MiniSShot

Progress Report #2

Rev. 2007/08/16

Progress Report #2

This document outlines progress, to date, of the *MiniSShot* project as a whole, as well as serving to summarize progress of each technical group.

Progress report #2 summarizes progress achieved in the three week period from July 23 to August 14th, 2007.

Overall, progress over the period July 23 to August 14th has been slow, although some significant steps forward have been taken by some Groups. A number of issues and problems have been raised in this report which will be given top priority to resolve. None of these are considered to be major hurdles.

Project Groupings

- Project Support
- Systems Engineering
- Electronic and Software Systems
- Propulsion System
- Recovery System
- Launch Support
- General Engineering Support
- General Manufacturing Support

Project Personnel

Joseph Mahaney (Project Manager) [1]

Andre Alexandre Barbosa
Matt Campbell
Randy Dorman
Alberto Gassol
Chris Hardaker
Joseph Jimmerson [2]
Zachery Kier [2]
Roman Lev
Ed Mallory
Richard Nakka [3]
Cory Posvic
Tom Raithby
Craig Strudwicke
Hans Olaf Toft
Tarun Tuli

[1] On indefinite Leave of Absence
[2] Inactive
[3] Acting Project Manager
[4] Acting focal

Project Support

The roles of the group as a whole include:

- document/drawing management
- arrange for launch site, permits, etc.
- develop / distribute marketing and promotional material
- develop fundraising means and assign funding to groups
- develop project goals, plan and budgets
- website enhancement and maintenance
- develop & implement an effective communication strategies between project participants and our public audience
- organizing and finalizing safety, vehicle integration, launch and recovery procedures and checklists

Members:
Joseph Mahaney (focal) [1]
Chris Hardaker
Alberto Gassol
Richard Nakka [4]
Joseph Jimmerson [2]

Progress July 23 to Aug. 14

- Additional motor CAD drawings have been completed.

Issues:

- Progress on completing motor CAD drawings has been slow.
- Search for additional CAD support has proven unsuccessful.
- Available funds have remained stagnant.
- FTP server to SugarShot website has been down for the past month. As such, no updates have been possible.

Prepared by: R. Nakka

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Systems Engineering

The roles of the group as a whole include:

- provide technical direction and facilitate resolution of any technical issues
- ensure successful integration of vehicle and ground system components
- produce project scope document
- produce and maintain project timetable and manage progress
- manage personnel including skills survey and assignment of duties
- definition and technical approval of project objectives and requirements, including associated documents and drawings
- develop mass targets for all vehicle components
- coordinate/perform miscellaneous testing, as requested from other groups
- plan and coordinate in concert with all other groups final integration and on-site test and assembly of vehicle and ground systems

Members:
Joseph Mahaney (focal) [1]
Richard Nakka [4]

Progress July 23 to Aug. 14

- Progress reports for the period have been submitted by most members.

Issues:

- Some members did not submit a progress report. As such, this report may not indicate complete *MiniSShot* progress.

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Electronic and Software Systems

The roles of the group as a whole include:

- define payload requirements and electronic and mechanical specifications
- design payload and recovery systems electronics including software as required. If commercially available units are to be used as part or whole of the payload, integrate the units as required to achieve requirements.
- Manufacture payload components and assemblies. Alternatively, produce drawings required for offload of part manufacture to the General Manufacturing group.
- Integration of payload components and systems
- testing of components to ensure proper operation and reliability, including flight testing
- provide applicable support to ground testing
- vehicle-ground communications
- motor ignition systems (ground & in-flight) development
- plan and coordinate in concert with all other groups as needed the integration and on-site test and assembly of all electrical vehicle and ground systems

Members:
Ed Mallory (focal)
Tarun Tuli
Hans Olaf Toft
Craig Strudwicke
Andre Alexandre Barbosa

Progress July 23 to Aug. 14

- On board trajectory calculation framework definition in progress.
- Homed in on suitable infra-red sensor (recent discussions with Hans).
- Acquired a thermocouple for testing and development, and reference material on how to apply it.

Issues:

- Chute controller & other hardware has to be started soon due to lead time issues.
- Decisions concerning number of recovery events and the recovery sequence are needed before any hardware can be started.
- Thermal analysis on the nosecone required; need to know the temperature range.

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- Don’t have a specification for the DTMF units and power supply for each module. Have been trying to get this sorted for many months but difficult in regards to power supplies due to unknown loads, etc.

