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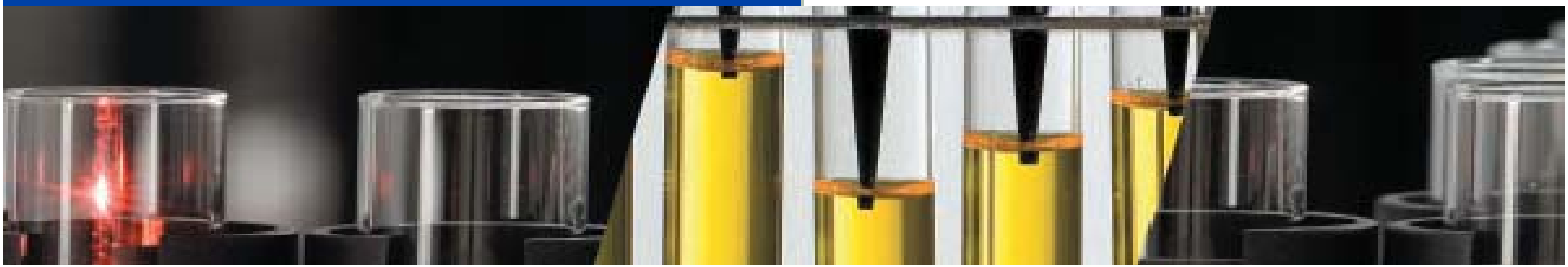
Automated Sample Preparation

Kevin Mc Guire,
Liquid Handling and Automation Specialist

KVCV Meeting, December 2nd 2010



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Introduction

Sample Preparation Techniques

- Dilution Series (serial dilution, direct dilution)
- Suspending (fixed or predefined volumes)
- Aliquoting
- Reagent Addition (e.g. derivatisation)
- Internal Standard Addition
- Solid Phase Extraction
- Sample Transfer (vials to tubes, tubes to vials, …)

Reasons to automate…

- Amount of samples
- Complexity of lay-out format
- Data consistency
- Accuracy
- Variation
- Traceability (barcoding)
- Worklist input and output (communication to other devices, LIMS, …)
- Elimination Contamination risk

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JANUS Sample Preparation Workstation

