

THEME
LEVEL I
LEVEL II
Level III

Revolutionize Aviation
Vehicle Systems
Power & Propulsion

Pulse Detonation Engine Technology (PDET) Project

OBJECTIVE

Evaluate the application of pulse detonation combustion technology to hybrid subsonic and supersonic gas turbine engines for commercial and military applications and combined cycle propulsion systems for access-to-space applications.

KEY DELIVERABLES

1 Hybrid PDE concept study report	9/04
2 Fundamental research status report	9/04

OVERVIEW

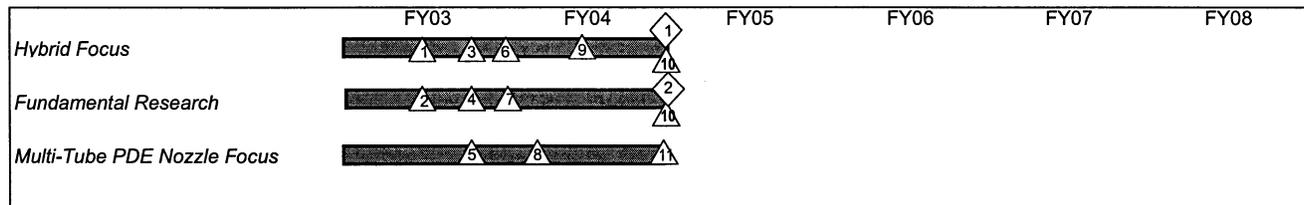
The PDET Project is comprised of a broad fundamental research base designed to:

- Develop conceptual designs of PD-based propulsion systems that take advantage of the thermodynamic efficiency of detonative combustion while overcoming inherent "pure" PDE deficiencies
- Demonstrate component interactions and efficiencies in appropriate scale rig tests
- Validate system performance models using experimental data

TECHNICAL APPROACH

Develop "clean sheet" system designs for detonative propulsion systems. This includes component and system analysis of high-frequency unsteady phenomena experienced during pulse detonation. The design of robust components for a detonation environment will also be emphasized.

SCHEDULE



MILESTONES

1	L3 – Evaluate multi-cycle systems analysis tool	3/03
2	L3 – Complete initial PD-tube emissions measurements	3/03
3	L3 – Complete initial emissions assessment for hybrid concept(s)	6/03
4	L3 – Complete pulsed inlet and ejector test reports	6/03
5	L3 – Multi-tube PDE rig design complete	6/03
6	L3 – Evaluate hybrid concept refinement	9/03
7	L3 – Evaluate status of fundamental research and decision to proceed	9/03
8	L3 – Evaluate status of nozzle design and testing	12/03
9	L3 – Evaluate component test rig development	3/04
10	L2 – Complete interim assessment of key PDE technologies	9/04
11	L3 – Complete initial nozzle evaluation	9/04

MANAGEMENT

PDET is a Level III project at the Glenn Research Center. Level I Manager is Richard Wlezien at HQ. Level II Manager is Dr. Gary Seng at the Glenn Research Center. Level III Manager is Richard DeLoof at the Glenn Research Center. This project is in full compliance with NPG7120.5B.

RESOURCES

	FY03	FY04	FY05	FY06	FY07	FY08
Funding (M\$)	4.464	5.000				
Workforce (WY)	16.0	20.0				

FACILITIES

	FY03	FY04	FY05	FY06	FY07	FY08
Research Combustion Lab						
1'X1' Wind Tunnel						
ECRL						

AGREEMENTS

Partner	Agreement Title	Number
WPAFB/AFRL	Interagency Agreement SAA3-307 between NASA Glenn Research Center and Air Force Research Laboratory	SAA3-307

ACQUISITION STRATEGY

Due to the broad nature of the PDET project, a variety of acquisition instruments will be employed. Procurements will be in accordance with approved procedures at the procuring Centers. Contract efforts will be executed using the RASER (Revolutionary AeroSpace Engine Research) mechanism to the maximum extent possible. Among the approaches to procurement, the most likely include NASA Research Announcements (NRA), NASA Cooperative Agreement Notices (CAN), and Requests for Proposal (RFP). These vehicles will result in grants, cooperative agreements and contracts. For any onsite contractors, performance based contracts are the preferred instrument.

RISK MANAGEMENT

Risk	Mitigation Strategy
If appropriate personnel are not assigned to the project; then the milestones will not be met.	1. Continue working with management to assure assignment of key personnel. 2. Diversify activity both inside and outside GRC
If adequate R&D funds are not available, major milestones will not be met.	1. Obtain management support 2. Descope efforts
If the project does not have sufficient priority in major test facilities; then milestones will not be met.	1. Obtain management support 2. Examine use of facilities at other organizations
Changes in program and center management could decrease support for PDE related research.	1. Continue working with center management to keep them informed of status 2. Create plan with near term results

TECHNOLOGY TRANSFER

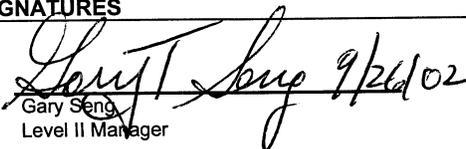
An objective of the PDET project is to ensure rapid and effective dissemination of the technology to the U.S. industry. Technology transfer mechanisms depend on the maturity of the technology. A variety of technology transfer mechanisms will be employed. The most important mechanisms are direct involvement by the customers in the formulation of the project described in this plan, direct contract of R&D and cooperative agreements with industry and other government agencies. The PDET project funds R&D contracts, memoranda of agreement (MOA's) and grants that ensure direct transfer of technology to the U.S. industry, increasing the likelihood of transfer into customer products. Technology exchange also occurs among the participants through special technical working group meetings. Presentations at technical conferences sponsored by the AIAA and other similar professional societies will be limited to discussion of non-competitively sensitive information. Other methods of technology transfer include publication of NASA technical reports, personnel exchanges between NASA, industry and other government agencies through MOA's, and technical demonstrations at NASA and user facilities.

Likely candidate technologies for transfer include engine design concepts, material/structural concepts, and cycle and numerical simulation computer codes.

EDUCATION OUTREACH

The PDET Project will support educating the public and raising awareness of NASA activities. Opportunities may include participation in air shows and other educational venues. From time to time, the PDET Project also distributes educational materials such as pamphlets and articles.

SIGNATURES


 Gary Seng
 Level II Manager


 Richard DeLoof
 Level III Manager