



CINRG Systems Inc.

Innovation in Automation

For Commercial Oil Analysis Laboratories



**CS-APC-2
Automated
Auto-Diluting
Particle Counter**



ASTM D7647-10

Standard Test Method for Automatic Particle Counting of Lubricating and Hydraulic Fluids Using Dilution Techniques to Eliminate the Contribution of Water and Interfering Soft Particles by Light Extinction.

Benefits of Automation and Auto-Dilution

- **Sample Dilution allows for a fully automated system with significant cost and quality benefits.**
 - Labor reduced by more than 80%
 - Elimination of operator differences
 - Simplified sample preparation - No ultrasonic or vacuum treatment.
 - Reduced error from particle co-incidence.
- **Appropriate solvent will eliminate interference from “soft particles”.**
 - Water (up to 2% can be effectively masked by a mixed solvent of 25% IPA/ 75% Toluene).
 - Additives – Silicones, specialized EP additives.
 - Varnish.
- **Highly viscous sample can be analyzed without an issue**
 - 1000 cSt @ 40 @ 1:1 dilution ratio.

System Components

GILSON
Automation



BAUMER

UNCK 09T9114/D1
Ultrasonic Distance Sensor



KLOTZ
PC Hardware



B&B Electronics
Industrial USB Hub
and RS232 Converter



CINRG

Custom Hardware and Software


Large Sample Volume
104 position sample tray



Auto-Dilution

Level Sensor Determines Sample Volume

Technician pours
approximately 15 ml
for 1:1 dilution

 KEEP HANDS CLEAR
OF PROBE!

Analysis Completed in Sample Cup

Dilute / Stir / Analyze / Wash / Remove to Waste

Washing syringe bathes
sample syringe

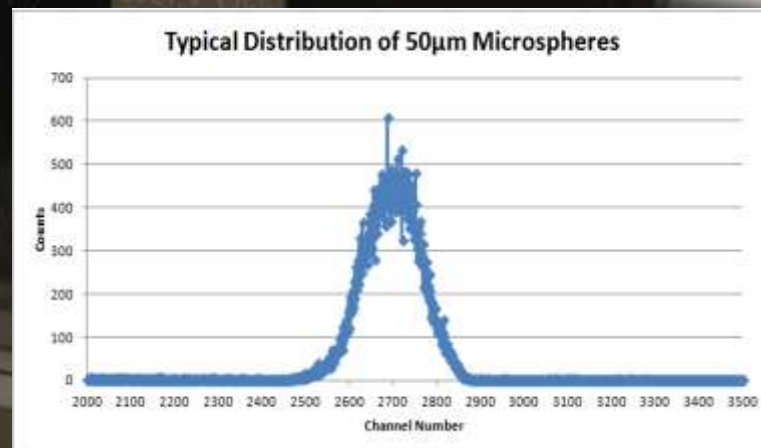
Level
sensor
measures
sample
volume

Angled
stirrer
prevents
air
entrainment



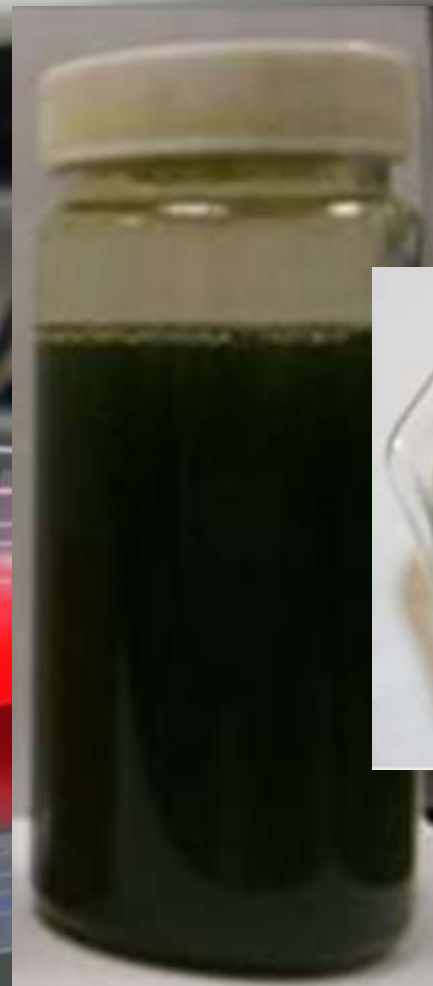
Accurate Particle Counts High Quality Laser Sensor

