



If you can't get a bigger target...

*Low-Cost Visualization
for
Guided Projectile
Trajectory Simulation*

**Mark Steinhoff and Robert Whyte
Arrow Tech Associates
(802)865-3460**

Design Goals

If you can't get a bigger target...

- An easy (and fast) way to generate:
 - Visuals of a 3D projectile model, including cross sections
 - Trajectory visualization to communicate projectile dynamics
 - Demonstration type videos of projectile interaction between gunners and targets
- Minimal User Interaction
 - Trade-off between ease of use and flexibility
- No Special Hardware Required, just a basic PC

Technology Involved

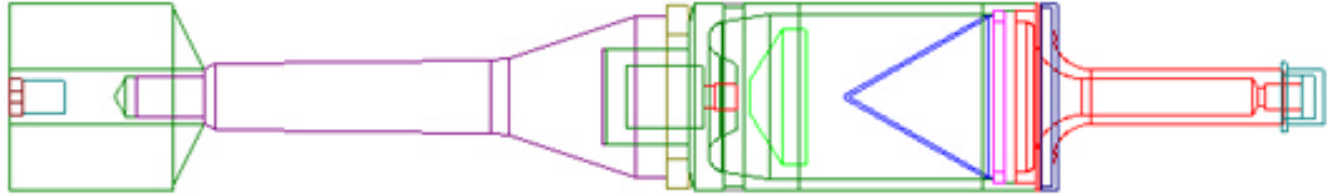
If you can't get a bigger target...

- VRML – Virtual Reality Modeling Language
- Data Source
 - PRODAS Geometric Model
 - PRODAS Generated Trajectory Data
 - X,Y,Z,Theta, Psi and Phi
 - PRODAS Generated Event Data
 - Rocket On
 - Side Thrusters Firing
- VRML Model Manipulation with Visual Basic

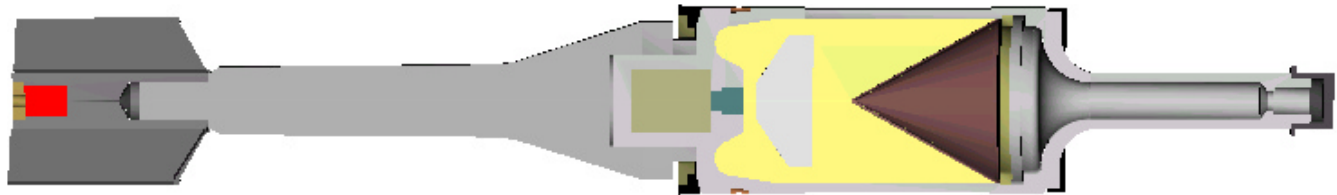
3D Visuals for Documents

If you can't get a bigger target...

From This



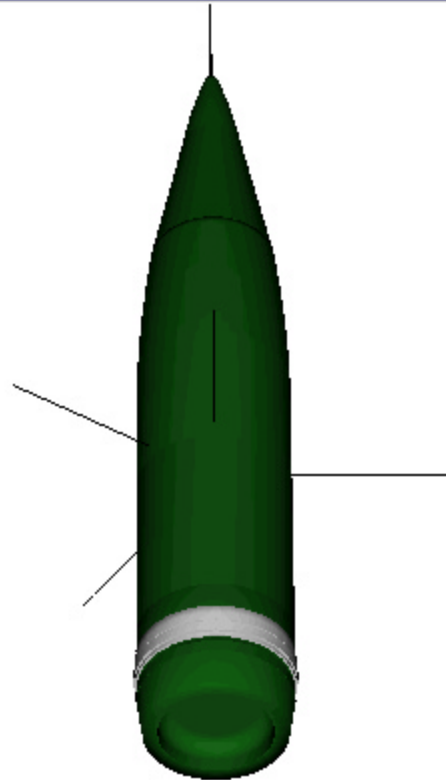
To This



Training Tool

If you can't get a bigger target...

