

# AC Analytical Controls Fame in Jet Application



# Outline

- Why Fame in Jet Analysis?
- Sample Range
- Existing Technologies
- Project Approach
- Advanced Technology
- Standardization developments



# Why Fame in Jet?

FAME (fatty acid methyl esters)  
used as blend stock for diesel in  
a refinery process

Jet fuel is produced, transported  
and stored using the same  
refinery infrastructure as FAME

Risks of fame contamination  
during jet fuel production,  
transportation and storage

- Risk of coke deposits in the fuel system
- Risk of gelling of the fuel

These conditions can result in engine operability problems, and possible engine flameout!



# Why Fame in Jet?



Important need for an analysis solution on  
FAME contamination in Jet

## AC Analytical Controls' Fame in Jet Solution:

High-end solution for the analysis of FAME traces in Jet Fuel using Gas Chromatography with a unique combination of Deans-Switching and Cryo Focussing



# Scope

Sample Matrix	Jet Fuel
FAMES of Interest	C16:0, C18:0, C18:1, C18:2, C18:3
Quantification Range Individual FAME	0.5 – 10 mg/kg*  * Complies to total FAME specification: <5 mg/kg (DEFSTAN 91-91 will be incorporated in ASTM D1655)



# AC Analytical Controls' Application Group



## AC Application Group

Customized  
Systems  
Request for  
Quote

Customized  
Systems –  
Ops  
assistance

Sustaining  
Engineering

Assist  
engineering  
projects  
(NPD)

New  
Application  
Development



*AC Fame in  
Jet project*



# Existing technologies

Infrared Technology	<ul style="list-style-type: none"> <li>▪ Does not meet 5 mg/kg specification</li> </ul>
GCxGC	<ul style="list-style-type: none"> <li>▪ Expensive</li> <li>▪ Complex</li> <li>▪ Not standardized</li> </ul>
GC-MS	<ul style="list-style-type: none"> <li>▪ Expensive</li> <li>▪ Complex</li> </ul>
SPE-GC	<ul style="list-style-type: none"> <li>▪ Complex sample preparation</li> </ul>
HPLC-ELSD	<ul style="list-style-type: none"> <li>▪ Incomplete separation</li> <li>▪ Complex calibration</li> </ul>