Multi-channel Sensor
(4096 channels)



Sample Processing Water Contamination

Process samples with
up to 2.0% water with
1:1 dilution



0.35% water



Sample Processing Opaque Samples



Undiluted: 23/22/14

Diluted: 19/15/12

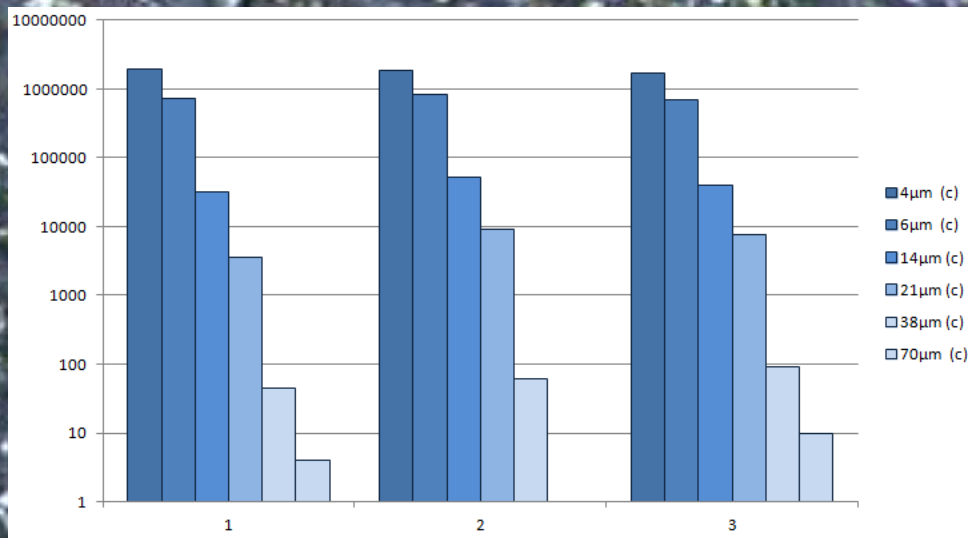


2

THU-12-Gear (3) 01738033-

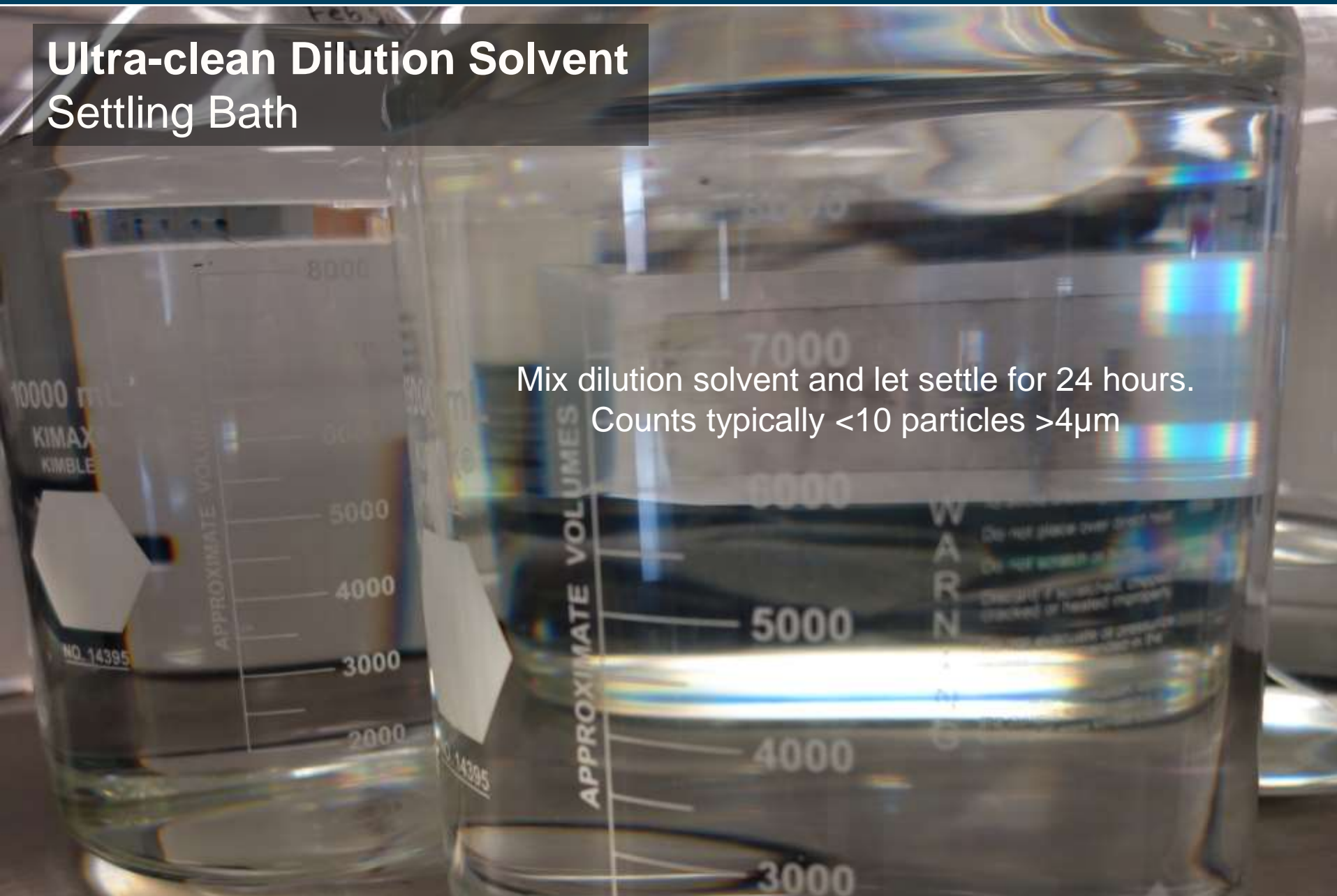
Sample Processing Highly Contaminated Samples