PRODAS2000 3D - #155m483.pr3

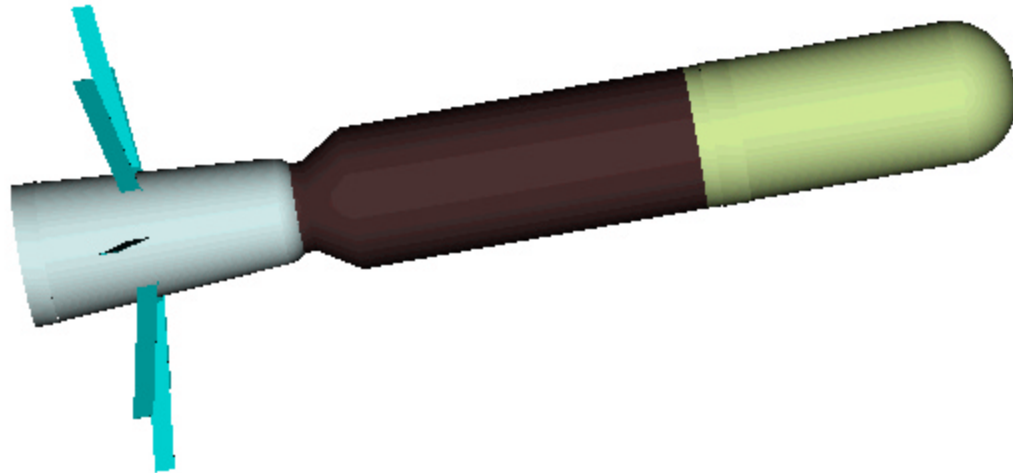


**M483 fired at high QE illustrating Yaw of Repose and Zero Yaw Dynamic Instability (coning)
(click to View)**

SMAW-D Stable Flight

If you can't get a bigger target...

3D PRODA52000 3D - BDMgood.pr3

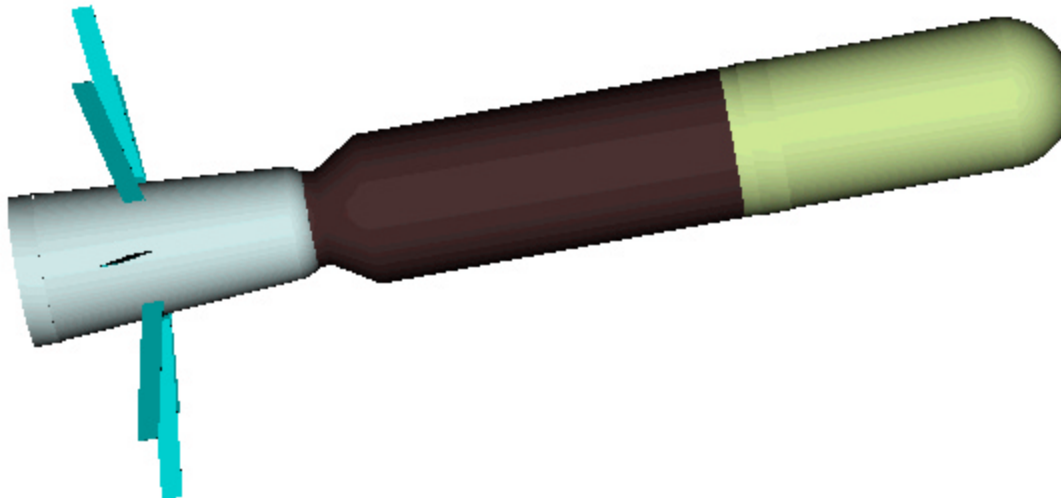


SMAW-D after fin modifications resulting in Stable Flight (click to View)

SMAW-D Unstable

If you can't get a bigger target...

