

# 5th Annual micro & Fast Gas Chromatography Symposium

## micro & Fast Gas Chromatography:

### The Empowering Force for Unconventional Analytical Chemistry

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(Chevron retired)

# Abstract

In 2015 the micro & Fast Gas Chromatography symposium focus was on demonstrating that the continuous development and improvement of micro and fast GC technology has moved it into the mainstream of gas chromatography. The authors showed that the technology is capable of much more than vapor samples and analyzers deployed in pristine laboratories. This 5th Anniversary symposium will show not only the very high performance levels that have been achieved with these breakthrough analyzers but also that their performance, size, power and speed empower application of analytical chemistry by gas chromatography in ways and in locations not previously possible . . . even in the back of a Jeep.

# The Journey: micro & Fast Gas Chromatography

- A short, quick look back
  - Snapshots from 2011 to 2015 GCC presentations
  - Shows the advances from historical gas samples only to fully capable fast gas chromatography from air components to hydrocarbons up to C<sub>50</sub>
- A short, quick preview of 2016 GCC presentations

# 2011

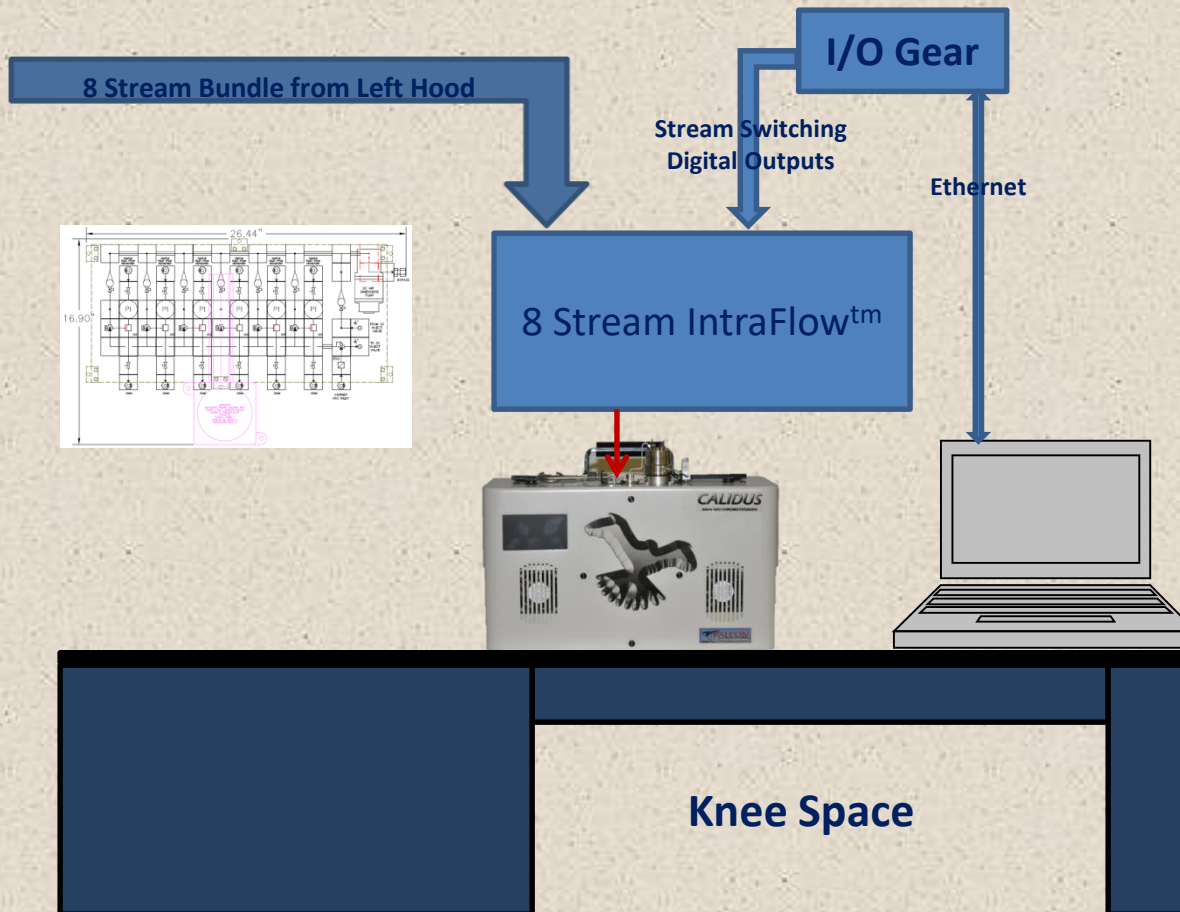
## *The ASTM Journey Begins, (validating fast GC as a technology workhorse)*



