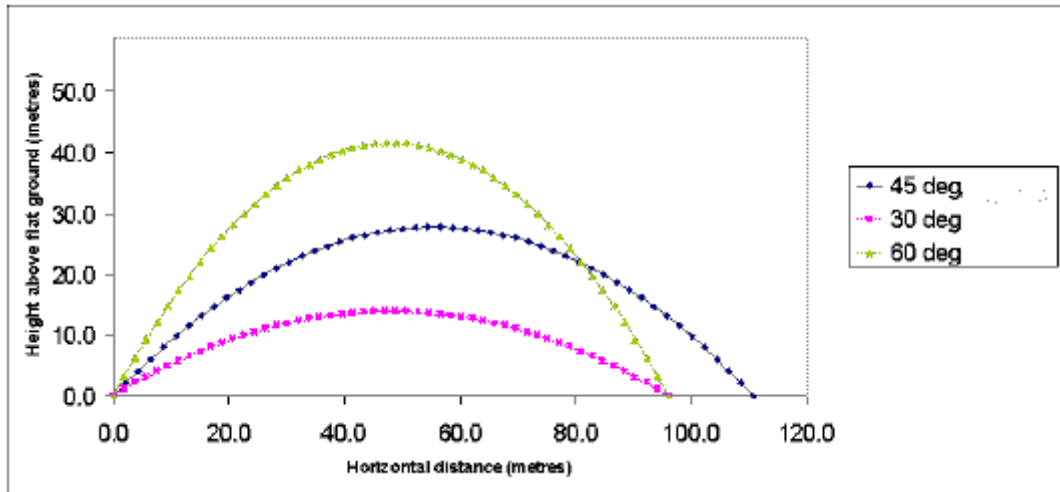
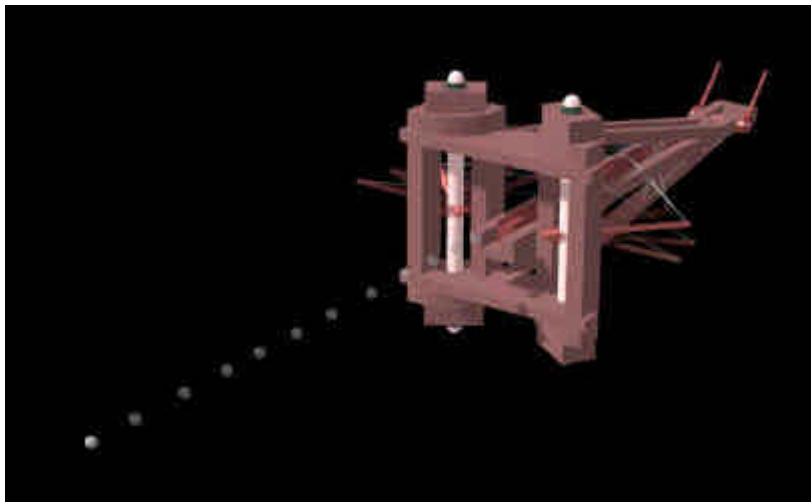
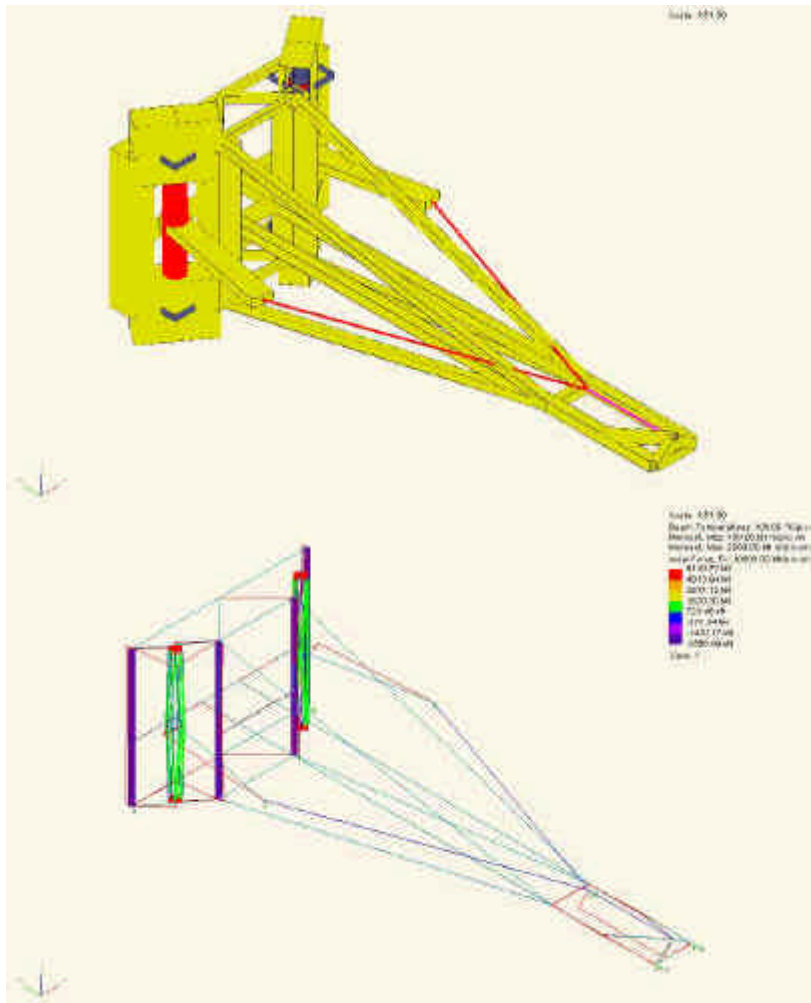