JANUS Sample Preparation Workstations

JANUS Mini

60cm Decksize

JANUS Standard

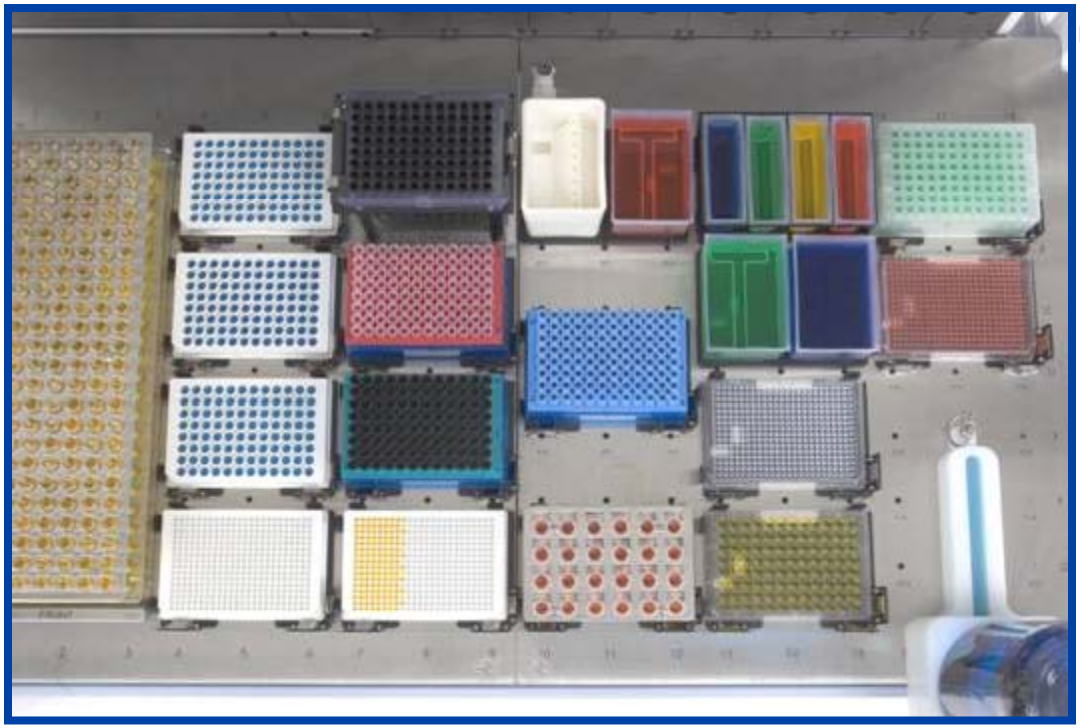
84cm Decksize

JANUS Expanded

112cm Decksize

Various Decksizes in function of application needs

JANUS Deck Design



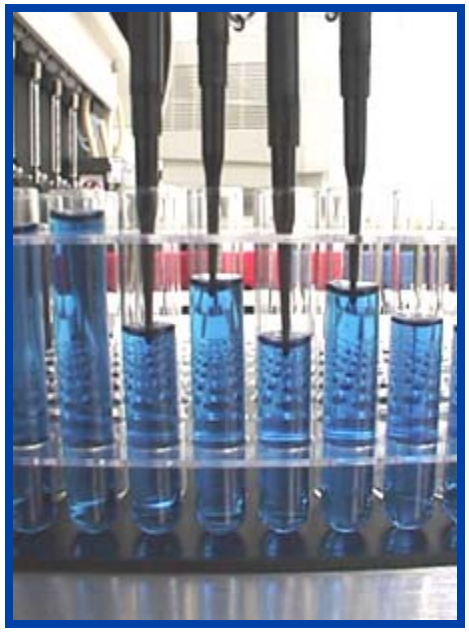
Modular Deck Design – Flexibility – Easyness of Use

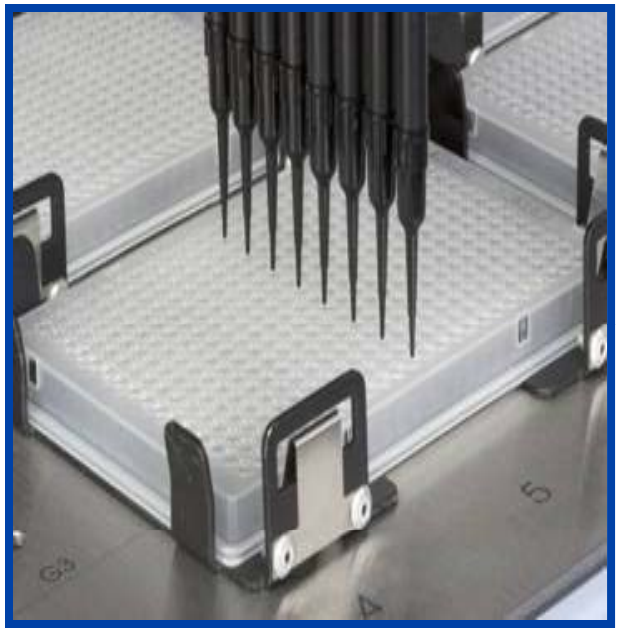
JANUS Deck Tile Concept

Deck Tile Concept : Fit any labware on the deck.

Bottles - Tubes - Vials – Microfuges - Reagent Troughs

JANUS VariSpan Arm





Variable Span : Enables accessing different labware

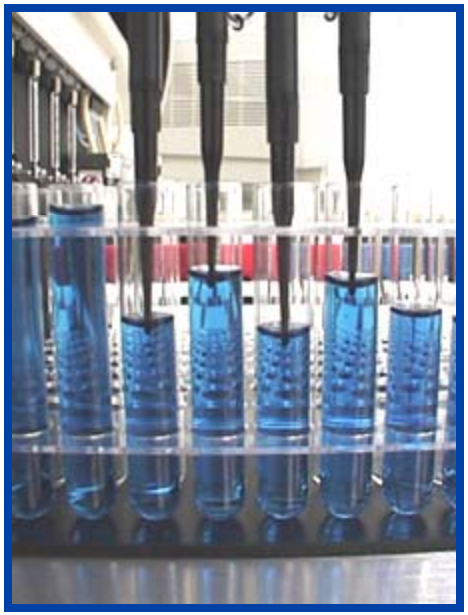
Bottles - Tubes - Vials – Microfuges - Reagent Troughs

JANUS VersaTip Feature

VersaTip :

- Disposable tips and fixed tips on same adapter.
- Eliminate use of disposables where possible.

JANUS AccuSense™ Liquid Level Sensing



Independant Liquid Level Sensing on Each Tip.