Sample Trend on
Gearbox with ISO
28/27/23

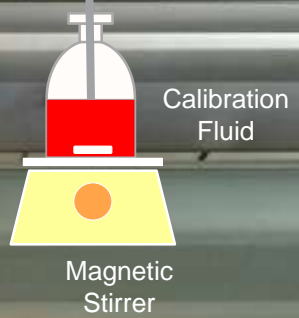
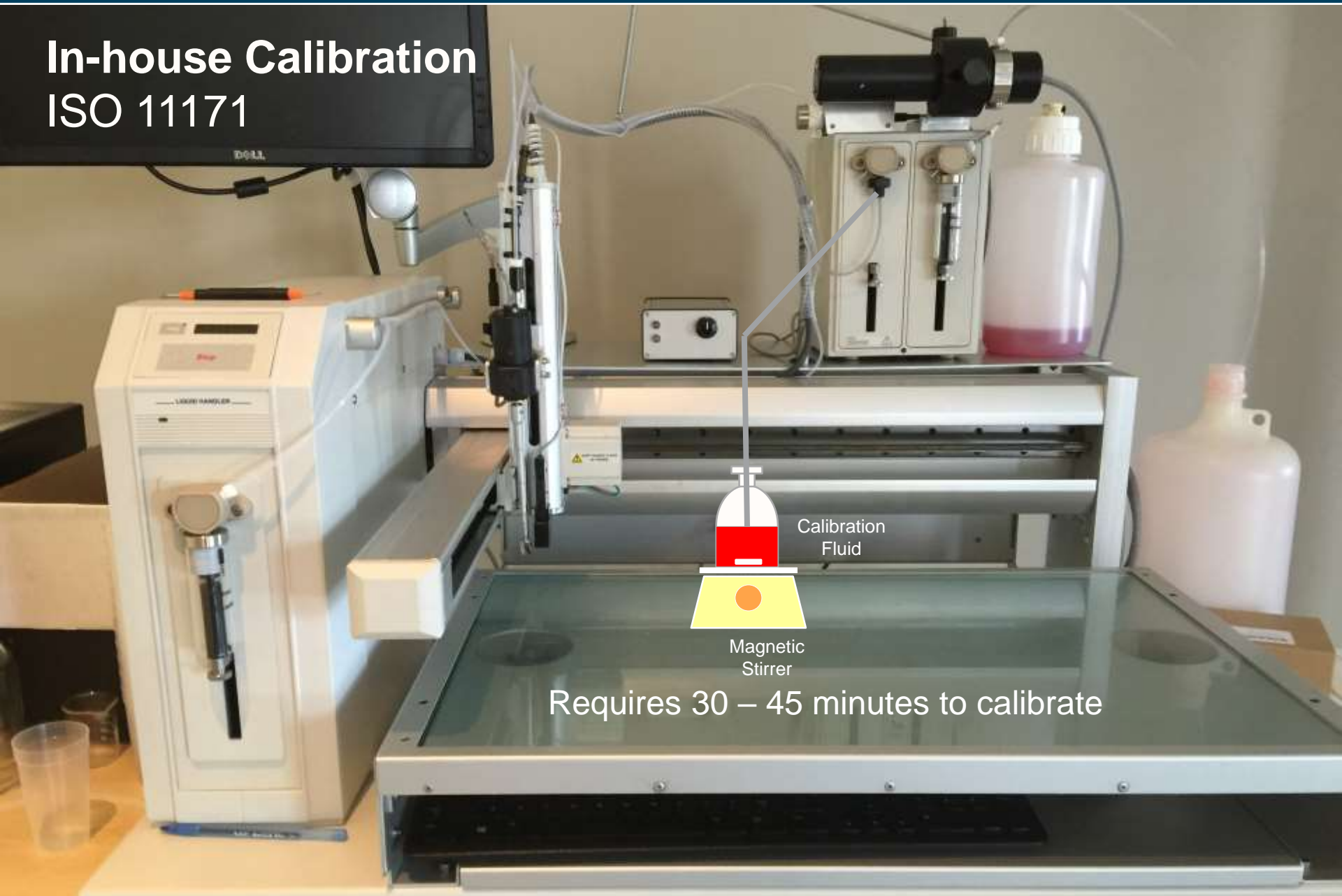


