NAU Rocket Propulsion Capstone Team #3 Prototypes

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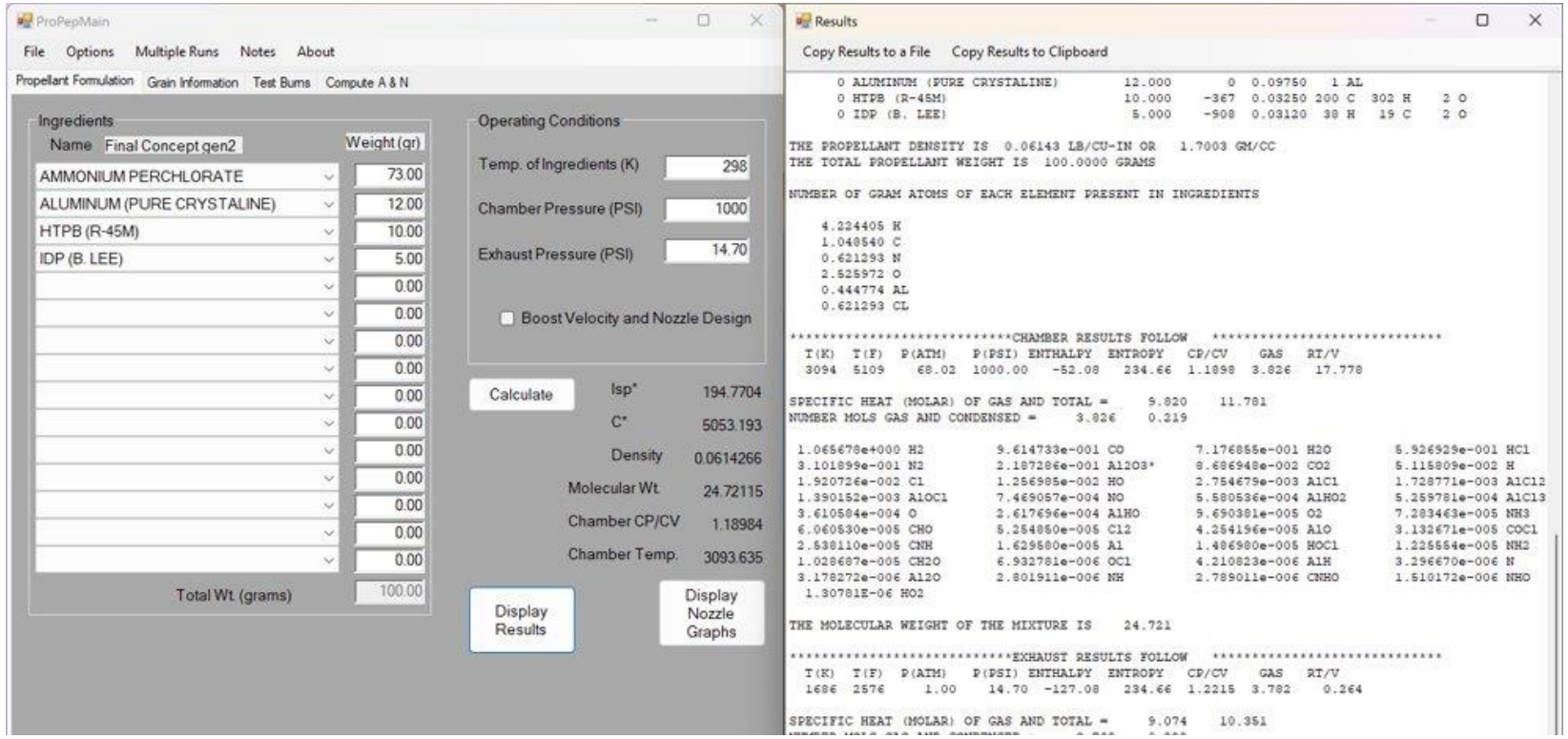
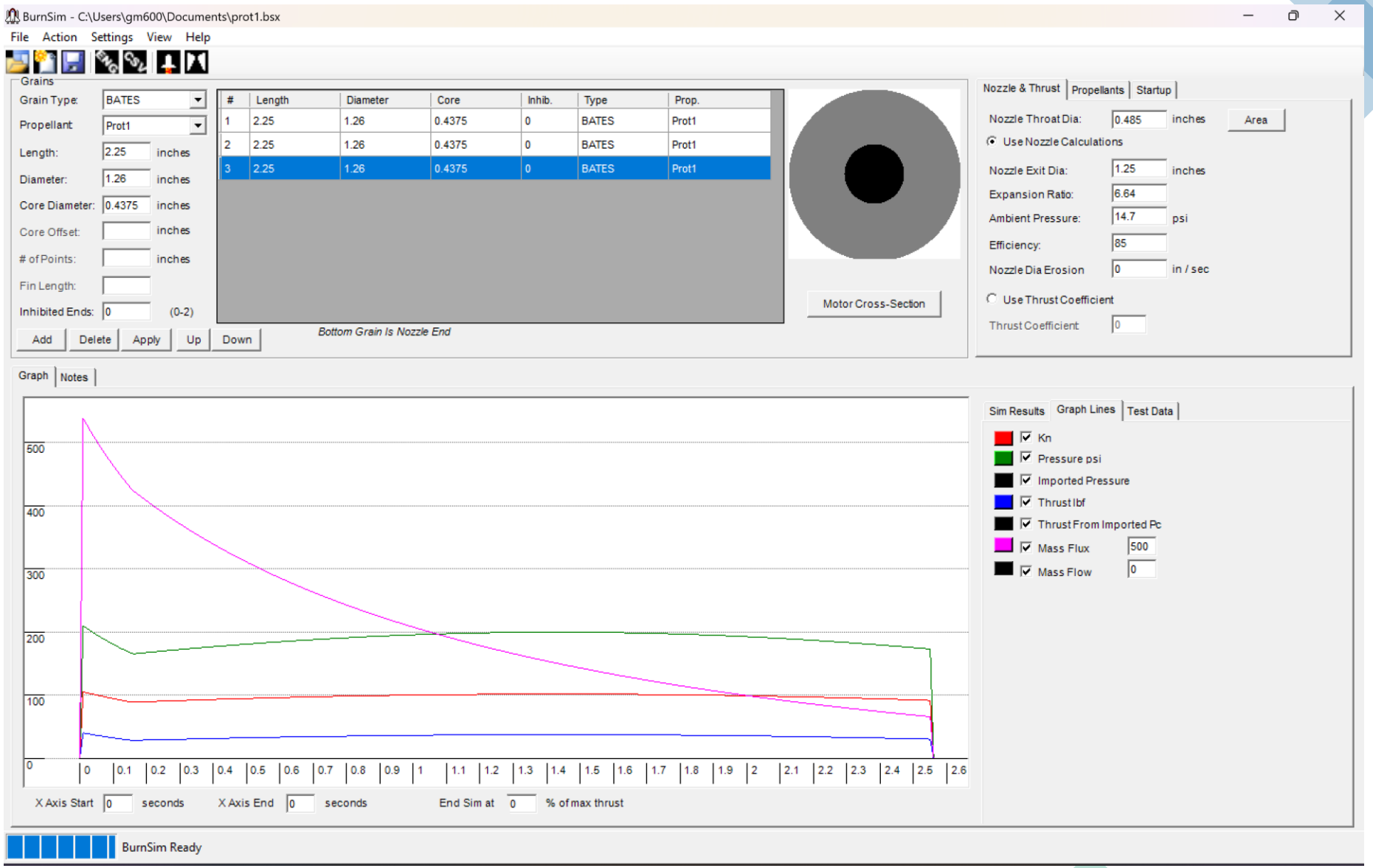
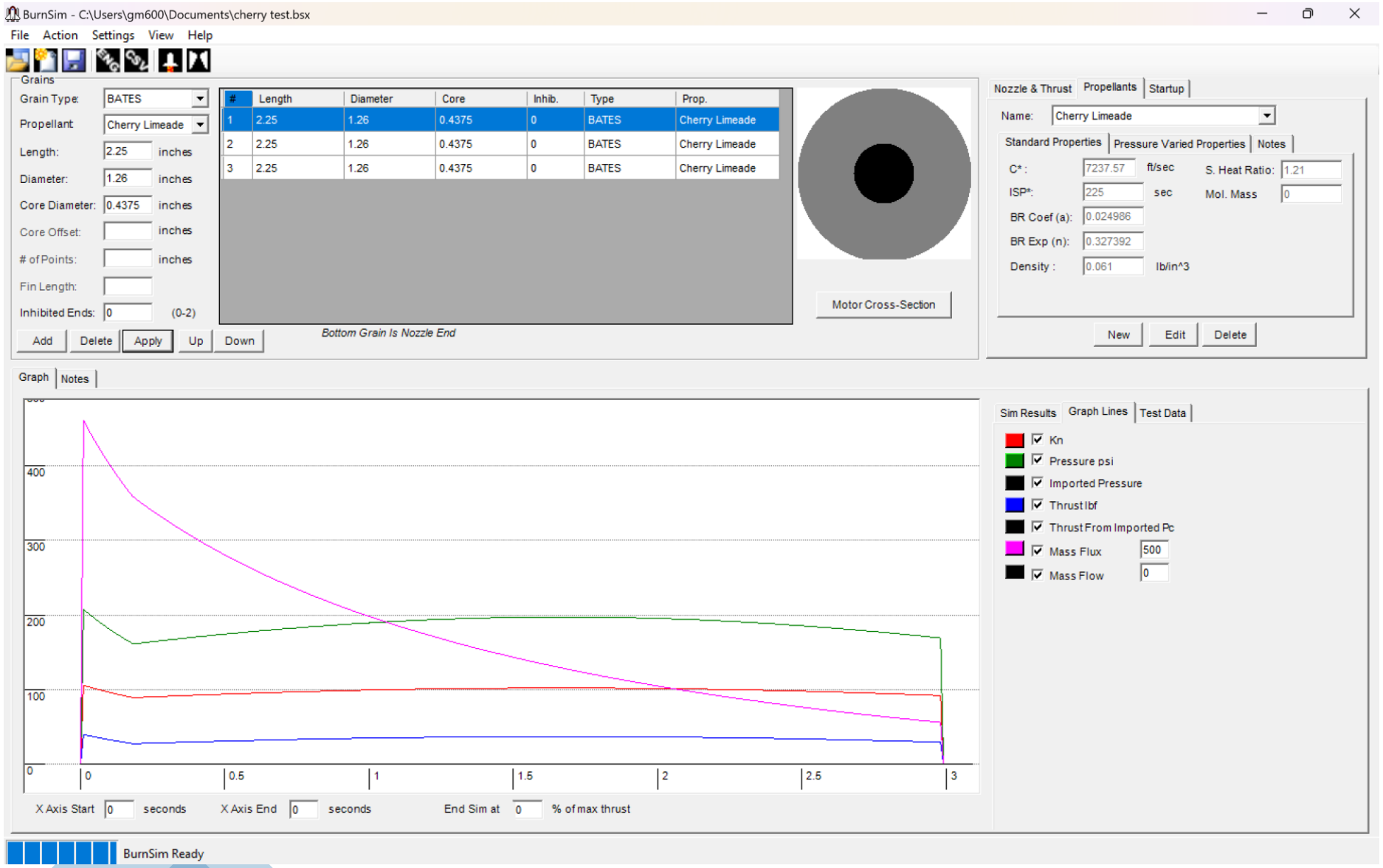
Virtual Prototype