Sense Ionic and Non-ionic Liquids

Optimal precision + Minimal Sample Carry-Over

JANUS Liquid Liquid Dispensing

- System Liquid Based:
  - excellent performance
  - excellent flush / wash
- Volume Range: 0,5µL to 10mL to ...
- High Precision Pumps
- Multiple Syringe Sizes

JANUS Performance Files

Properties of C:\Packard\JANUS\Performance Files\WaterBlowoutFT_1 ml.prf

Selection Criteria | Performance Set | Global Parameters

	Volume (µL)	Aspirate Speed (µL/sec)	Aspirate Delay (msec)	Dispense Speed (µL/sec)	Dispense Delay (msec)	Waste Volume (µL)	Waste Volume (% of Asp.)	Blowout Volume (µL)	Blowout Delay (msec)	Transport Air Gap (µL)	System Air Gap (µL)
<1>	5.0	10.0	200	400.0	200	0.0	0.0	20.0	0	3.0	10.0
2	30.0	25.0	200	400.0	200	0.0	0.0	20.0	0	3.0	10.0
3	50.0	50.0	200	400.0	200	0.0	0.0	20.0	0	3.0	10.0
4	100.0	75.0	200	400.0	200	0.0	0.0	20.0	0	3.0	10.0
5	250.0	125.0	200	400.0	200	0.0	0.0	20.0	0	3.0	10.0
											10.0

Performance Files ensure Precision and Accuracy:

- Liquid Class Dependant (H_20, oil, solvents, ...)
- Aspirate & Dispense Speeds are volume defined
- Pipetting Mode Waste or Blow-Out
- Fixed or Disposable tips
- PreDefined and Pre-installed

