Buffalo bill rodeo

Datas:

h₀=11m

h₁=0,5m

h₂= 3,2m

Et= 50Kw= 50˙000W=50˙000 m/s

Suppose that we use a 70kg person instead of the rotative disk:

Epₐ= m·h·ȣ= 70Kg· (h₀- h₁) · 9,8=5007,8Ϳ

Ecb= Et= Epₐ= 7203J Vb= $√(2Ec÷m)$= $√(2·7203÷70$)= 14,35m/s= 52Km/h

Ecc= Et= Epc

Ecc= Epₐ-Epc= 7203J-2195,2J= 5007,8J

Vc== $√(2Ec÷m)$=$ √(2·5007,8J÷70$)= 12m/s= 43Km/h

Let’s suppose this time to take the mass of the rotative disk with the maximum number of people on it (about 70 kg per person):

Et=50˙000W·180s=9˙000˙000J

Epₐ= Et= 9˙000˙000J

m·h·ȣ= 9˙000˙000J

1049m= 9˙000˙000J

m= 87˙464Kg= 87,5 tonnellate

Ecb= Epₐ= 9˙000˙000J

Vb=$√(2·9˙000˙000J÷87˙464Kg$)= 14,3m/s= 52Km/h

Ecc= Et-Epc= 9˙000˙000J-2742871J= 6257129J

Vc=$ √(2Ecc÷m)$= 12m/s= 43Km/h

|  |  |
| --- | --- |
| Radius (m) | 3.5 |
| people | 24 |
| path length (m) | 80 |
| Max height (m) | 11 |
| minimum height (m) | 0.5 |
| frequency | 1/6 |
| central height (m) | 3.2 |

Trajectory:

$γ\_{1}: x^{2}+(y-17.52)^{2}=306.84$

$$γ\_{2}: (x-33.5)^{2}+(y-17.52)^{2}=306.84$$

$$γ\_{3}: (x-16.75)^{2}+(y+33.03)^{2}=1280.92$$

Motion of the disk in some points of the route:

B = E : $a\_{y}=g=9.81m/s^{2}$ $a\_{c}=\frac{v^{2}}{r}= 0 m/s^{2}$ $v=0$ $r=17.52 m$

C = D : $a\_{y}=g=9.81m/s^{2}$ $a\_{c}=\frac{v^{2}}{r}= \frac{14.7^{2}}{17.52}=12.34 m/s^{2}$ $v=14.7 m/s$ $r=17.52 m$

A : $a\_{y}=g=9.81m/s^{2}$ $a\_{c}=\frac{v^{2}}{r}= \frac{12.1^{2}}{35.79}=4.09 m/s^{2}$ $v=12.1 m/s$ $r=35.79 m$

Angoular velocity:

$v=2πrf=3.6 m/s$ $ω=2πf= \frac{1}{3}π rad/s$ $a\_{c}=\frac{v^{2}}{r}= \frac{3.6^{2}}{3.5}=11.5 m/s^{2}$