- How does our formulation compare to current formulations?
- Is this safe to manufacturer?

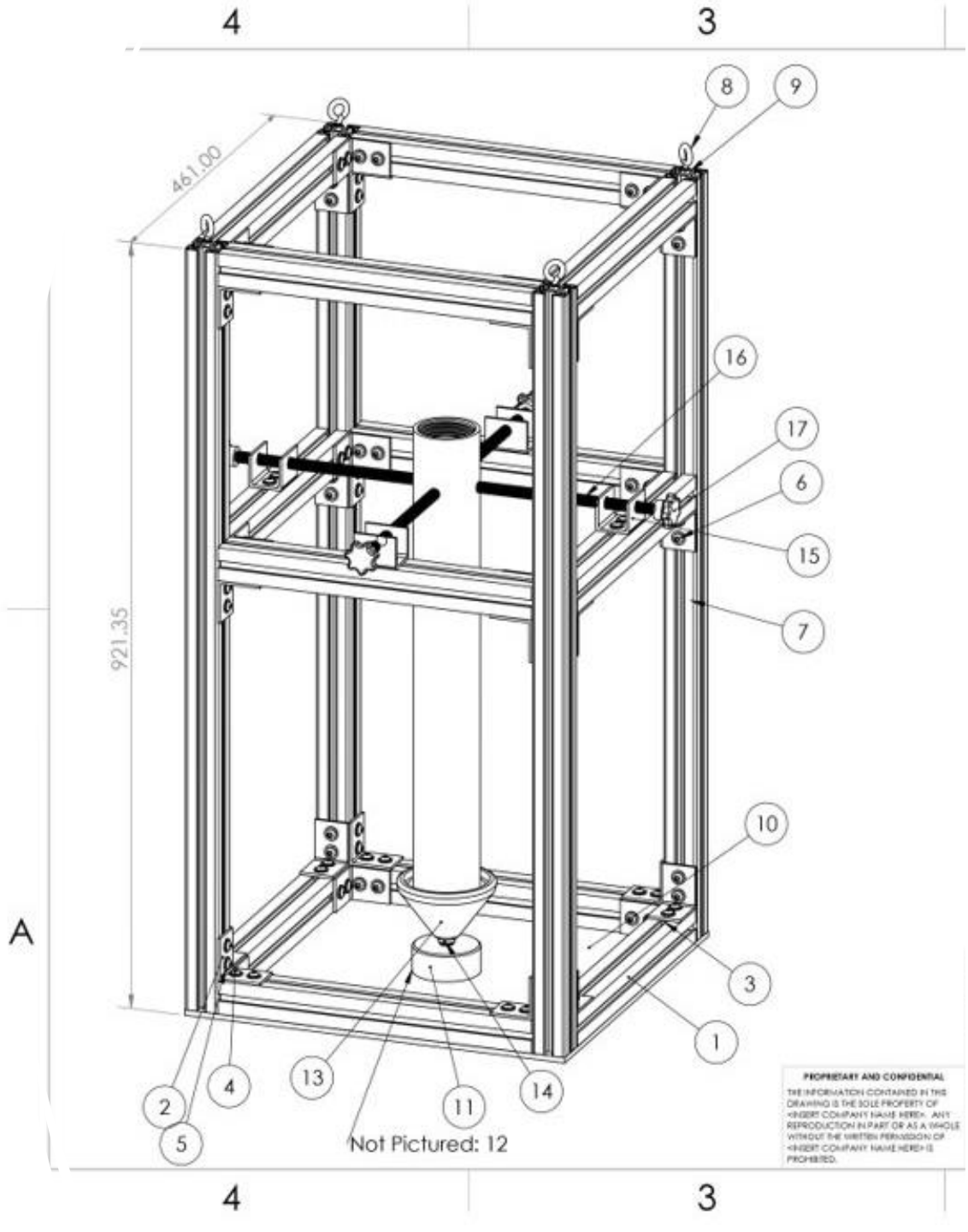



BurnSim - C:\Users\gm600\Documents\prot1.bsx
File Action Settings View Help
Grains
Grain Type: BATES
Propellant: Prot1
Length: 2.25 inches
Diameter: 1.26 inches
Core Diameter: 0.4375 inches
Core Offset: inches
# of Points: inches
Fin Length:
Inhibited Ends: 0 (0-2)
Add Delete Apply Up Down
Length Diameter Core Inhib. Type Prop.
1 2.25 1.26 0.4375 0 BATES Prot1
2 2.25 1.26 0.4375 0 BATES Prot1
3 2.25 1.26 0.4375 0 BATES Prot1
Bottom Grain Is Nozzle End
Motor Cross-Section
Nozzle & Thrust Propellants Startup
Nozzle Throat Dia: 0.485 inches Area
Use Nozzle Calculations
Nozzle Exit Dia: 1.25 inches
Expansion Ratio: 6.64
Ambient Pressure: 14.7 psi
Efficiency: 85
Nozzle Dia Erosion 0 in / sec
Use Thrust Coefficient
Thrust Coefficient 0
Graph Notes
500
400
300
200
100
0
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2 2.1 2.2 2.3 2.4 2.5 2.6
X Axis Start 0 seconds X Axis End 0 seconds End Sim at 0 % of max thrust
Sim Results Graph Lines Test Data
Kn
Pressure psi
Imported Pressure
Thrust lbf
Thrust From Imported Pc
Mass Flux 500
Mass Flow 0
BurnSim Ready


