Operational Verification of the VIMF

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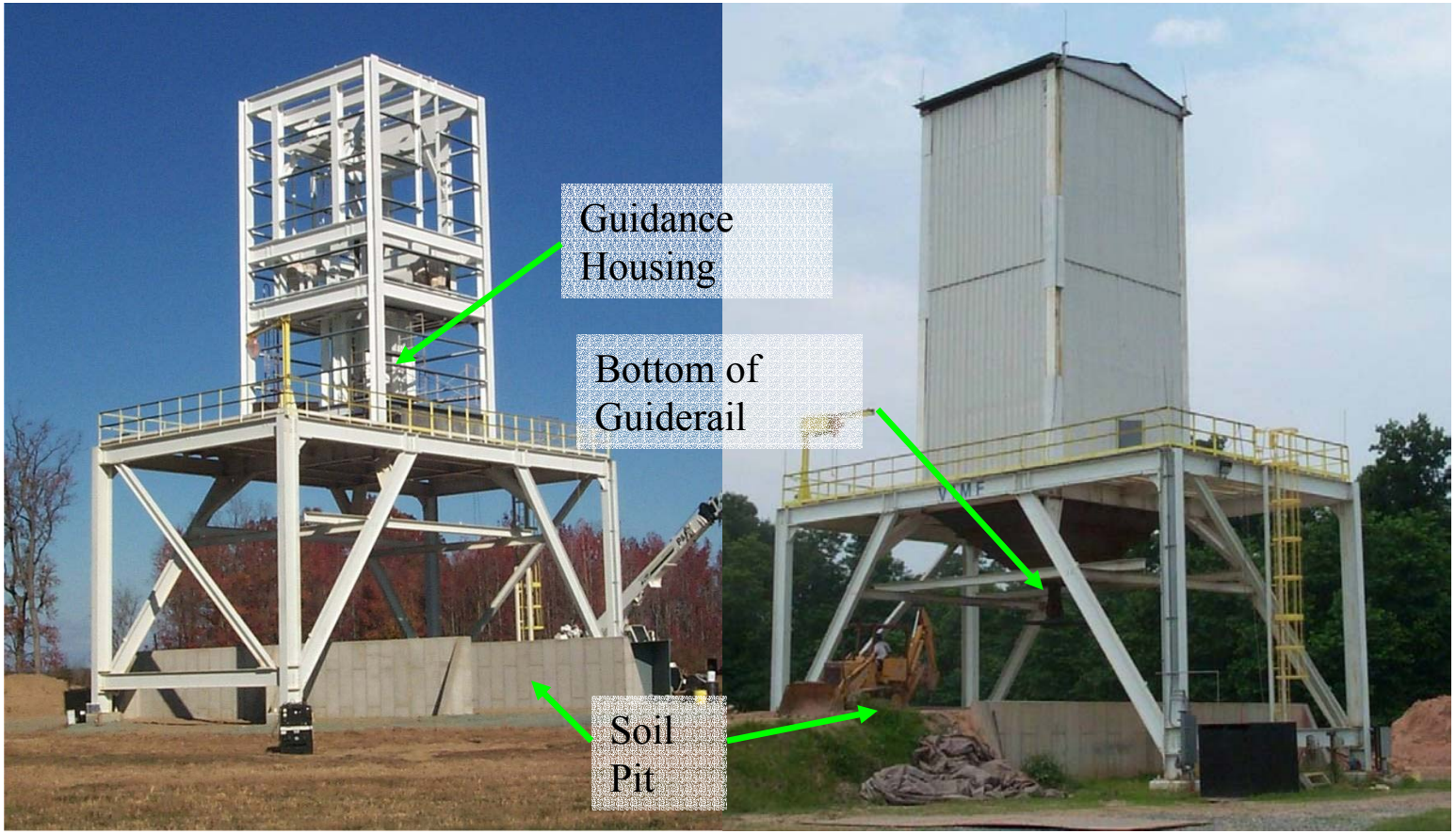
Objective

