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# Using Synthetically-Derived (Fischer-Tropsch) Fuels in the U.S. Army Tactical Fleet

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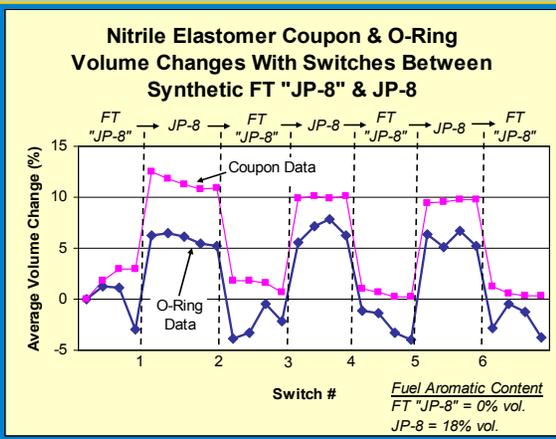


The Global Fischer-Tropsch (FT) Industry is emerging – Army TARDEC evaluations of these synthetically-derived liquid hydrocarbons pave the way for the Army to take advantage of these non-petroleum fuel sources.

Early focus in evaluations of FT fuels:

- fuel interchangeability
- fuel lubricity
- exhaust emissions

Some elastomeric components in fuel distribution systems are affected by changes in fuel composition such as aromatic hydrocarbons



Nitrile components swell in JP-8 and then shrink when switched into FT "JP-8"; shrinking of nitrile o-rings inc reases risk of sealing failures. Use of unaffected o-ring elastomers, and use of FT hydrocarbons in blends with JP-8, are ways to reduce this risk. [TARDEC Report No. 16028]

## Improved lubricity of treated synthetic fuel

Test	Pump	Duration (hours)	Change <sup>1</sup> (mm)	FT Fuel CI/LI (mg/L)
1	1	95.6	0.096	Untreated
	2	150.7	0.068	
2	3	500	0.007	12
	4	500	-0.006	
3	5	500	0.005	22.5
	6	500	0.002	

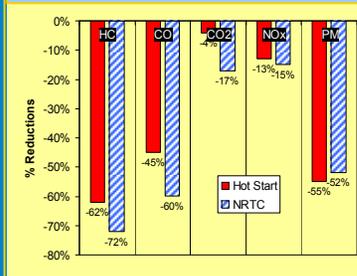


Data courtesy SwRI – TARDEC Fuels & Lubricants Research Facility

<sup>1</sup> Change in roller-to-roller dimension pre- & post-1e st.  
<sup>2</sup> Min. and Max. treat rates per QPL-25107.

Testing in rotary injection pump test rig establishes improvement in neat FT fuel treated with lubricity improver additive, CI/LI, indicative of acceptable field performance. [SAE 2004-01-2961]

## Reduced tailpipe exhaust pollutants

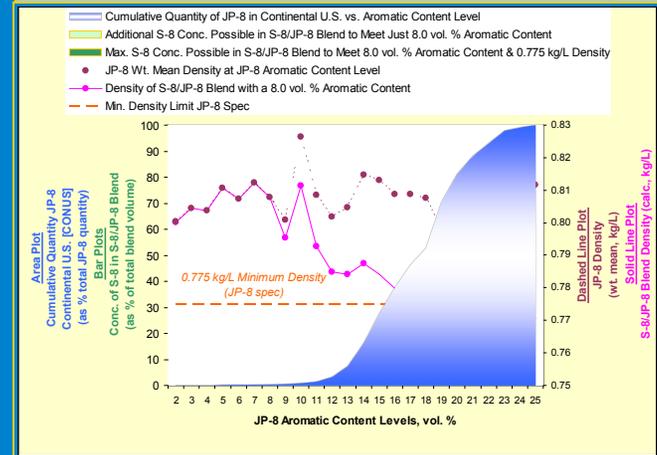


Data courtesy SwRI – TARDEC Fuels & Lubricants Research Facility

Synthetic Fischer-Tropsch (FT) "JP-8" compared to low-sulfur cert. DF2 tested in 6.5L diesel engine. [SAE 2004-01-2961]

Recent study on blends – blending FT "JP-8" into U.S. supplies of JP-8:

Use of synthetically-derived (FT) hydrocarbons in blends with JP-8 is reasonable strategy to begin evolution towards reducing petroleum content of military's primary bulk fuel



Significant amounts of FT IPK\* can be used in blends with JP-8 in Continental U.S. [CONUS] to produce fuel meeting established criteria for use of semi-synthetic jet fuel in aircraft. (basis: JP-8 data CONUS-2004, DEF STAN 91-91) [SAE 2006-01-0702]

\* FT Iso-Paraffinic Kerosene (IPK) contains no sulfur or aromatics; S-8 is FT IPK produced by Syntroleum Corp. with most properties meeting chemical/physical properties per MIL-PRF-83133 (JP-8 spec)

Current evaluations include:

- side-by-side operation of 10kW tactical gensets using diesel, JP-8, FT "JP-8", and JP-8/ FT "JP-8" blend
- Caterpillar C7 engine testing per 2x ARMY 210-hr wheeled vehicle test cycle (≈40,000 miles) to compare FT "JP-8" to JP-8