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Propulsion System

The roles of the group as a whole include:

- define propulsion and static testing requirements including technical specification document
- rocket motor detail design
- produce sketches or informal CAD drawings of rocket motor components and assembly
- fabricate (or coordinate fabrication of) rocket motor components
- propellant casting
- perform motor static testing
- plan and coordinate in concert with all other groups the integration and on-site test and assembly of vehicle propulsion and propulsion ground support systems

Members:
Randy Dormans (focal)
Richard Nakka
Matt Campbell

Progress July 23 to Aug. 14

- Fabrication of Mid-bulkhead nearly completed.
- Graphite procured for throat insert.
- Additional candidate ablative material (Plasti-Dip) procured.
- Fabrication of thermal liner for aft motor chamber 90% completed; liner for forward chamber 20% completed.
- Casings fully completed except for hydro-static proof testing and painting.
- Forward bulkhead pressure port fitting designed and manufactured.

Recovery System

The roles of the group as a whole include:

- define recovery system requirements
- design and manufacture of recovery system components (excluding electronics)
- ground and flight testing to verify design concept and reliability
- plan and coordinate tracking and recovery of vehicle
- plan and coordinate in concert with all other groups the integration and on-site test and assembly of vehicle recovery system elements

Members:
Matt Campbell (focal)
Tom Raithby

Progress July 23 to Aug. 14

- Several designs for the separation point have been penned and are ready to be drafted.
- The design of the recovery fairings has been completed including the location of separation points.
- Rick Maschek has been contacted and is interested it helping out with recovery design.
- Collaborations have happened between the recovery and electronics teams to share design thoughts.

Issues:

- The group is suffering from split-time zone syndrome coupled with summer-break syndrome meaning that although there is always someone from the group in town there is rarely a quorum.

Launch Support

The roles of the group working in concert with all other project groups include:

- coordinate ground support systems
- coordinate on-site assembly and testing, launch, tracking and recovery of vehicle

Members:

Members will consist of volunteers from all other groups within the project that can be on-site to assist in launch and recovery efforts. The members are to be selected 3 months prior to launch attempt.

General Engineering Support

The roles of the group as a whole include:

- define overall design of the vehicle
- provide technical support and direction to all other groups (including role as a clearinghouse for technical queries from all other groups)
- provide mechanical and thermal part simulations
- perform flight trajectory simulations and studies
- define vehicle stability requirements
- produce (or assign tasks regarding) CAD models and drawings based on sketches or informal CAD drawing from all groups
- perform brief part or assembly optimization

Members:
Zachery Kier (focal) [2]
Cory Posvic
Hans Olaf Toft
Roman Lev
Richard Nakka (consultant) [4]

Progress July 23 to Aug. 14

- Progress on preliminary vehicle models & sims.
- Vehicle drag studies begun.
- Nosecone profile final definition completed; x-y coordinates passed on to fabrication.
- Nosecone thermal CFD analysis set to begin based on estimated flight envelope.

Issues:

- Thermal analysis of nozzle, started some months ago, is in an indeterminate status.

Prepared by: R. Nakka

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General Manufacturing Support

The roles of the group as a whole include:

- provide manufacturing support for the project, including off-load work from other groups
- provide technical support regarding manufacturing methods to all groups
- provide access to manufacturing facilities or materials

Members:
Richard Nakka (focal)
Tom Raithby
Roman Lev
Zachery Kier [2]
Matt Campbell
Randy Dormans
Joseph Mahaney [1]

Progress to date

- The 14-ply plywood block 10x10x70 cm for the nosecone plug has been bonded.

Issues:

- Set and approval of the final design of the separation method and joint is required ASAP. Unless known, the nosecone plug can not be completely finished (root area of the nosecone plug has to correspond with the separation joint to achieve required concentricity.

