

# Helicopter Main & Tail Rotor Blade Forces

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Example: Raptor 30 fitted with NHP Razor Rotor Blades

## Main Rotor Blade Details

Blade Size (m)	0.55
Radius of blade grip (m)	0.07
Total Radius of Rotor (m)	0.62
Weight of blade (kg)	0.116
Radius of Gyration (m)	0.3579572

## Tail Rotor Blade details

Tail Blade Size (m)	0.085
Radius of tail blade grip (m)	0.035
Total Radius of Tail Rotor (m)	0.12
Weight of tail blade (kg)	0.005
Radius of Gyration (m)	0.06928

## Tail/Main Rotor Ratio

Number of Main Gear Teeth	41
Number of Tail Gear Teeth	9
Tail/Main Rotor Ratio	4.55556

	1,000	1,100	1,200	1,300	1,400	1,500	1,600	1,700	1,800	1,900	2,000
<b>Main Rotor Headspeed (rev m-1)</b>	17	18	20	22	23	25	27	28	30	32	33
<b>Main Rotor Headspeed (rev s-1)</b>	105	115	126	136	147	157	168	178	188	199	209
<b>Force at main rotor blade grip (Newtons)</b>	455	551	656	770	892	1,025	1,166	1,316	1,475	1,644	1,821
<b>Effective weight (kg)</b>	46	56	67	79	91	105	119	134	151	168	186
<b>Effective weight (lbs)</b>	102	124	148	173	201	230	262	296	332	370	410
<b>Tail Rotor Headspeed (rev m-1)</b>	4,556	5,011	5,467	5,922	6,378	6,833	7,289	7,744	8,200	8,656	9,111
<b>Tail Rotor Headspeed (rev s-1)</b>	76	84	91	99	106	114	121	129	137	144	152
<b>Tail Rotor Angular Velocity (rad s-1)</b>	477	525	572	620	668	716	763	811	859	906	954
<b>Force at tail rotor blade grip (Newtons)</b>	79	95	114	133	155	177	202	228	255	285	315
<b>Effective weight (kg)</b>	8	10	12	14	16	18	21	23	26	29	32
<b>Effective weight (lbs)</b>	18	21	26	30	35	40	45	51	57	64	71

## Notes:

1. The 'Effective Weight' is to give you a rough idea of what the figure in Newtons would feel like although strictly speaking you shouldn't measure force in kilos
2. This spreadsheet is for interest only and should not be used as the basis for designing/modifying any mechanical device. I cannot guarantee its accuracy - if necessary consult a qualified engineer.