BurnSim - C:\Users\gm600\Documents\cherry test.bsx
File Action Settings View Help
Grains
Grain Type: BATES
Propellant: Cherry Limeade
Length: 2.25 inches
Diameter: 1.26 inches
Core Diameter: 0.4375 inches
Core Offset: inches
# of Points: inches
Fin Length:
Inhibited Ends: 0 (0-2)
Add Delete Apply Up Down
Length Diameter Core Inhib. Type Prop.
1 2.25 1.26 0.4375 0 BATES Cherry Limeade
2 2.25 1.26 0.4375 0 BATES Cherry Limeade
3 2.25 1.26 0.4375 0 BATES Cherry Limeade
Bottom Grain Is Nozzle End
Motor Cross-Section
Nozzle & Thrust Propellants Startup
Name: Cherry Limeade
Standard Properties Pressure Varied Properties Notes
C* : 7237.57 ft/sec
ISP*: 225 sec
BR Coef (a): 0.024986
BR Exp (n): 0.327392
Density : 0.061 lb/in^3
S. Heat Ratio: 1.21
Mol. Mass 0
New Edit Delete
Graph Notes
400
300
200
100
0
0 0.5 1 1.5 2 2.5 3
X Axis Start 0 seconds
X Axis End 0 seconds
End Sim at 0 % of max thrust
Sim Results Graph Lines Test Data
Kn
Pressure psi
Imported Pressure
Thrust lbf
Thrust From Imported Pc
Mass Flux 500
Mass Flow 0
BurnSim Ready

Physical Prototype

- Will the test stand be based on the CAD shown in presentation 3 be the final design?
- Yes



Images of Physical Prototype Test Stand