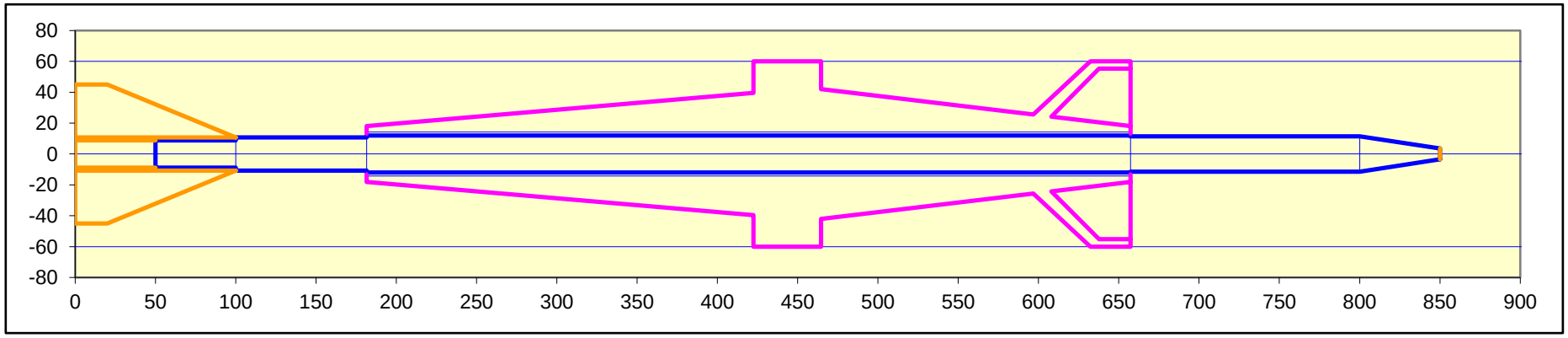
120mm Smooth Bore - Design of Tungsten Penetrators and Corresponding Sabots

Gun	caliber	cal	120	mm
	tube length	L_{cal}	44	
	charge mass	m_c	8.3	kg
	design pressure	p_{max}	750	MPa
Penetrator	yield strength	R_m	1'700	MPa
	density	ρ_P	17'500	kg/m^3
frustum	Ø at top	D_{FT}	7.0	mm
	length frustum	L_{Fru}	50	mm
cylindrical front part	diameter	D_{FP}	22.8	mm
	length	L_{FP}	142.8	mm
buttress part	buttress dia outside	D_{BO}	26.5	mm
	in the grooves	D_{BG}	24	mm
rear part	diameter	D_{RP}	21.6	mm
	length	L_{RP}	81.4	mm
tungsten	length	L_P	800.0	mm
	mean diameter	D_{mean}	23.5	mm
	working length	L_w	773.4	mm
	acpect ratio L/D	L/D	34.0	
	mass	m_P	5.883	kg
Target	Target density	ρ_T	7'850	kg/m^3
	Brinell Hard. Number	BHNT	235	
	obliquity NATO	θ	60	°
Mean Shear Forces	penetrator	τ_P	253	MPa
	sabot	τ_S	99	MPa
Iteration Accuracy	Diff. in L_S between step 4 to step 5		-0.008	mm

Projectile	projectile length	L_{PRO}	850	mm
	velocity drop 1000 m	Δv_{1000}	55	m/s
	tip length	L_{TIP}	0	mm
	accelerated mass	m_{acc}	10.351	kg
	flying mass	m_{fly}	6.213	kg
	muzzle velocity	v_0	1.522	km/s
Sabot	density	ρ_S	2'700	kg/m^3
	guiding length	L_G	235	mm
	mass	m_S	4.138	kg
	total length	L_S	475.9	mm
Fin Assembly	number of fins	n_F	6	
	length of fins	L_F	100	mm
	cord ratio	f	0.2	
	dia of fins	D_F	90	mm
	fin thickness	t_F	2	mm
	tube thickness	t_{FT}	2	mm
	density	ρ_F	7'850	kg/m^3
	tracer length	L_T	50	mm
	tracer mass	m_T	0.040	kg
	mass fin assembly	m_{FA}	0.330	kg
Velocity (km/s)	at muzzle		**1.522**	**764** mm
Perforation	1 km		**1.467**	**731** mm
	2 km		**1.412**	**695** mm
	3 km		**1.357**	**658** mm
			output	input



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