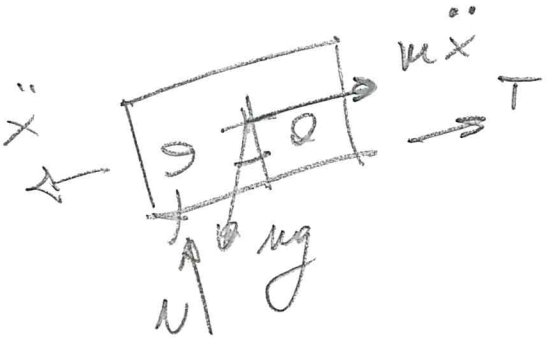
$\perp$) $N - mg\cos\vartheta = 0$

$T = fN$



$f\,mg\cos\vartheta - mg\sin\vartheta + m\ddot{x} = 0$

$g(-f\cos\vartheta + \sin\vartheta) = \ddot{x}$



$\ddot{x} = 9,81(-0,1 \cdot \cos 11,31 + \sin 11,31)$

$\ddot{x} = 0,962\ m/s^2$

ϑ AL DI SOTTO DEL QUALE SI RESTA

$tg\vartheta = f \qquad \vartheta = \operatorname{atan} f = 5,71°$

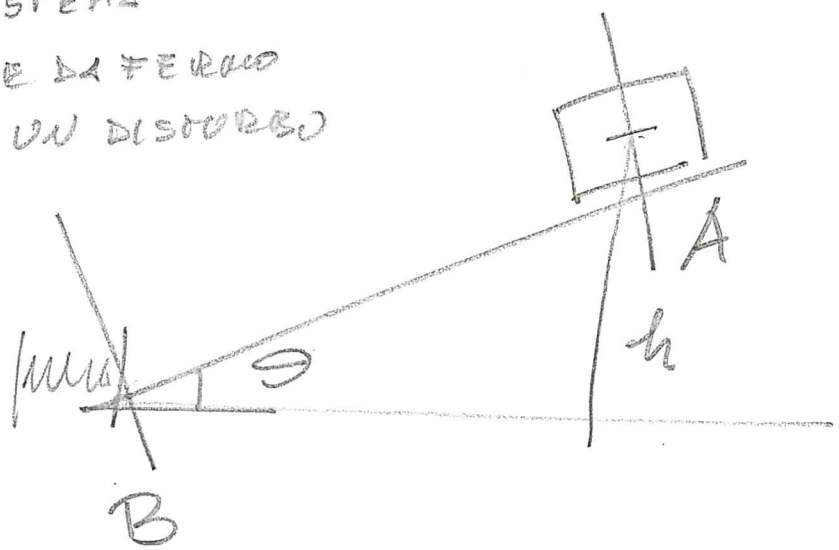
$\vartheta = 11,31^\circ$ IL SISTEMA PARTE DA FERMO DOPO UN DISTURBO

$\mu_a = 0,2$; $f = 0,1$

$\ddot{x} = 0,962\ m/s^2$

$m = 100\ kg$

$AB = 100\ m$



$L_e + L_i = \Delta E_c + \Delta E_g + \Delta E_{rc} + \dots$

$L_i = \Delta E_c + \Delta E_g$

$L_i = \left[\frac{1}{2} m v_B^2 - 0\right] + [0 - mgh]$

$h = AB \sin\vartheta = 19,61\ m$

$L_i = \frac{1}{2} 100 \cdot$

$v_B = 0 + \ddot{x} t \qquad t = v_B/\ddot{x}$

$S_{AB} = 0 + 0 \cdot t + \frac{1}{2}\ddot{x} t^2$

$S_{AB} = \frac{1}{2}\ddot{x}\frac{v_B^2}{\ddot{x}^2} = \frac{1}{2}\frac{v_B^2}{\ddot{x}}$

$v_B^2 = 2 S_{AB} \ddot{x} = 2 \cdot 100 \cdot 0,962 = 192,4$

$|v_B| = 13,87\ m/s$

$L_i = \frac{1}{2} 100 \cdot 192,4 - 100 \cdot 9,81 \cdot 19,61 = -9617,41$]

$L_i = T \cdot S_{AB} = -9600$]