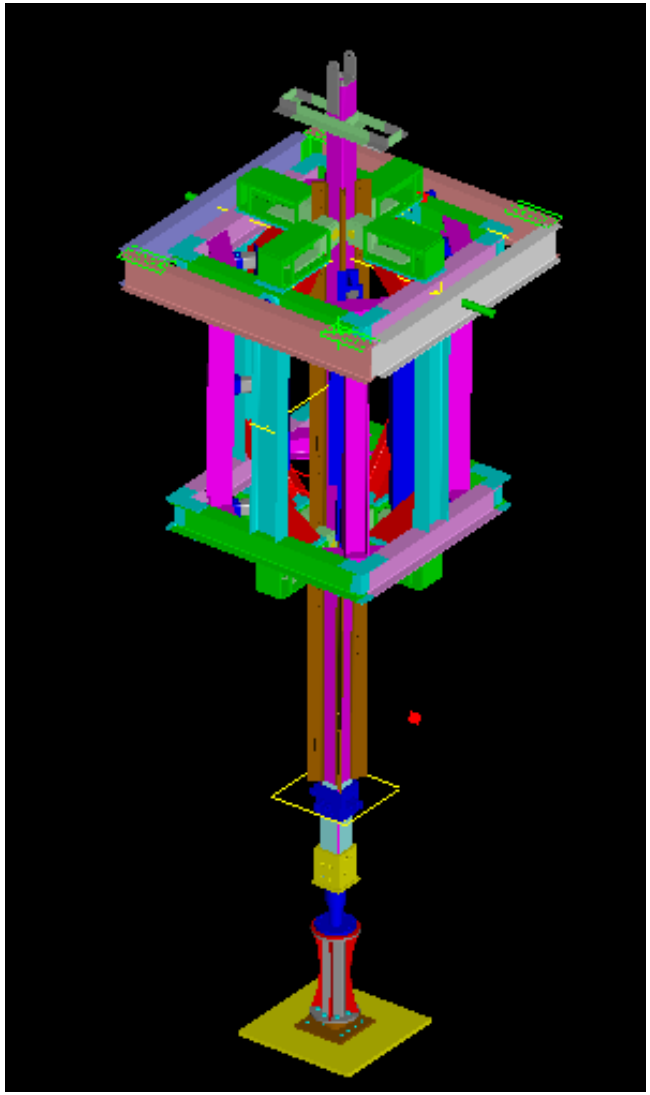


Is it working as expected???

the VIMF

Major Moving Components

Guiderail



Guidance Housing

Use of the Facility

Controlled testing of vehicle design concepts and retrofit schemes

Generation of high-quality load histories for various soil conditions, land mines and standoffs

Current Approach to Vehicle Testing

Concept, Design, Construction, Verification, Operation

Fred Gregory

Neil Gniazdowski

Tim Cline

ARL shops

ATC shops

Reed Skaggs

Jerry Watson

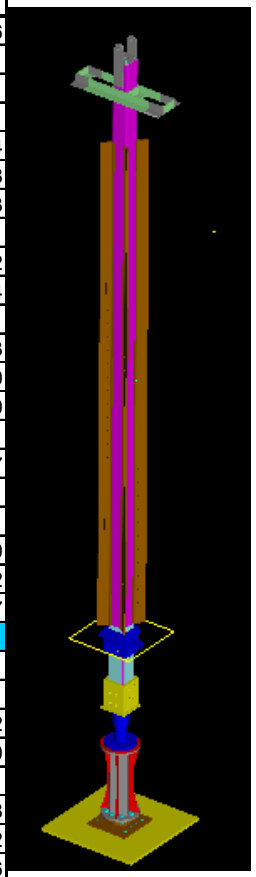
Pat Baker

EF-12 Gang

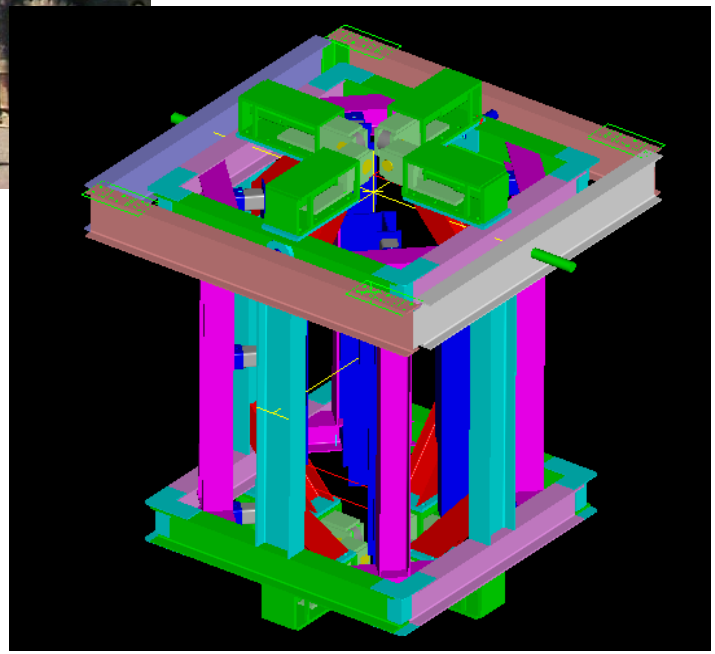
Operational Verification: "As-Built" - Guiderail