- Calidus presented December 2009 for the first time
- Boiling point data presented June 2010
  - Subcommittee requested the RGO campaign reported here
  - Suggested an initial method draft
- Initial draft method presented December 2010
- Results presented to ASTM D02.04 June 2011
  - Committee authorized preparation of a balloted draft method
  - Will be presented in December 2011 for balloting

2012

# Fully Automated Analytical Fast Gas Chromatography Sampling, Calibration, Analysis, Reporting



# 2013

## Rapid Deployment in Remote Locations

### Solution:

- Hand carry Calidus micro GC on airplane
- Natural Gas Analyzer with FID and TCD
- 6 minute analysis (C<sub>1</sub>-C<sub>14</sub>, CO<sub>2</sub>, air)
- Minimal cross training, utilizes *ChromPerfect*

### Results:

- Arrived onsite from Houston within 48 hours
- Calidus calibrated and analyzing samples within 6 hours
- Cleared backlog of 30+ natural gas samples within 48 hours

Total Time: 102 hours (~4 days)



2014  
*Chemometrics Role in Fast GC*

# Increasing GC Throughput

– The D7798 Inter Laboratory Study validates external equivalency with D2887



- Faster analyses... < 5 minute cycles
- Easier operations... automation
- Data equivalency from an internal perspective
- Data equivalency from an external perspective

# Calibration

Chromperfect MarkerTrace

Main


**Prepare for a calibration injection.**

1. Wash the syringe with the calibration standard.
2. Load the appropriate volume on the MicroShot.
3. Wipe the needle.
4. Make the injection when told to do so.

\*\*\* Make the injection now. \*\*\*

CPPC = WAITSTART, Inst = Ready to Go

Test Mode



Chrom Perfect Data Acquisition on GEORGESCHREINER [SingleUser-]

File Plot View Tools Window Help Edit

	Instrument	Control	Detector	Status	Sample Name	Raw File	Method File
1 A	Calidus Digital D		FID	Ready	CALIBRATIO	1510202245_C_A.0001.R	MarkerTraceC_A.met
1 B				Ready	CALIBRATIO	1510202245_C_B.0001.R	MarkerTraceC_B.met
2 A	FID Digital			Ready	Test	TestOneNote.0002.RAW	ATEST.MET

Process Control Monitor

10/20/15 22:45:53 SCHEDULED: Calibration stream #A2 (Priority) <CALIBRATION>

10/20/15 22:45:56 Downloading Method file <C:\CPData\MarkerTrace\MarkerTraceC\_A.met>