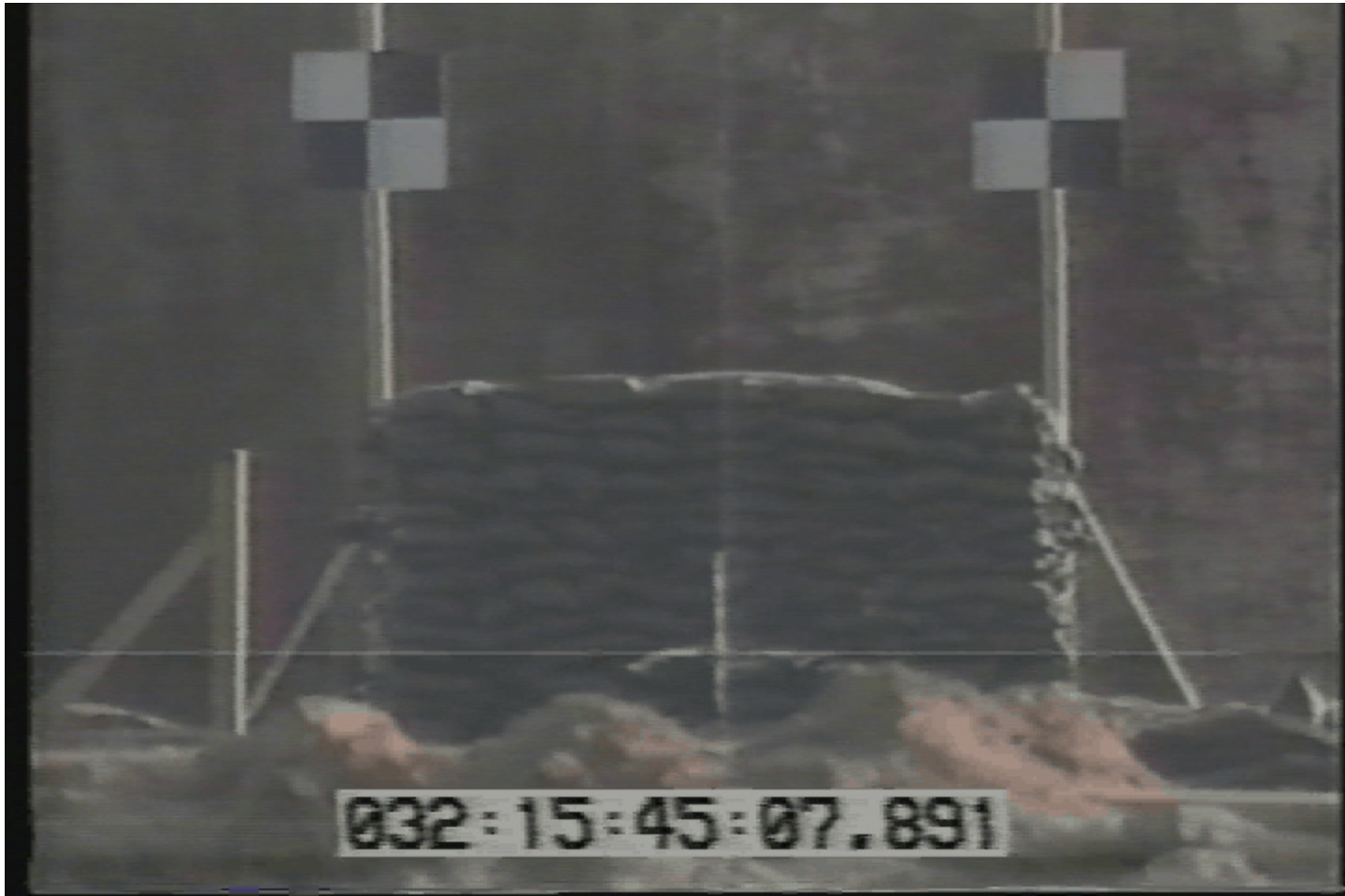
3D PRODA2000 3D - BDM.pr3



SMAW-D in Unstable Flight (click to View)

SMAW-D Test Video

If you can't get a bigger target...