# Project Approach

Multi-Dimensional GC

Deans-switching and  
Cryo-focussing

Cryo Trapping in 2nd  
Dimension

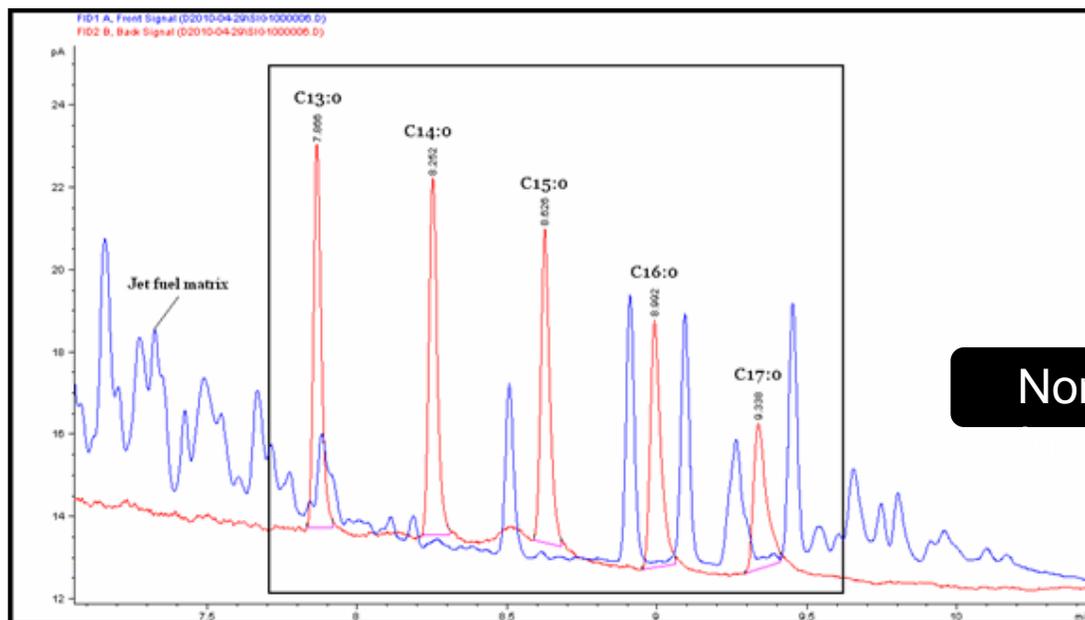
Non Polar 1st  
Dimension column

Polar 2nd Dimension  
column



# Principle of Deans Switch Heart-Cut

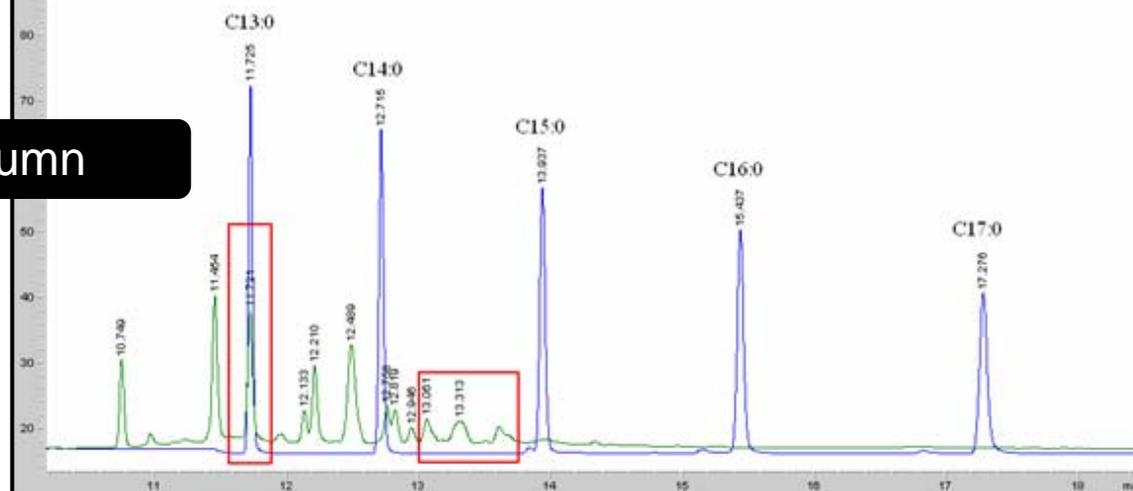
Heart-cut per FAME No or Low Number of Co-elutions