Ultra-clean Dilution Solvent Settling Bath

Mix dilution solvent and let settle for 24 hours.
Counts typically <10 particles >4 μ m



In-house Calibration ISO 11171



Requires 30 – 45 minutes to calibrate

Maximize Customization Flexible Software

Initialise Hardware

Solvent Verification

Run Samples

Adjust Table

Measure Table

Cup Calibration

Edit Parameters

System Parameter Configuration

Section Parameters: Micro Setup

Section: Table

Parameters Available

Leveler_1
Leveler_2
Leveler_3
Leveler_4
Leveler_5
Leveler_6
Leveler_7
Leveler_8
Leveler_9
Leveler_10
Leveler_11
Leveler_12
Leveler_13
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Leveler_97
Leveler_98
Leveler_99
Leveler_100

Control Most System Parameters

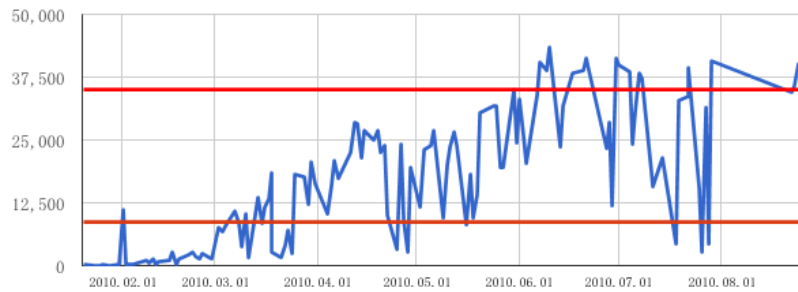
ISO 4406 / NAS 1638 Codes

Customize Data Output

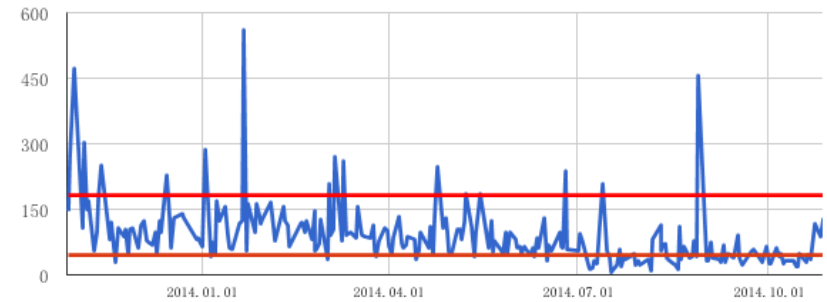
Internal Standard 2010 n:149

Internal Standard 2014 n:247

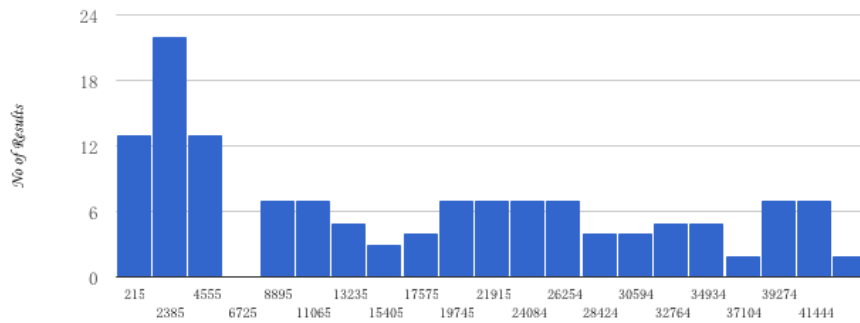
Trend for PC_sM



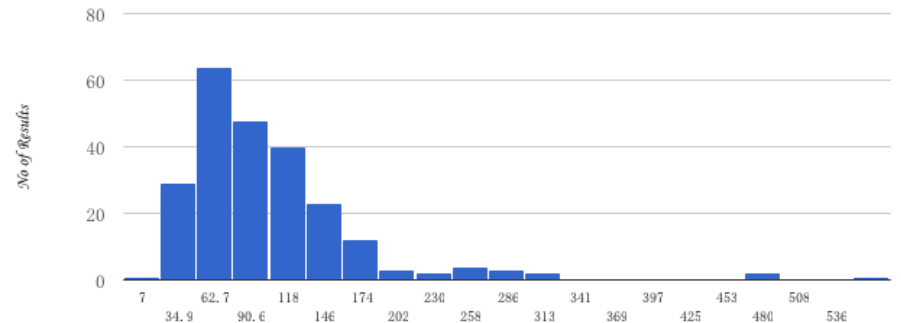
Trend for PC_sM



Histogram of PC_sM



Histogram of PC_sM





**CS-HVA-1
Houillon
Viscometer
Automation
System**

CS-HVA-1
HOULLON
VISCOMETER
AUTOMATION
SYSTEM



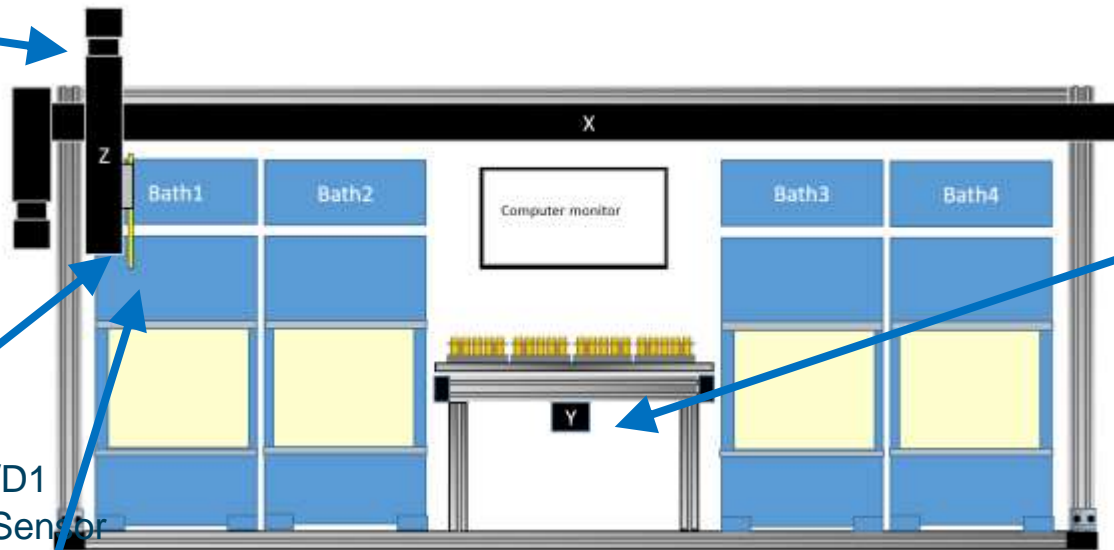
ASTM D7279-14

Standard Test Method for
Kinematic Viscosity of Transparent and Opaque Liquids by
Automated Houillon Viscometer.