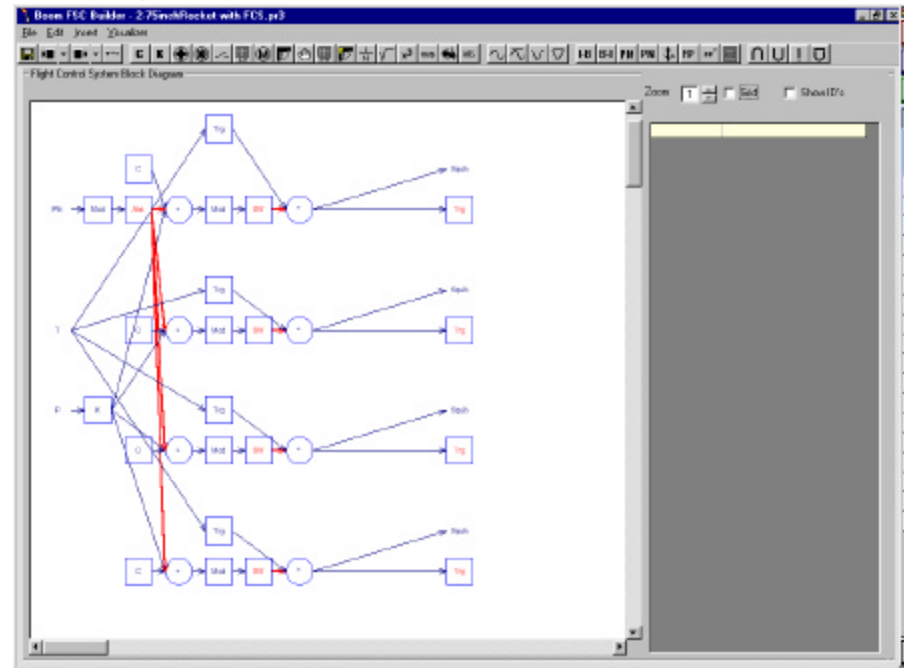


Actual video of a SMAW-D in Unstable Flight (click to View)

Guidance & Control Trajectory Simulation

If you can't get a bigger target...

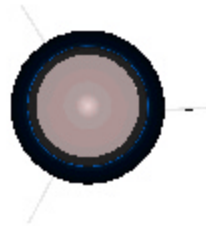
- Combines a Time Based Control System Simulation with a 6DOF Body Fixed Trajectory
- Drag and Drop Editor Visual Editor to input the Control System Block Diagram
- No coding required
- Tabulated and Plot Outputs
- Outputs to the 3D Visualizer



Thruster Control

If you can't get a bigger target...

PRODA52000 3D - PETRock5_6_ver 12-5MarksSpecial.pr3

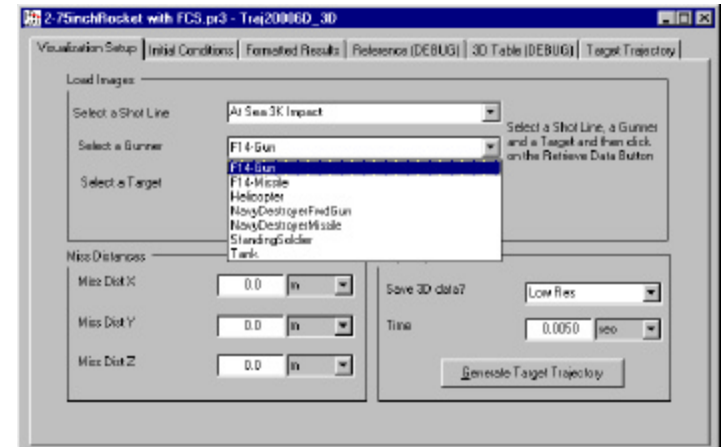


2.75" Rocket demonstrating Main Motor and Thruster Firing (click to View)