**1 LARGE HEART-CUT**

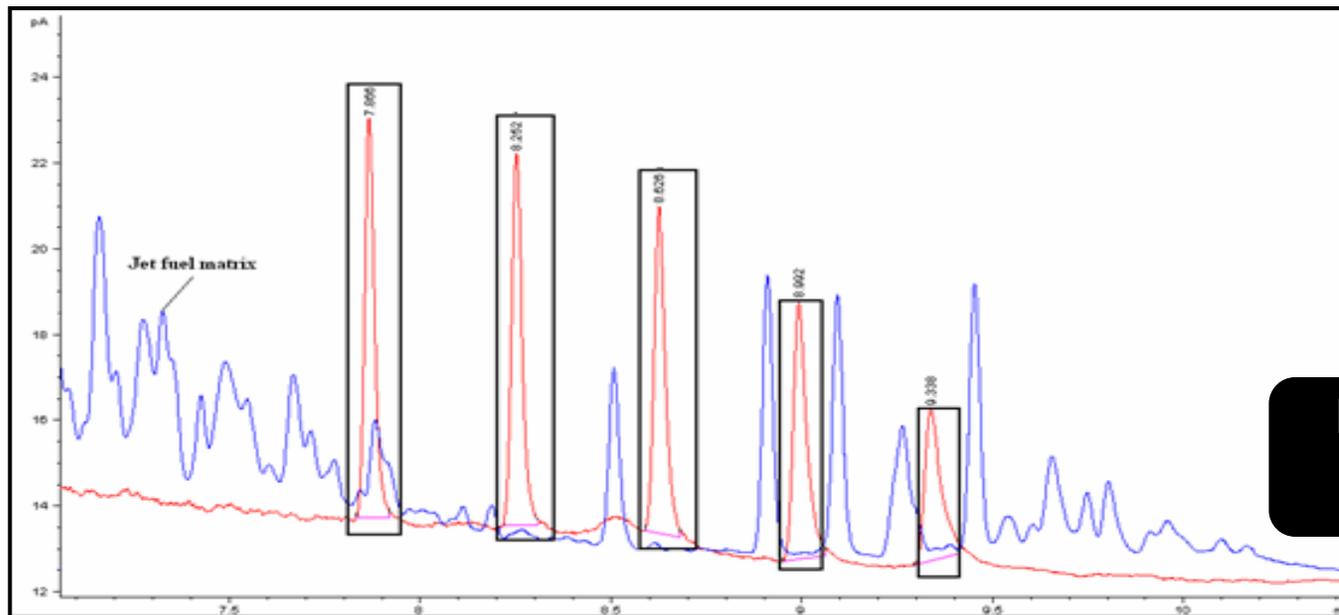
**Non Polar 1st Dimension**

**Polar 2nd Dimension column**



# Principle of Deans Switch Heart-Cut

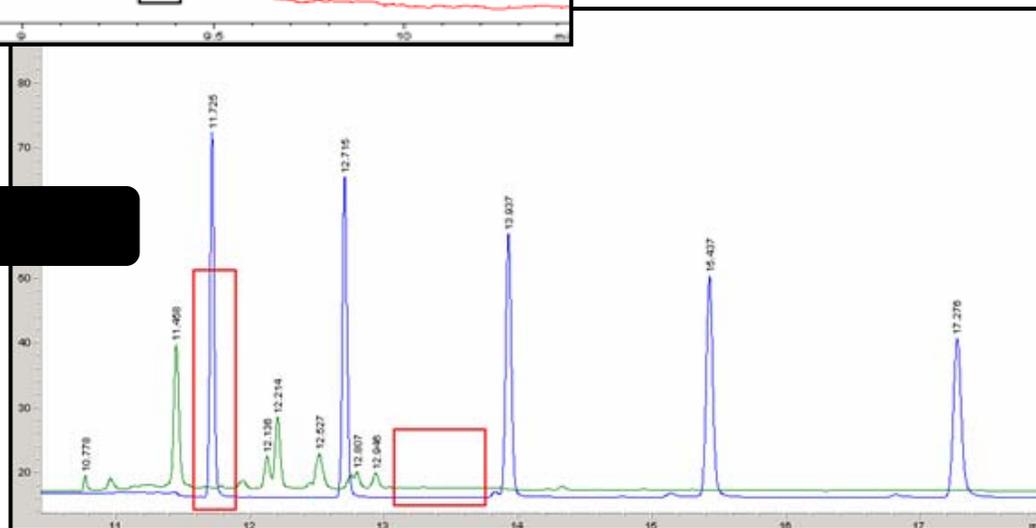
Heart-cut per FAME No or Low Number of Co-elutions