10/20/15 22:45:59 Selecting calibration stream #A2

Process Log

10/20/15 22:40:12 STARTED: STARTUP

10/20/15 22:42:13 COMPLETED: STARTUP

10/20/15 22:42:20 STARTED: BLANK

10/20/15 22:43:00 No run started in 1 minutes

10/20/15 22:43:42 Run starts have resumed

10/20/15 22:44:06 COMPLETED: BLANK

10/20/15 22:44:46 No run started in 1 minutes

10/20/15 22:45:53 STARTED: CALIBRATION

Display only messages from selected instrument

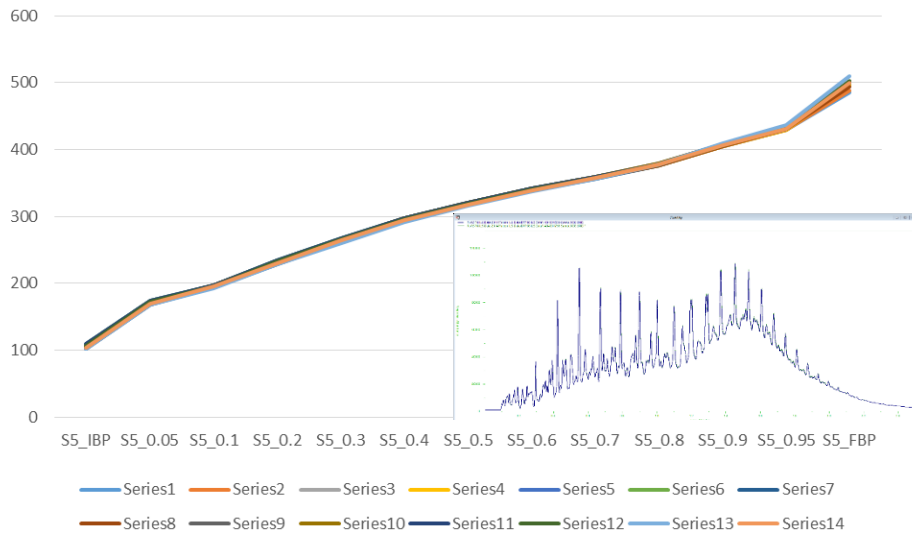


# 2015

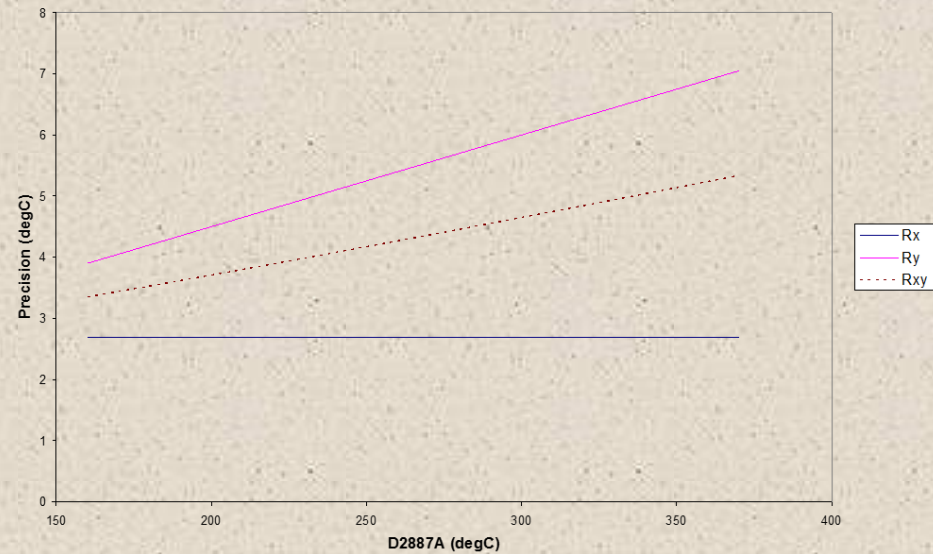
## ASTM D2887/D7798 Statistics

### Fully Validated

Samples 5 & 21 ASTM Reference Gas Oil



Between-Method Reproducibility (T10)



# Agenda-1

		Presenter
<b>1:00pm</b>	Introductory Remarks (#127)	Dr. Carl Rechsteiner
<b>1:10pm</b>	<a href="#"><u>Micro GC Fusion – Advancing Gas Analysis (#128)</u></a>	Chingyue Yeung
<b>1:30pm</b>	<a href="#"><u>Fast Gas Chromatography using Heated Headspace Gas Autosampling Techniques: Ethylene Oxide and Dioxane in Fatty Acids (#129)</u></a>	Derrick Saul
<b>1:50pm</b>	<a href="#"><u>Fast Gas Chromatography Meets Fast Miniature Mass Spectrometry (#130)</u></a>	Dr. Chris Brown
<b>2:10pm</b>	<a href="#"><u>Fast HPLC Enables Online Process Analyzer Technology (#148)</u></a>	Dr. Ernie Hillier
<b>2:30pm</b>	<a href="#"><u>Fast Gas Chromatography in the Refinery Quality Control Laboratory (#133)</u></a>	Dr. Carl Rechsteiner
<b>2:50pm</b>	Break	

# Agenda-2

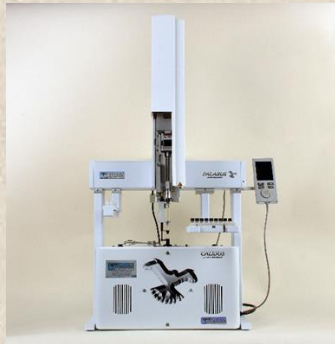
		Presenter
<b>3:00pm</b>	<a href="#"><u>Making SimDist Faster and More Robust (#147)</u></a>	Dr. Brian Rohrback
<b>3:20pm</b>	<a href="#"><u>Boiling Range Distributions: In the Lab, In the Process (#134)</u></a>	Joe Perron
<b>3:40pm</b>	<a href="#"><u>Contrasting Spectroscopy and Chromatography for Motor Fuel Assessments (#135)</u></a>	Dr. Michael Roberto
<b>4:00pm</b>	<a href="#"><u>The Role of the Chromatography Data System in Fast GC: Control, Data Fusion, Automation (#145)</u></a>	George Schreiner
<b>4:20pm</b>	<a href="#"><u>Transportable Fast Gas Chromatography for Pipeline Product Interface Detection and Flare Controls (#143)</u></a>	Shane Stewart
<b>4:40pm</b>	Analysis of Chemical Markers in Adulterated Fuels using a Transportable Ultrafast Micro Gas Chromatograph (#144)	Dr. J.C. Reyes
<b>5:00pm</b>	Adjourn	

# Thanks for your attention!

One Takeaway from this Symposium!

Data Equivalency...Regardless of Location

**LAB**



**PROCESS**



**TRANSPORTABLE**