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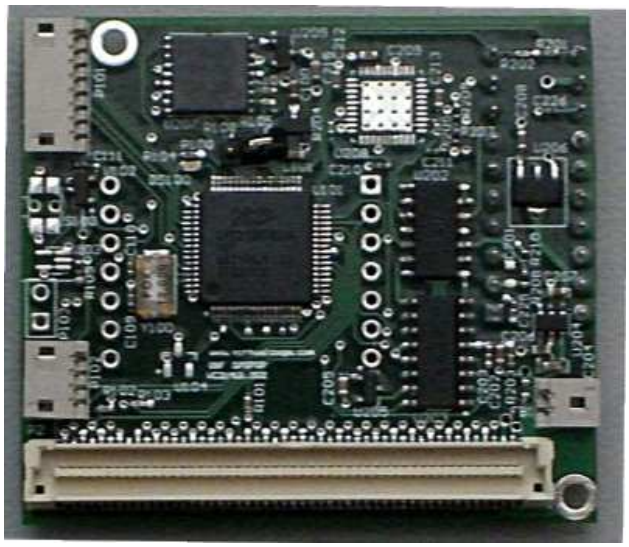
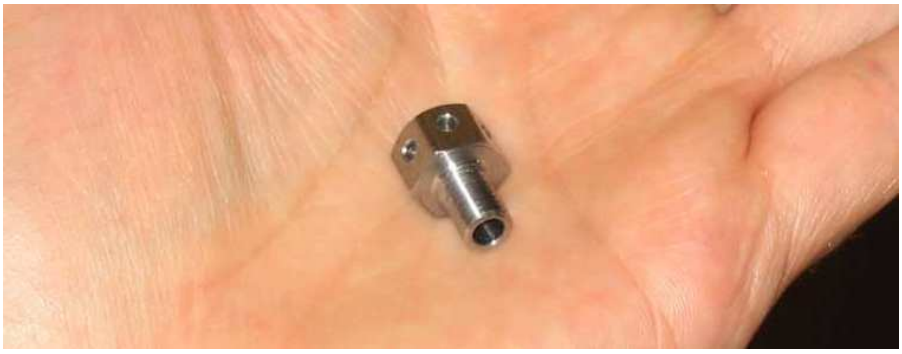
Progress Photos July 23-August 14



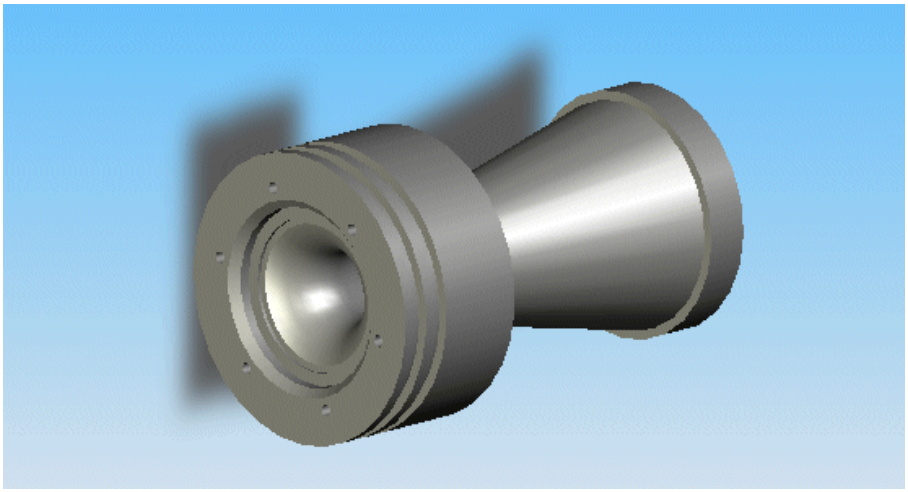
Inertial Measurement Unit (IMU), work in progress

Nosecone thermocouple sensor

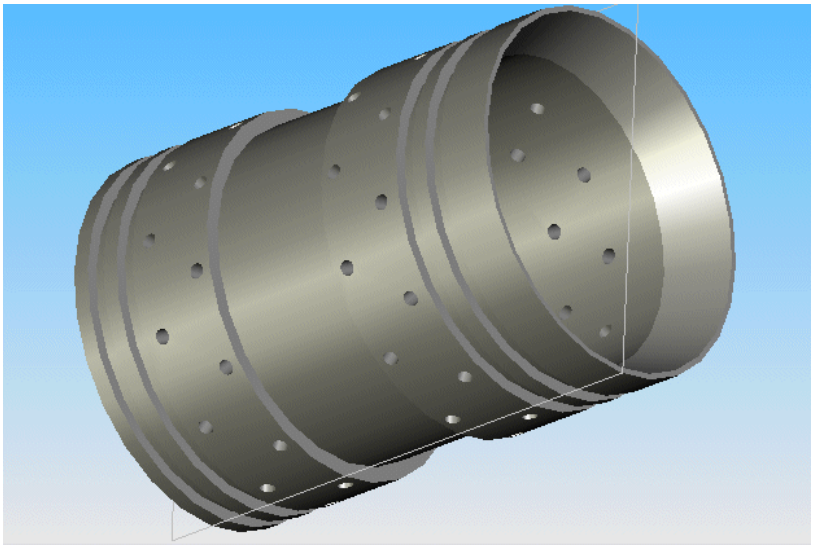


Motor Forward Bulkhead pressure port fitting

Aft chamber thermal liner fabricated from *Deltaflex-100*



SolidWorks model of Nozzle Assembly



SolidWorks model of Mid-Bulkhead

14-ply bonded plywood block for nosecone plug-mould