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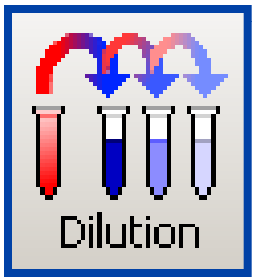
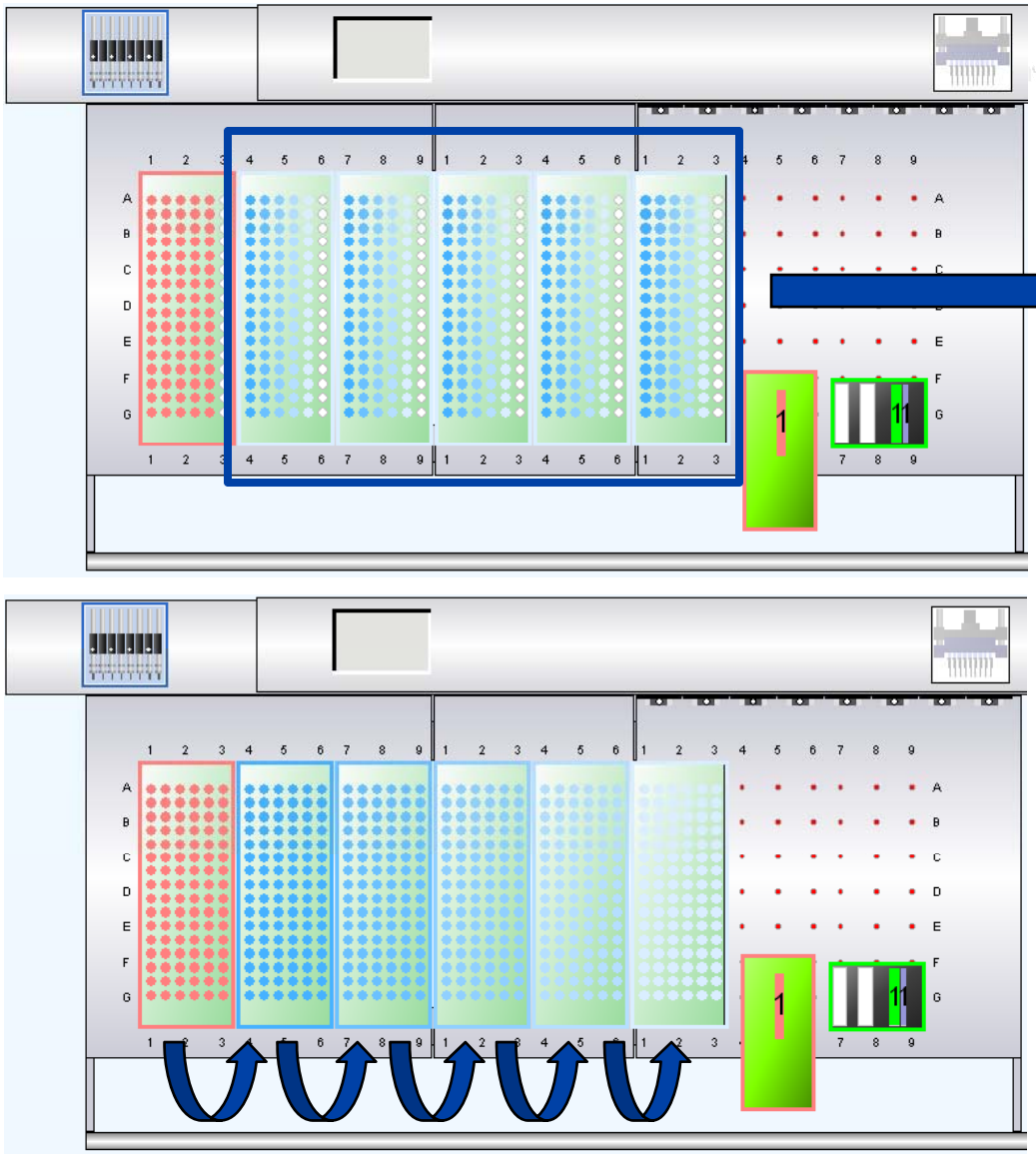
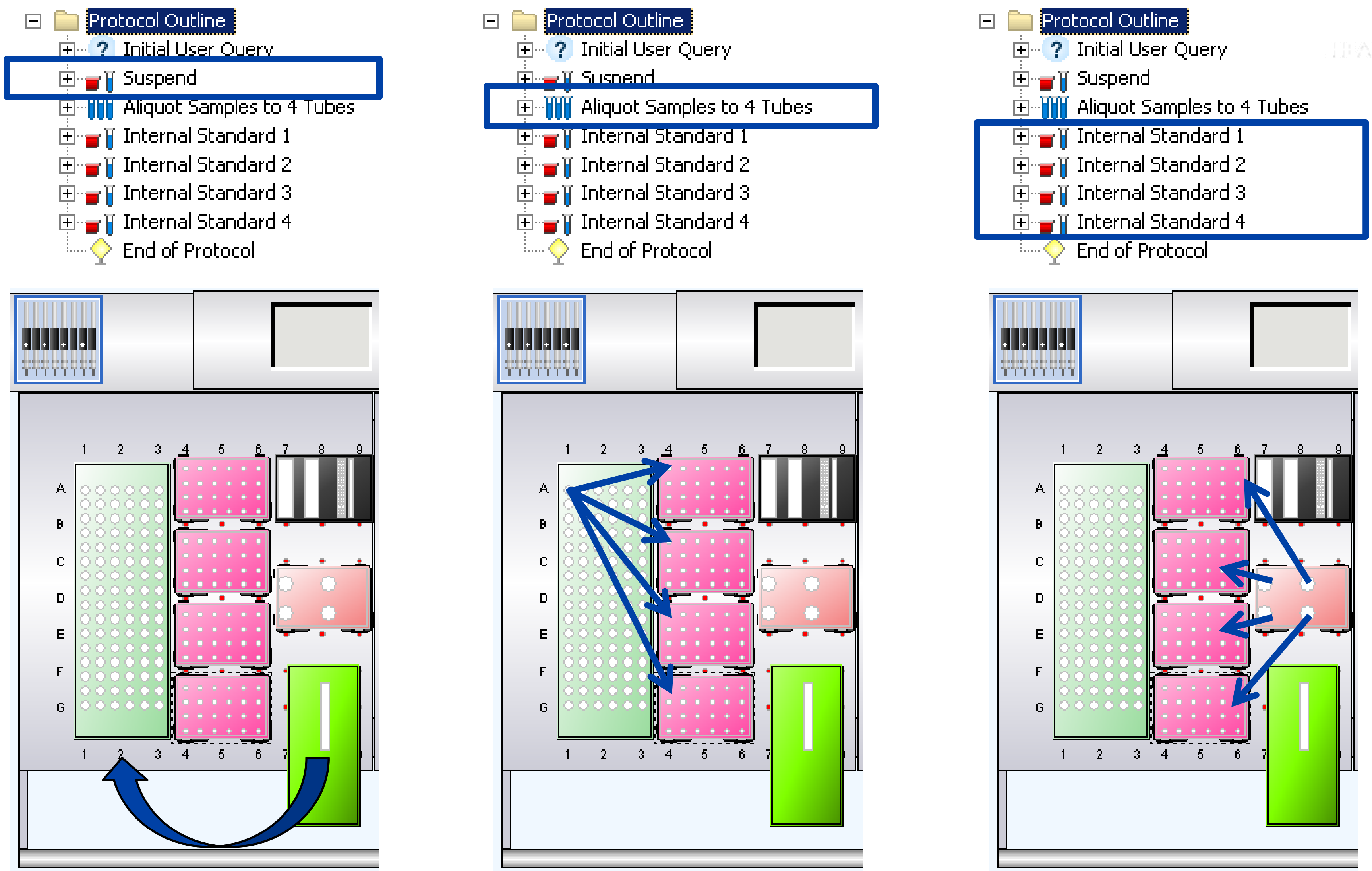
Sample Preparation Examples