Scenario Generator

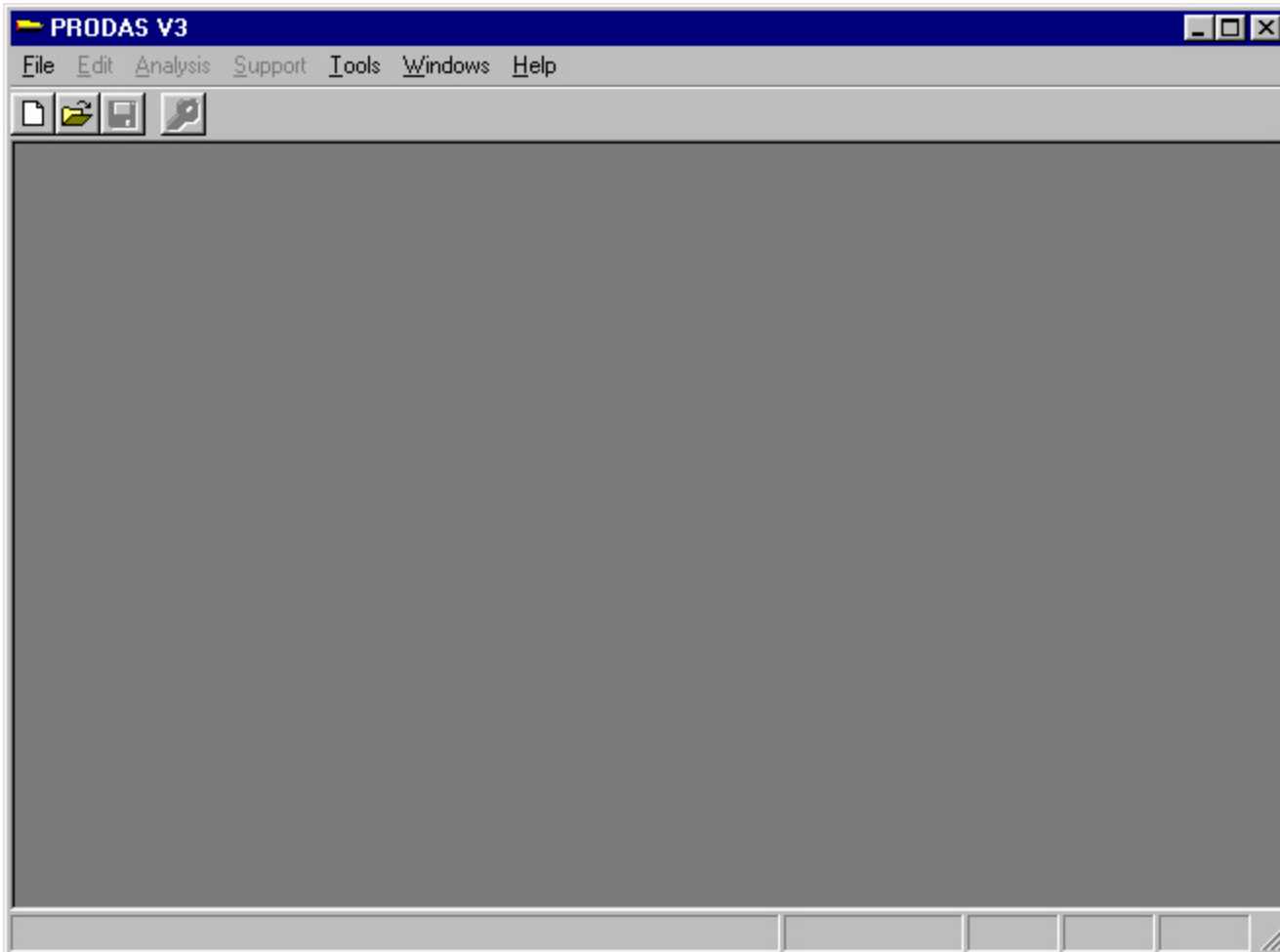
If you can't get a bigger target...

- Quickly generate complete scenes
 - Set the Stage pick the actors
 - Range Model
 - Gunner
 - Target
 - Scenario generator calculates the Fire Control Solution and Generates the trajectory
 - Go to the Visualizer, everything is ready to go
- Record as an AVI for insertion into presentations



Demonstration of Scenario Generator

If you can't get a bigger target...



(click to View)

Example Scenes

If you can't get a bigger target...



2.75" Attack on Tank Column (click to View)

What's Next

If you can't get a bigger target...

- Moving Gun Platform (Target can already move)
 - Dog Fight
 - Bomb Drop
- Sub-munitions Dispense
- More Targets, Ranges and Gunners
- GPS based model of actual range