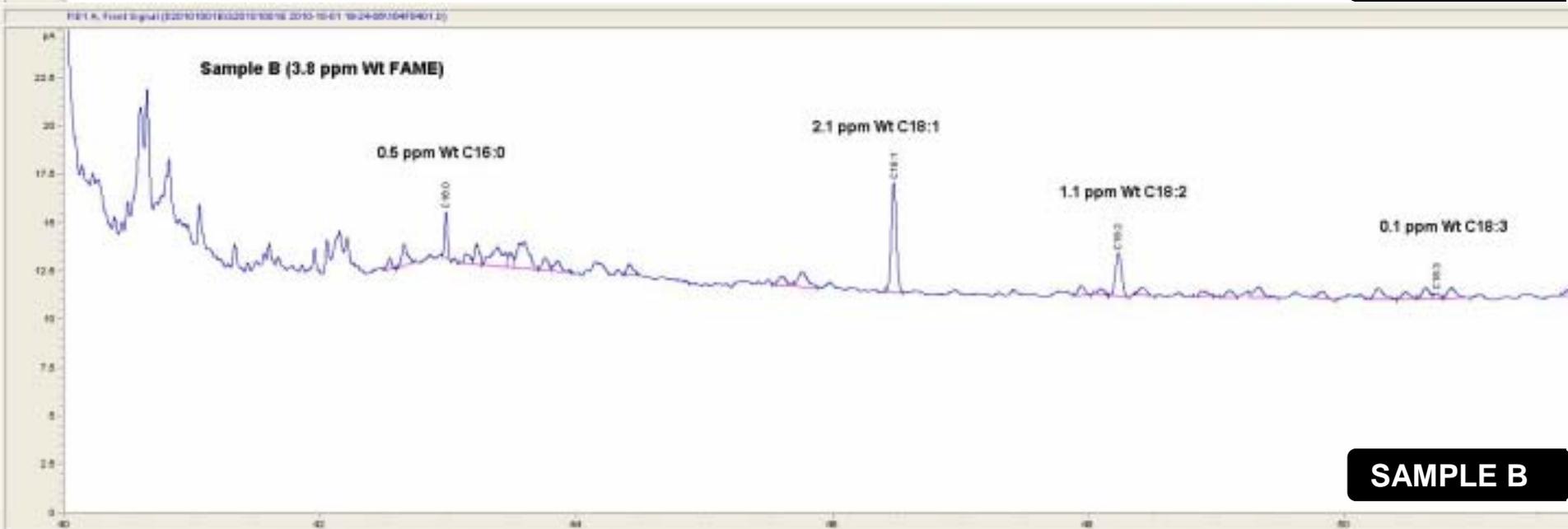
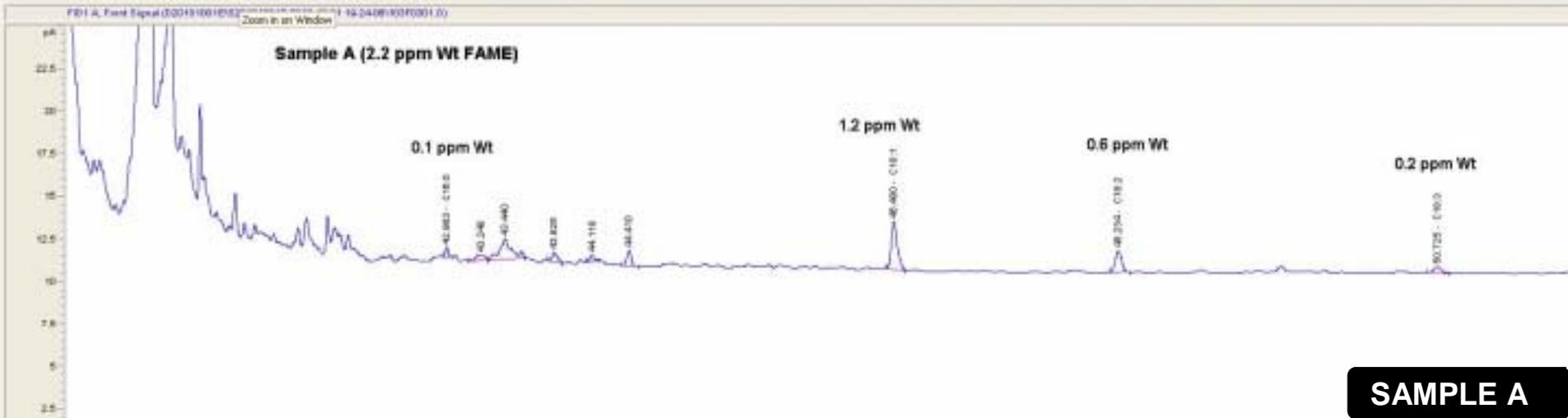
**MULTIPLE  
SMALL  
HEART-CUTS**

Non Polar 1st  
Dimension column

Polar 2nd Dimension column



# Analysis Results – Contaminated Jet Fuel Sample



# Standardization Developments

Heart-cut GC application presented at FAME in Jet workshop:

- Positive feedback with request to work on an IP test method
- Draft test method being developed in EI committee TMS SC G6 (Gas Chromatography)



# Questions

