JP-8+100 Development & History

In the late 1980's the United States Air Force (USAF) began investigating the anticipated impact of higher heat loads created by new propulsion engines which were designed to power the next generation of fighter aircraft. An expected result of the higher heat loads was a substantial increase of the bulk fuel temperature prior to the point of combustion. Fuel system coking, especially on the fuel nozzle face, was a concern with the use of standard JP-8 fuel currently utilized in the military community.

The result of this investigation was the creation of a joint program between the USAF, United States Navy (USN), and industry partners. The goal was to find alternative fuel solutions that could tolerate the increased heat loads of propulsion engines designed for advanced fighter aircraft like the F-22 and the Joint Strike Fighter (JSF). The initial required performance goal was 100°F of thermal stability above the current JP-8 fuel, which led to the program name *JP-8+100*.

Early in the *JP-8+100 Program* it became clear that there were two potential options; procure a more highly refined fuel from current fuel producers, or find an additive technology that could be combined with today's standard JP-8 to meet the performance criteria. Through a series of laboratory screening tests, developed and performed by the USAF and USN it was quickly determined that the most cost effective solution was through additive technology.

Hammonds Technical Services, Inc., headquartered in Houston, Texas, has long been a leader in additive injection technology. Hammonds has been involved with the *JP-8+100 Program* since its inception as a sole source provider for US Military additive injection systems. BetzDearborn, a specialty chemical supplier to the refining and petrochemical markets, and industry leader in high temperature process chemistry, became a participant in the *JP-8+100 Program* in 1989. BetzDearborn was subsequently purchased by General Electric.

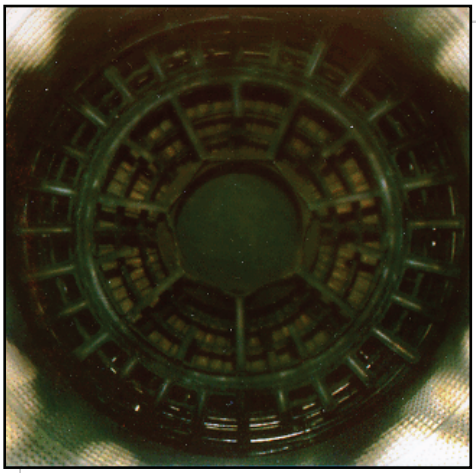
After several years of screening by the USAF, the high temperature dispersant chemistry, SPECAID 8Q405, was determined to be superior to hundreds of additive candidates tested. By 1992, this additive technology was recognized as the first to meet the performance goals of the program and became the backbone of the *JP-8+100* additive package.

In 1994, after thousands of hours of laboratory and small scale engine testing, and an exhaustive materials and compatibility screening, the time had come to actually demonstrate a “no harms” test in an actual fighter engine. The test was conducted on an F100-200 engine from an F-16 Air National Guard (ANG) plane at Kelly AFB. The engine had accumulated over 250 hours at the time it was pulled and visual inspection showed it to be "dirty".

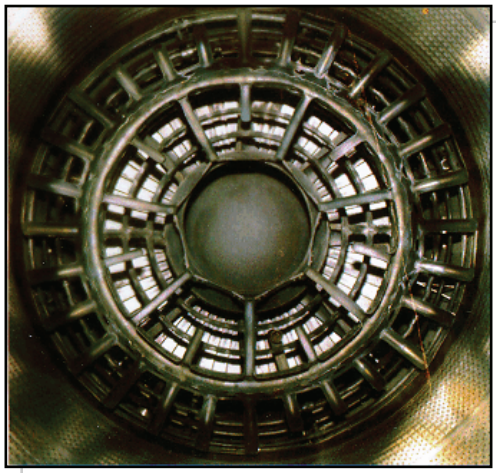
During the test on JP-8+100 fuel, it was noted that the engine began to run quieter, the exhaust flame burned cleaner, and the linings in the afterburner section became whiter; in short, the engine began to show indications of clean-up.

Based on the exciting clean-up results seen during the Kelly AFB engine test, the USAF quickly moved to determine the maintenance savings potential with the current fleet of aircraft. The first field demonstration was initiated at the 173rd FW of the Oregon ANG at Klamath Falls. A wing of F-16's with Pratt & Whitney F100-200 engines were monitored for one year using JP-8+100 fuel. They were

then compared to operational data from the prior year on standard JP-8 fuel. The results were dramatic; maintenance costs were reduced by over 70% - which translated into hundreds of thousands of dollars saved at a single ANG base.



200+ Hrs on untreated JP-8



200+ Hrs on JP-8 then
50+ Hrs on JP-8+100

In the end, JP-8+100 fuel not only met the high temperature, thermal stability requirement for future aircraft, but it also provided tangible clean up benefits to the current aircraft fleet. The USAF recognized the significant maintenance savings with the use of SPECAID 8Q462 and began accelerating the conversion of their trainer and fighter wings to JP-8+100 fuel in 1996.

In late 2005, the US Army completed a 2 year study to determine the potential savings in maintenance costs. The study, conducted at Ft. Rucker, AL, involved almost 600 helicopters and approximately 230,000 flight hours per year. The results were overwhelming with an estimated average annual savings of $5.4 million. The study recommended that SPECAID 8Q462 be used in all Army aircraft whenever possible.

Today, we have more than 10 million hours of experience with JP-8+100 fuel on a variety of aircraft. Trainers (T-37, T-38), fighters (A-10, F-15, F-16), cargo (C-130), and helicopters (UH-1H, H-58, HH-60G) all currently use SPECAID 8Q462.

Hammonds is proud to be part of a program that is not only helping our country improve its air readiness and flight safety, but also reducing the daily operating costs associated with training and protecting the men and women who serve our country. For more information on the *JP-8+100 Program*, or how this technology can help lower your aviation operating costs, please contact:

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