Dilution Series



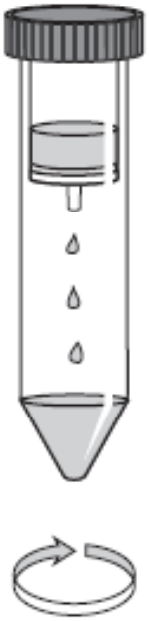


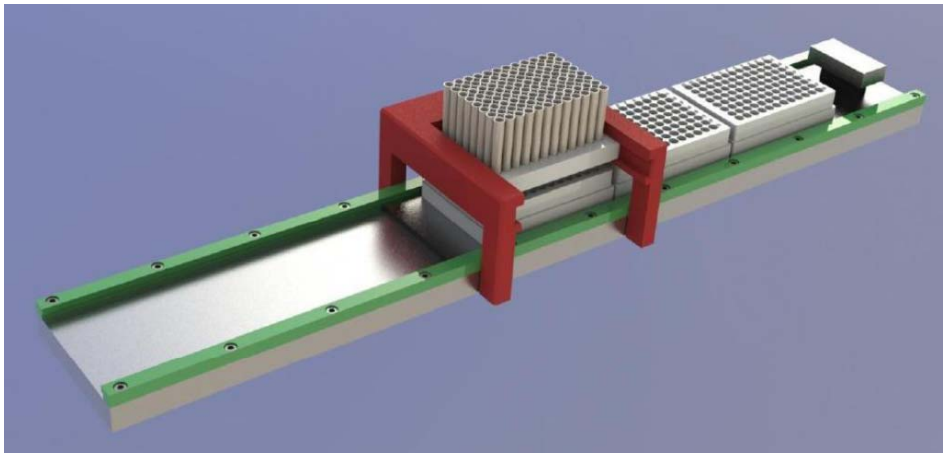
Reagent Addition - Aliquoting – Internal Standard



SPE – Solid Phase Extraction

- Transfer Sample to Column
- Apply Vacuum or Centrifuge
- Dispense Wash Solution on Column
- Apply Vacuum or Centrifuge
- Dispense Elution Solution on Column
- Elute Sample (transfer)





Working in a LIMS environment

LIMS generates Sample Worklist

Barcode Read Samples

Handle Samples (dilution, ...)

Transfer into predefined lay-out

Generate worklist new Sample lay-out

Transfer Worklist to LIMS/other device

Identify sample barcode

Link barcode to worklist (task)

Execute the task.

JANUS transfers samples, controls, standards and blancks in specific order (in e.g. an ICP rack)