Benefits of Robotic Automation

- **Robotic Automation allows for a fully automated system with significant cost and quality benefits.**
 - Labor reduced by more than 90%
 - Elimination of operator differences
 - Consistent and correct tube selection for anticipated viscosity.
 - Reduced error from selecting incorrect viscometer tube.
- **Fuzzy logic system optimizes sample flow without result quality degradation.**
 - System waits for appropriate factor viscometer tube to be available for each sample.
 - Skips sample where no appropriate tubes are currently available.
 - Processes skipped samples when appropriate factor tube is available.
- **Automated Wash Solvent Filling**
 - Maintains appropriate solvent fill level to ensure optimal tube cleaning.

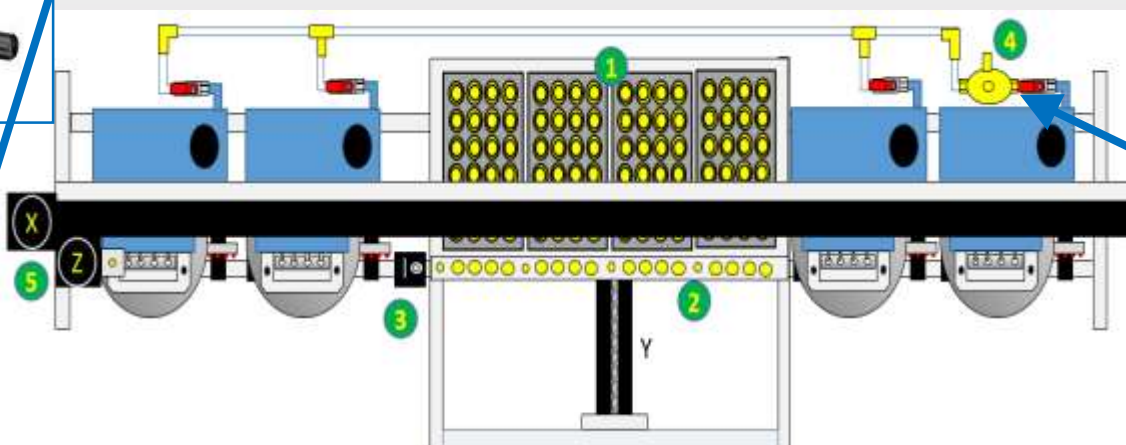
ZABER
XYZ Robotic Axes



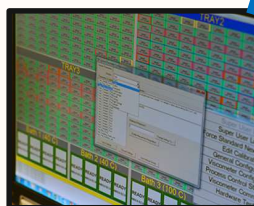
B&B Electronics
Industrial USB Hub
and RS232 Converter