Part	Sub Parts	Geometry	Dimensions Verified	Material	Volume in^3	Density lb / in^3	Weight by Main Groups (lb)	Weight by Sub Part (lb)
Main Tube		12x12x1/2	from steel manual	Square Pipe	10672.1	0.284	3026	3026
10" Tube		10"x .75"	"		7657.1	0.284	2171	2171
Inner Tubing			"		636.6	0.284	181	181
4ft Guiderail Extension					3156.8	0.284	895	
	Main Tube	12x12x1/2 Tube	from steel manual		1073.1	0.284		304
	Gussets 4x	3/4 in THK		RHA	555.9	0.284		158
	Flange Plates 2x	2 in THK			1527.8	0.284		433
Stub Collar					1944.0	0.284	551	
	Pipe 1	OD-8.06	On Site		255.1	0.284		72
	Pipe 2	OD-10.106	On Site		85.8	0.284		24
	Pipe 3	OD-11.459	On Site		320.4	0.284		91
	Flange Plate				717.0	0.284		203
	Pipe 1 Ext				282.8	0.284		80
	Bolts				283.0	0.284		80
Bolt On Adapters					6168.0	0.284	1749	
	Clevis Adapter			Mild Steel (A360?)	2106.2	0.284		597
	Bolt On Adapter			Mild Steel	2401.2	0.284		681
	Bolts?				1660.6	0.284		471
Hoist Clevis	2x plates	40 mm THK		RHA	635.1	0.284	180	180
Cam Plates	4x plates	1/2 in		Mild steel	1063.6	0.284	302	302
Guide Rail Caps	2x plates	1 in		Mild Steel	236.1	0.284	67	67
Syntactic Foam					45194.9	0.025	1151	1151
Guide Rail Stop		L 6x6x3/4	On Site		1591.5	0.284	451	451
Break Fins					13020.8	0.284	3692	
	Fin part 4x				7624.0	0.284		2162
	Connectors 8x	3/8 in		Mild steel	5396.7	0.284		1530
Witness Plate					14623.5	0.284	4147	
	Plate				12230.8	0.284		3468
	Connector				2194.5	0.284		622
	Bolts				198.2	0.284		56
Washer					382.0	0.284	108	108
					Total Weight (lb) :		18671	18671