e.g. JANUS export list is imported in ICP

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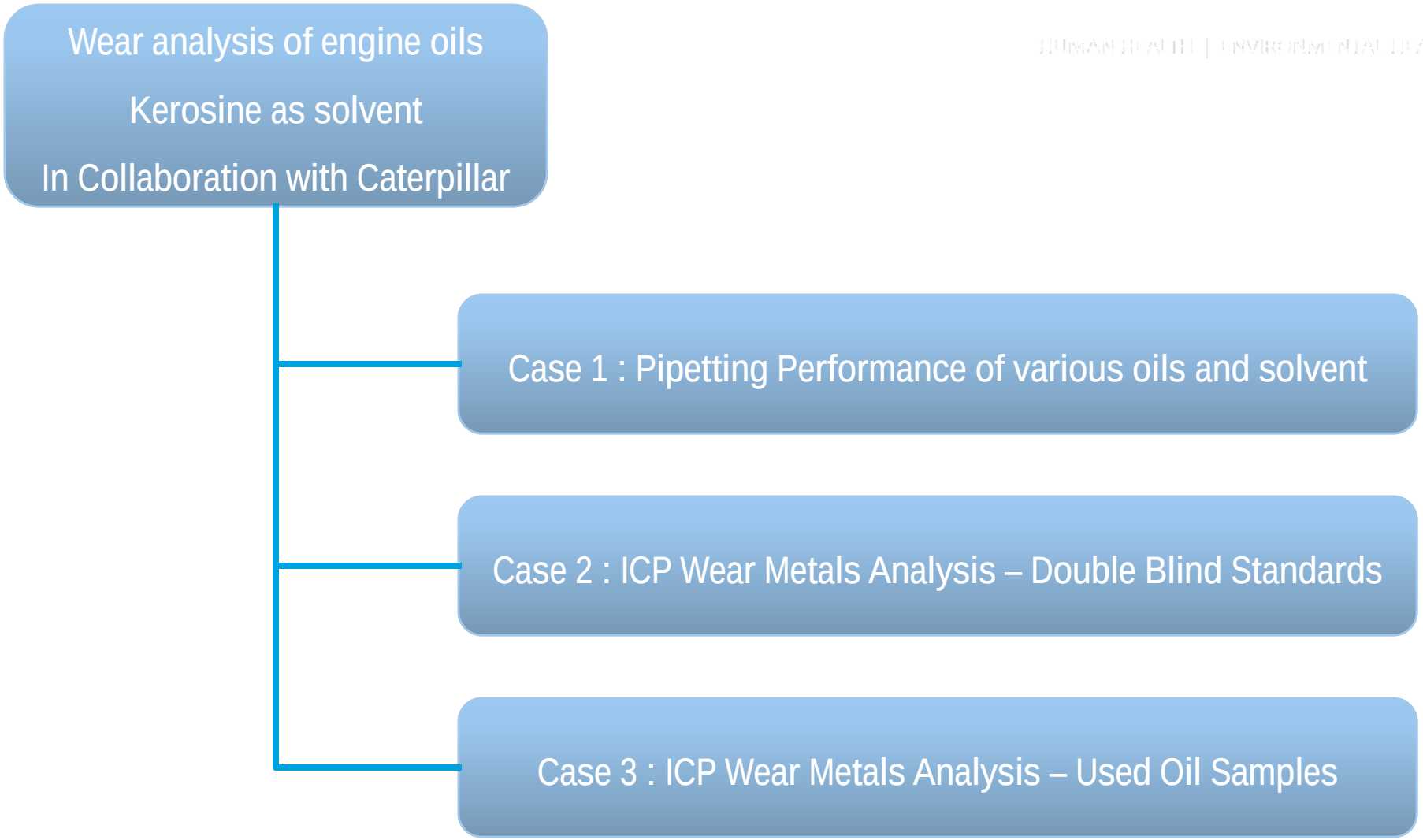
JANUS Oil Workstation

Oil Workstation : Experiment Setting



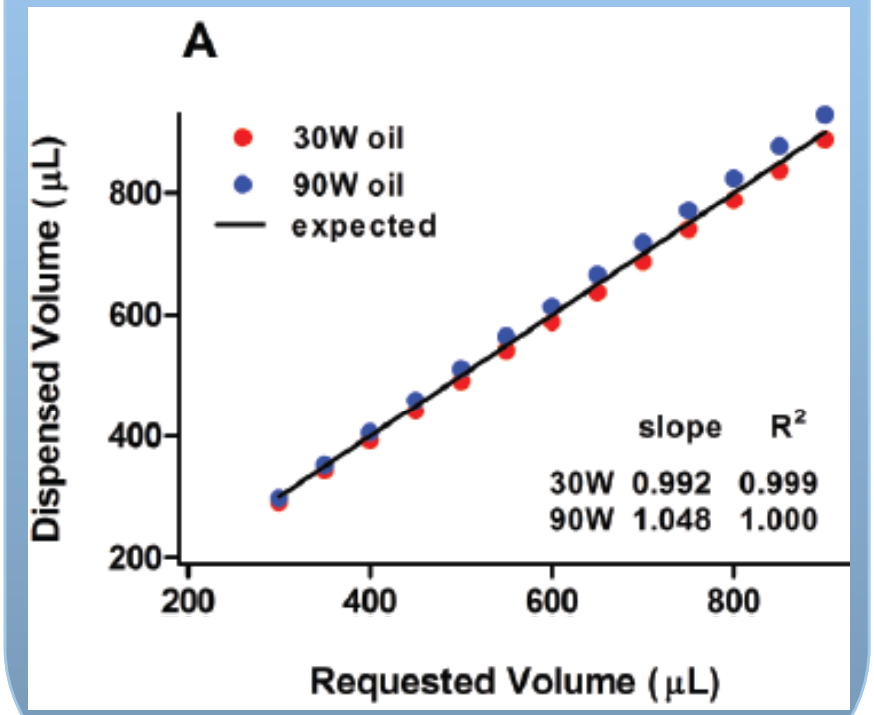
Case 1 : Pipetting Performance

Relative Densities were by manual standard curves. Weight check each volume.

