

# The Rapier Gas Generator Story

Power for the guidance of a missile may be by one of the following sources: Tapping gas from the main sustain propellant (provided it does not burn out before reaching the target). Alternatively an electric battery may be used but long-term storage may be a problem. Finally a separate end-burning propellant to provide hot gas to actuate a steering unit has proved popular in a number of missiles including Swingfire, Sea Wolf and Rapier.

Traditional gas generators for these missiles used Mechanite 14 propellant inhibited with ethyl cellulose overwound with electricians tape! The tape was necessary to prevent inhibitor failure.

For the field standard 'C' version of Rapier ICI decided to inhibit their Mechanite 14 with silicone rubber. This offered many advantages in production costs and was accepted by BAe for development.

All went well until it was found that the pipes to take the hot gas to the actuator were being distorted by higher than normal gas temperatures compared with ethyl cellulose inhibited charges.

P1 branch were asked to suggest a solution and an MoD contract was placed on us to provide a cartridge for testing in a BAe rig. Eric Baker formulated a double-base propellant with a low NG level for use with an oxamide filled cellulose acetate inhibitor. After some problems with ignition, solved by increasing the surface area of the end of the charge, the problem was solved.

In 2017 a group of retired BAe staff had a group visit to Waltham Abbey Mills and Tony Machell who had tested the P1 cartridges confirmed that it was now in service use.

From this story it is easy to understand why the missile business is ultra-conservative and is cautious about using new technology.

**B C Howard**