$\vartheta = 20°$ $f_a = 0{,}25$ $f = 0{,}1$

$m = 100\ kg$

$R = 0{,}25\ m$

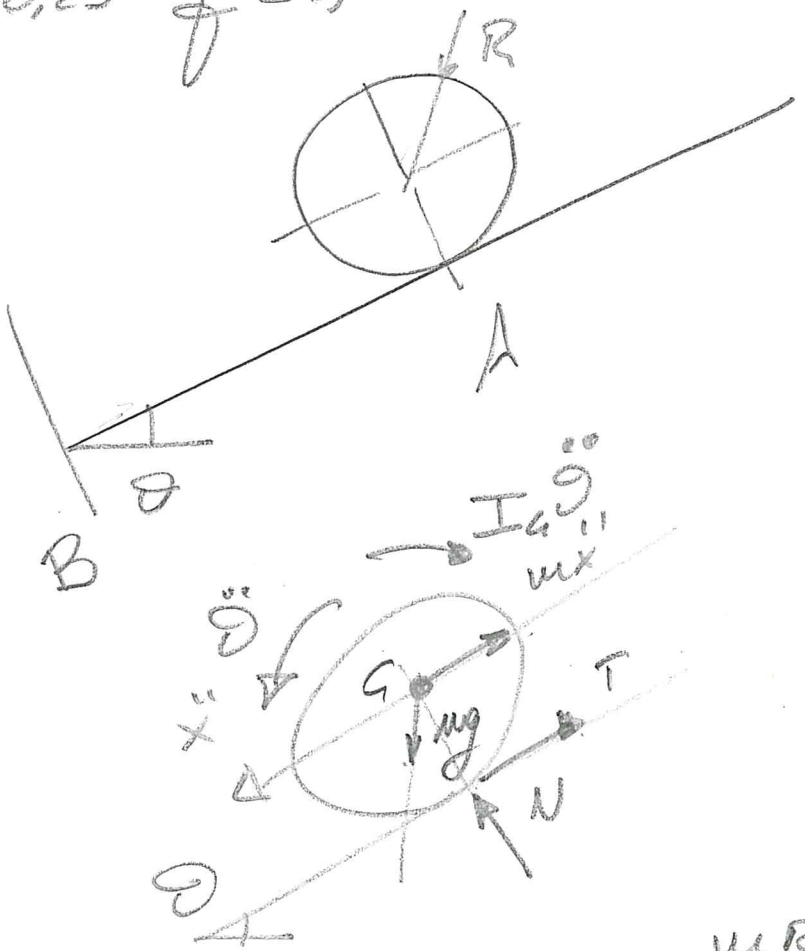
$s_{AB} = 100\ m$

V_B ?

$u = 0$

$u = 1\ cm$

$u = 0$



$$I_G = \frac{mR^2}{2} = 3{,}12\ kg\,m^2$$

$x)\ mg\sin\vartheta - m\ddot{x} - T = 0$

$y)\ N - mg\cos\vartheta = 0$

$G)\ TR - I_G\ddot{\vartheta} = 0$

$T, \ddot{x}, N, \ddot{\vartheta}$

$\ddot{x} = \ddot{\vartheta} R$ SE $T \le f_a N$

IPOTESI: ROTOLAMENTO SENZA STRISCIAM

$$mg\sin\vartheta - m\ddot{\vartheta}R - I_G\frac{\ddot{\vartheta}}{R} = 0$$

$$\ddot{\vartheta}\left(\frac{I_G}{R} + mR\right) = mg\sin\vartheta$$

$$\ddot{\vartheta} = mg\sin\vartheta \Big/ \left(\frac{I_G}{R} + mR\right) = \frac{100 \cdot 9{,}81 \cdot \sin 20°}{\frac{3{,}12}{0{,}25} + 100 \cdot 0{,}25} = 8{,}94\ \frac{rad}{s^2}$$

$\ddot{x} = 2{,}24\ m/s^2$

a) VERIFICA $\ddot{x} = \ddot{\vartheta} R$ SE $T \leq fa\, N$

$$T = I_a \frac{\ddot{\vartheta}}{R} \qquad N = mg\cos\vartheta$$

$T = 3{,}12 \cdot 8{,}94 / 0{,}25 = 111{,}57$

$N = 100 \cdot 9{,}81 \cdot \cos 20 = 921\,N$

$$\frac{T}{N} = 0{,}12 < fa \quad SI$$

SE $\vartheta = 45°$

$$\ddot{\vartheta} = \frac{mg \sin\vartheta}{\frac{I_a}{R} + mR} = \frac{100 \cdot 9{,}81 \cdot \sin 45°}{\frac{3{,}12}{0{,}25} + 100 \cdot 0{,}25} = 18{,}51 \frac{rad}{s^2}$$

$\ddot{x} = \ddot{\vartheta} R = 4{,}63\ m/s^2$

a) VERIFICA $\ddot{x} = \ddot{\vartheta} R$ SE $T \leq fa\, N$

$$T = I_a \frac{\ddot{\vartheta}}{R} \qquad N = mg\cos\vartheta$$

$T = 3{,}12 \cdot 18{,}51 / 0{,}25 = 231{,}00\,N$

$N = 100 \cdot 9{,}81 \cdot \cos 45° = 693{,}67\,N$

$$\frac{T}{N} = 0{,}33 \not< fa \quad NO!$$

RISCRIVO SISTEMA

x) ———

y) ——

q) ———

T=fv ẍ≠ÖR