30W Oil & 90W Oil (viscosity range)

Disposable Tip Mode, 1mL Tips

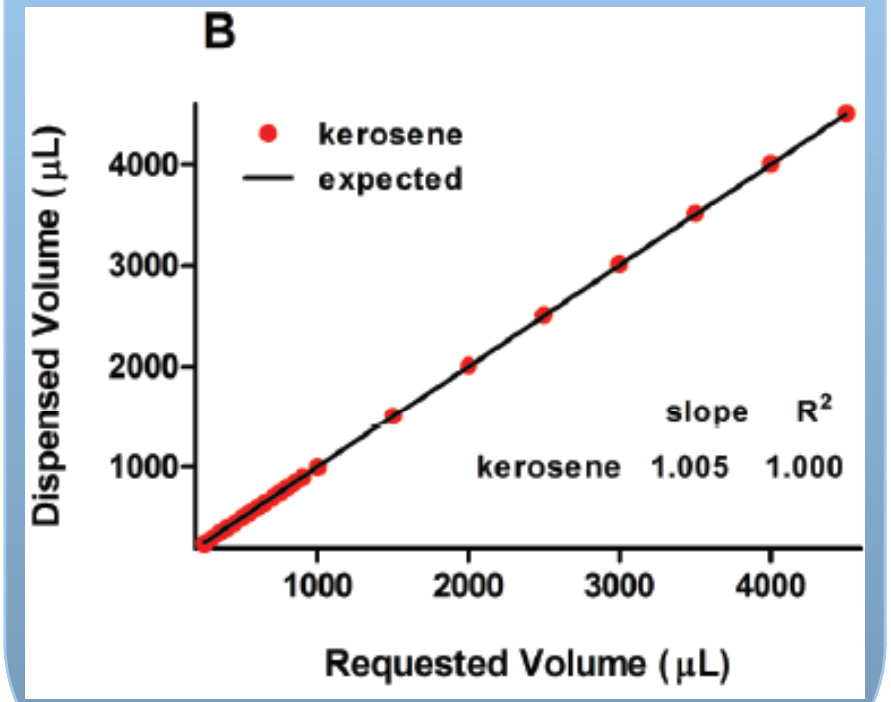
Testvolumes: 300µL – 900µL



Kerosine Solvent

Fixed Tip Mode

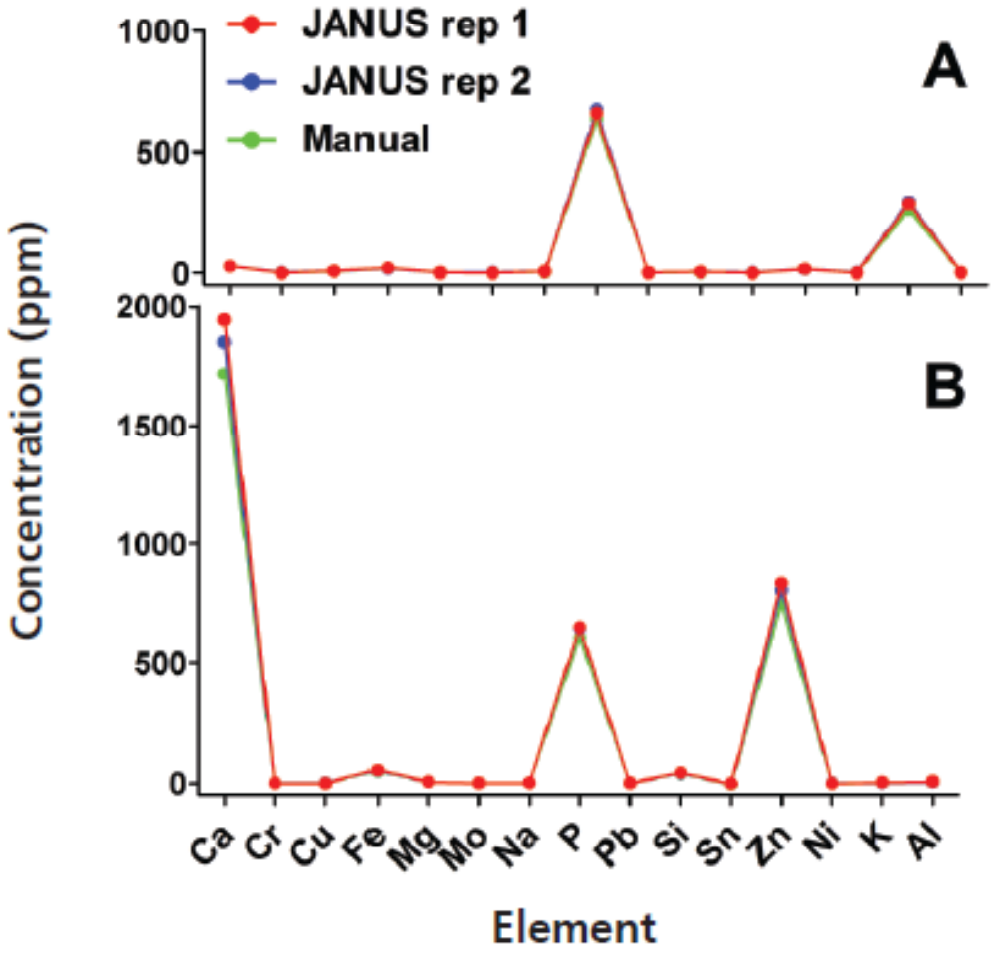
Testvolumes: 100µL – 5000µL



Case 2 : ICP Wear Metals Analysis – Double Blind Stds

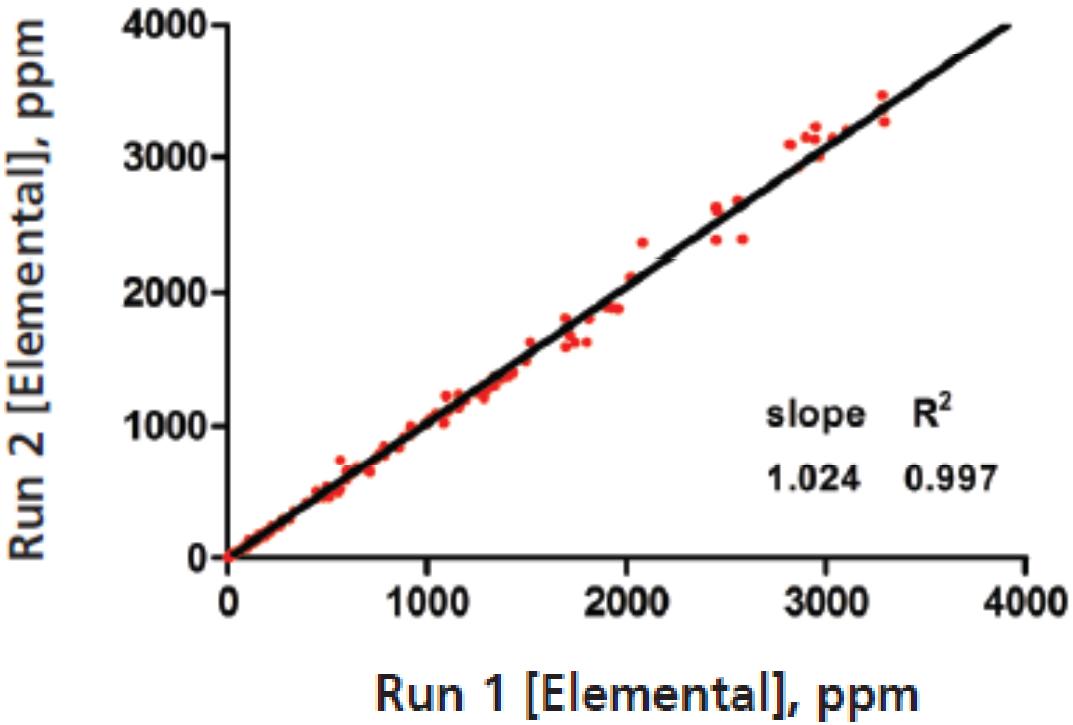
- WM-PTP (Wear Metals Performance Testing Program; commercially available)
- Double Blind Standards (VHG Labs Inc ; commercially available)

- Standards diluted 10x in triplicate; using 1mL tips
- Duplicate samples diluted manually for comparison
- Data analyzed by Optima 4300V ICP-OES
- Data was provided courtesy of Caterpillar Testing Laboratories



Case 3 : ICP Wear Metals Analysis – Used Oil Samples

- 24 Unknown Used Oil Samples
- 15 Wear metals Analyzed (ID and concentration)
- Data analyzed by Optima 4300V ICP-OES
- 2 Independant Runs plotted against eachother
- Data was provided courtesy of Caterpillar Testing Laboratories



Comments or Thoughts?