Accepted Value:	18600
Error	71.5
% Error	0.38%



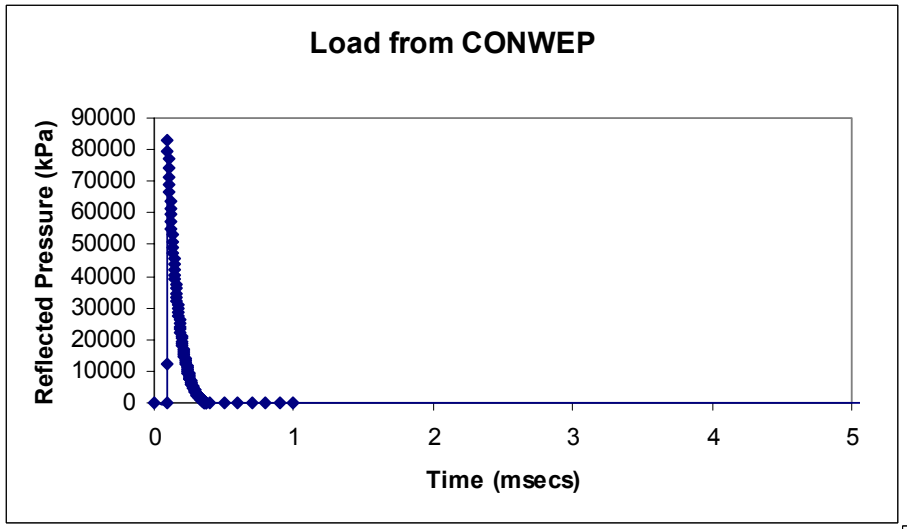
“As-Built” - Guidance Housing



Guidance Housing Details

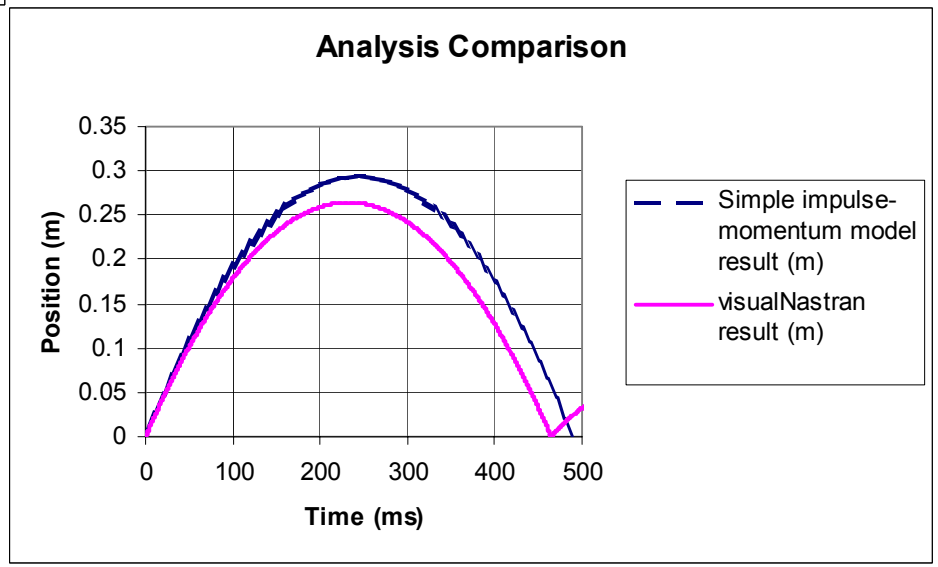
Part	Sub Parts	Geometry	Dimensions Verified	Material	Volume (in^3)	Density (lb / in^3)	Weight by Main Groups (lb)	Weight by Sub Part (lb)
Vertical Beams		W16x89 x 132"	On Site		13949.5	0.284	3956	3956
Brake mount Beams - added		W12x72 x 136.5"	On Site		11603.3	0.284	3290	3290
Top Box Beams					18362.6	0.284	5207	
	Coped Ends	W16x89x120"			5882.3	0.284		1668
	Straight w/ Gimbal Stiffner	W16x89x120"			7152.7	0.284		2028
	Diagonal Corners	W12x72			3775.1	0.284		1070
	Corner Connectors				1552.4	0.284		440
Brake Mount Assemblies					25735.6	0.284	7298	
	Brake Mount Plates	18x96x3/4 in		Armor Plate	5184.0	0.284		1470
	Retractable Shafts			Square Tubing	3431.8	0.284		973
	Beam	W16x89 x 162 in			17119.7	0.284		4855
Bottom Box Beams					17578.5	0.284	4985	
	Coped Ends		On Site		5882.3	0.284		1668
	Straight		On Site		6368.7	0.284		1806
	Diagonal Corners		On Site		3775.1	0.284		1070
	Corner Connectors				1552.4	0.284		440
Roller Mounts					16747.7	0.284	4749	
	Support Brace	W10x49	On Site		7785.0	0.284		2208
	Mount Plate	18"x40.75"x40mm			8962.6	0.284		2541
Roller Assemblies					39568.5	0.284	12297	
	Sliding Roller Mount				15554	0.284		4411
	Casing				24014.5	0.284		6810
	Rollers							1076.8
					Total Weight (lb) :		41781	41781

Validation of the Models

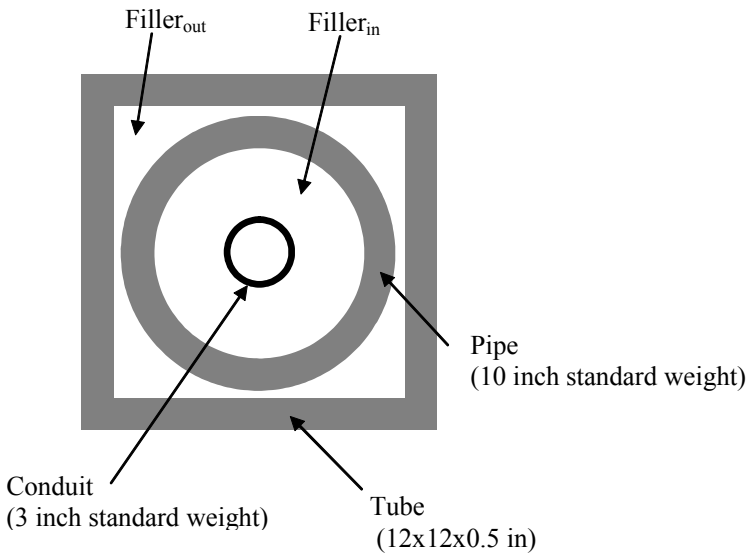


CONWEP generated impulse

visualNastran simulation versus “hand-calculation”



Operational Limits



Future Work

"Unfortunately, real landmines are planted in real dirt and cause real serious damage to vehicles and occupants. The chain of events that finally leads to injuries or death is a long one, with many uncertainties influencing the outcome. It is very difficult to do tests and analyses that account for all these unknowns. We aim to arrive at a rational and repeatable…"
(Becker van Niekerk of Vickers OMC)

Questions…