Roman Stone Hurling Catapult



For the big Cat, all constructed and erected in green oak by Carpenter Oak and Woodland, we did all projectile and trajectory studies, parametric studies of geometry and stresses, 3D visualisations and assembly mockups, materials selection, all working drawings, mechanical drawings and erection/safety dossiers.

In this, we were greatly helped by Alan Wilkins, classical archaeologist, who provided definitive interpretations of the texts of the ancient engineers Vitruvius and Philon and provided us with literal interpretations of them in sketch form as the basis of our own work:



Structural stress analysis and visualisations



Torsion spring and arm assembly

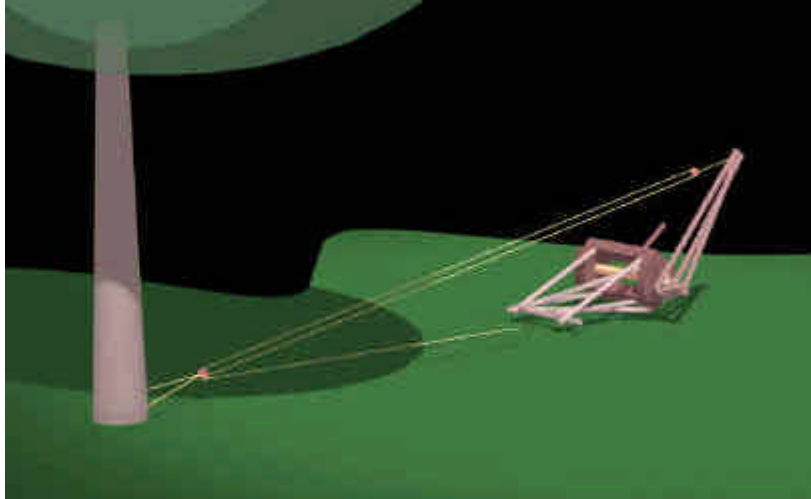




Torsion spring components



Rope installation



Pre-rotation of spring cassettes to wind in spring tension (up to 200 tonnes per spring)



Trigger system and 4 man-windlasses



Twin A Frame lift to position 8.5 tonne catapult body on its stand

Sample firing test data

The figures here give some idea of the sort of performance we aimed to achieve. In fact, we managed to fire the projectile 93 yards with a slider travel of 2.8m and an initial spring load of 140 tonnes:

Test number	1	2	3	4	5	6	7
Mass of projectile	26	26	26	26	26	26	26
Initial spring load incl. prerotation		60	60	60	110	110	160
Arm rotation during pull-back		15	30	45	30	45	30
Additional spring load from arm rotation		16.7	33.3	50.0	33.3	50.0	33.3
Total torsion spring axial tension		76.7	93.3	110.0	143.3	160.0	193
Slider travel		1.8	2.8	3.5	2.8	3.5	2.8
Launch velocity at 70% efficiency, say	20	9	18	26	21	31	25
Force on projectile force (av)	0.8	2.0	3.6	2.9	5.1	4.1	6.5
Target trigger force		0.1	0.2	0.4	0.3	0.5	0.4
Target trigger force		0.24	0.59	1.05	0.91	1.52	1.23
Range	8	31	69	45	98	64	125
	9	34	76	49	108	70	137



26 kg limestone ball in flight, and 93 yards down-range



What the papers say:

"For woodwork teachers, this surely is heaven" (Sunday Telegraph)

"if they get the design wrong it could easily self-destruct and kill them all"

"It looks as if one of them might end up as a human cannon-ball"

"Historical DIY"

"Chris appears to do his best calculations in the pub"