

## **RCS IERT Advanced Propellant Formulation and Processing Course Outline & Information**

The RCS Institute of Experimental Rocket Technology (IERT) "Advanced Propellant Formulation and Processing Course" is taught by Gary C. Rosenfield, president of RCS, founder of AeroTech Consumer Aerospace and co-inventor of the reloadable hobby rocket motor. Gary will personally instruct course participants in the most important and relevant information concerning modern composite propellant formulation and manufacture that he's learned in over 35 years of experimental, hobby and military/industrial rocketry experience.

**This is not the typical "make it-take it" EX course, nor is it a beginner's course.** It is intended for the more experienced experimental rocket enthusiasts who want to raise their knowledge of propellant chemistry and manufacturing techniques to an entirely new level. A mixture of theoretical and practical instruction will be emphasized, and the information provided will have direct application to real-world experimental rocketry activities. The two-day seminar will be presented in both a lecture format at the course hotel and live demonstrations at selected locations.

Participants must be at least 18 years of age, have read and understood Terry McCreary's book "Experimental Composite Propellant", be NAR or Tripoli level 2 or 3 certified (this requirement waived for military or government participants) and be "U.S Persons" as defined in the International Traffic in Arms Regulations (ITAR). Participants must not be affiliated with commercial hobby rocket propellant or motor manufacturing enterprises.

Course dates will be announced at periodic intervals. A registration form with course dates and a participation contract may be downloaded from the "Classes" page on the RCS website. **NOTE:** The course topics and agenda are subject to change without notice.

**Course Topics & Agenda:**

- Learn and apply practical safety rules and techniques to experimental propellant formulation and processing:

- Personal protection
- Housekeeping
- Chemical segregation
- Sources of inadvertent ignition
- Remote operation
- Specific hazards
- Process discipline
- Overview & analysis of the 10/15/01 AeroTech fire

- Learn how to properly select and formulate propellant ingredients to create a variety of readily processable experimental propellants with different performance and visual characteristics including:

- The importance of proper particle size distribution; optimum particle sizes and ratios
  - How to make any propellant castable
  - Curative selection and NCO:OH ratio calculations
  - The best plasticizer, bonding agent and burn rate catalysts for EX use
  - How to formulate an 88% solids AP/Al/HTPB room temperature mix, cast & cure propellant
- Learn methods for post-processing propellant safely:
    - Core drilling
    - C-slotting
    - Removal of propellant cuttings
    - Mandrel extraction
- Demonstrate the types of equipment and techniques necessary to quickly and safely produce high-performance castable propellant:
    - The best mixing process for EX rocketry
    - Mix up to 30 lbs. propellant in a 16 minute mix cycle
    - Simple and effective vacuum mixing techniques
    - A highly efficient void-free casting method
    - Mandrel casting basics
- Bonus: Learn experimental motor design fundamentals:
    - Core Kn analysis
    - Grain design selection
    - Erosive burning issues
    - Nozzle selection
    - Liner selection
    - Igniters
    - Delay & ejection options
- Exam & certificate presentation
  - Dinner & informal discussion (optional)

**What Won't be Disclosed:** • Proprietary AeroTech formulations

- Sources of supply for RCS rocket motor parts



**www.rocketmotorparts.com**

- Course Prerequisites:**
- Proof of “U.S. Person” status
  - 18 years of age or older unless accompanied by parent/guardian
  - NAR or Tripoli level 2 or 3 certified (this requirement waived for military or government participants)
  - Must have read and understood Terry McCreary’s book “Experimental Composite Propellant”
  - Participant must not be affiliated with commercial rocket propellant manufacturing enterprises

**Course Date:** March 14 & 15, 2009

**Course Hotel:** Pruneyard Plaza Hotel, Campbell, CA, 800-559-4344  
<http://www.pruneyardinn.com>

**Course Fee:** \$1,500.00

**Payment:** Check or money order made payable to “RCS Rocket Motor Components, Inc.”; credit cards accepted including via [www.paypal.com](http://www.paypal.com) using the email address [orders@rocketmotorparts.com](mailto:orders@rocketmotorparts.com).

- Other Information:**
- Each day will have ample time for Q & A
  - Course attendees will be required to sign non-disclosure/non-circumvention/non-compete and liability waiver contract, and must agree to conduct all activities in connection with this course in a safe manner
  - No photography or electronic recording devices are permitted during the course lecture presentation or live demonstrations.
  - Note taking is encouraged!

**Schedule:**

- Saturday 3/14            9:00 AM – 7:00 PM
- Sunday 3/15            9:00 AM – 3:00 PM

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