BAUMER
UNCK 09T9114/D1
Ultrasonic Distance Sensor



GILSON
Automation for
Solvent Pump



CINRG
Custom Hardware
and Software

Integrate with Existing Houillon Instrumentation Robotic Automation Framework

Safety guards

Fixed positions
for baths 1 and 2


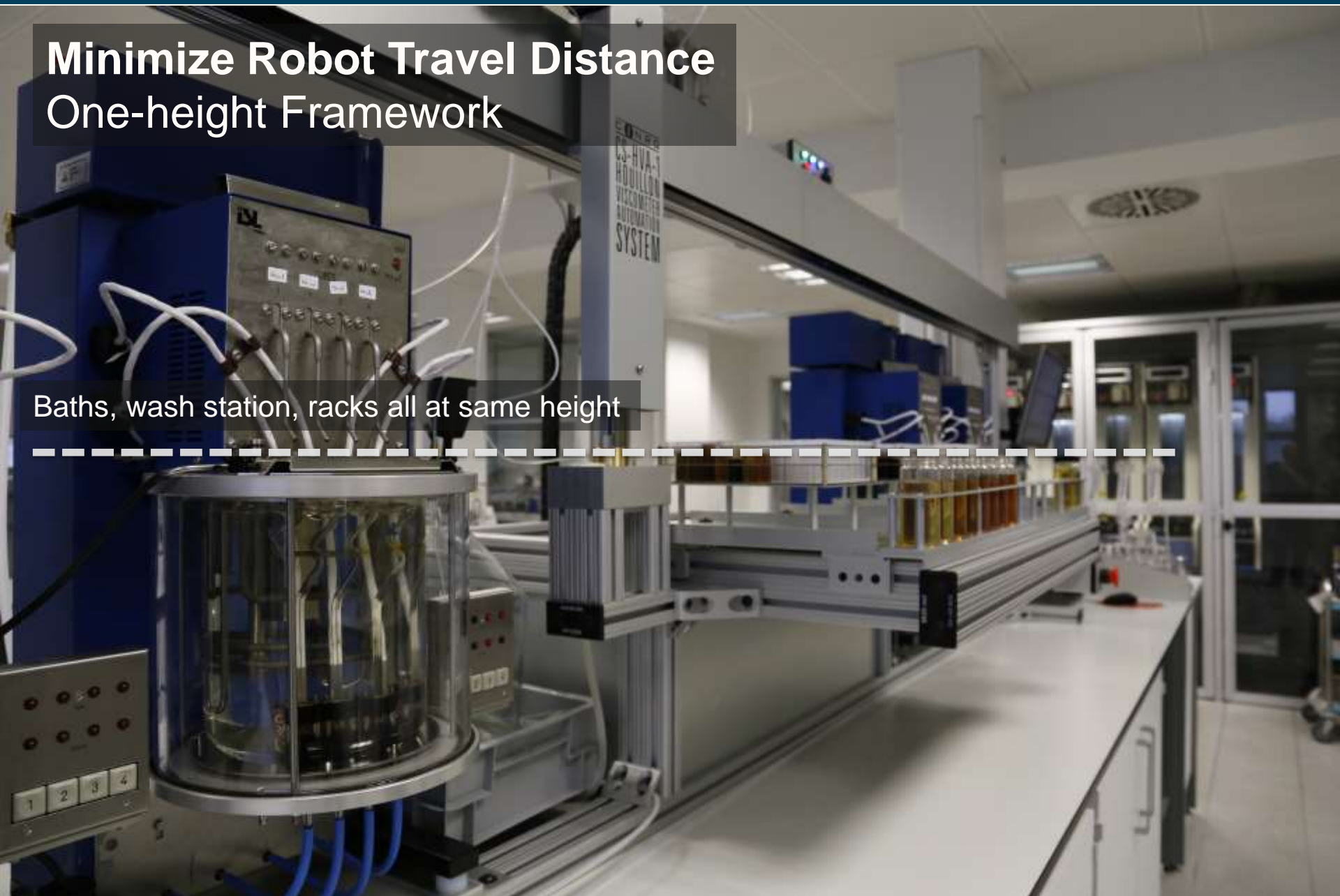
Customizable
lab rack platform

Fixed positions
for baths 3 and 4




Minimize Robot Travel Distance One-height Framework

Baths, wash station, racks all at same height


A horizontal dashed white line is drawn across the image, indicating the consistent height of the various components mentioned in the text above it.

Unique Uptake Sample Syringe Piston and Valve Assembly




Takes up only
1ml of fluid

Eliminate Sample Carry-over Level Sensor

A close-up photograph of a laboratory tray containing several glass vials filled with a yellowish liquid. A thin, vertical metal rod, which is a level sensor, is inserted into the liquid in the vial in the foreground. The background shows more vials, some of which are out of focus. The lighting is soft, highlighting the texture of the liquid and the metallic surface of the sensor.

Minimize syringe
penetration into sample

Eliminate Sample Carry-over Level Sensor

A close-up photograph of a laboratory tray containing several glass vials filled with a yellowish liquid. A thin, vertical metal rod, which is a level sensor, is inserted into the liquid in the vial in the foreground. The background shows more vials, slightly out of focus, creating a sense of depth. The lighting is soft, highlighting the texture of the glass and the clarity of the liquid.

Minimize syringe
penetration into sample

Eliminate Sample Carry-over Wash Station

Sample Drip Comb



Eliminate Sample Carry-over Wash Station

Solvent / Air Bubble
Syringe Bath



Eliminate Sample Carry-over Wash Station




Solvent Drying Pad

**Minimize Testing Error
Level Sensor**



Minimize Testing Error Level Sensor

A close-up photograph of a laboratory instrument. A small glass vial containing a yellowish liquid is positioned in a metal tray. A level sensor, which is a cylindrical metal component with a black O-ring, is mounted on the instrument's surface. The sensor is positioned to detect the liquid level in the vial. The background is slightly blurred, showing other parts of the instrument and a blue panel on the left.

Determines if sample
tube has been filled

Optimize Tube Cleaning Auto-solvent Fill

Auto-solvent filling
maintains solvent
levels for optimum
cleaning efficiency

ROL

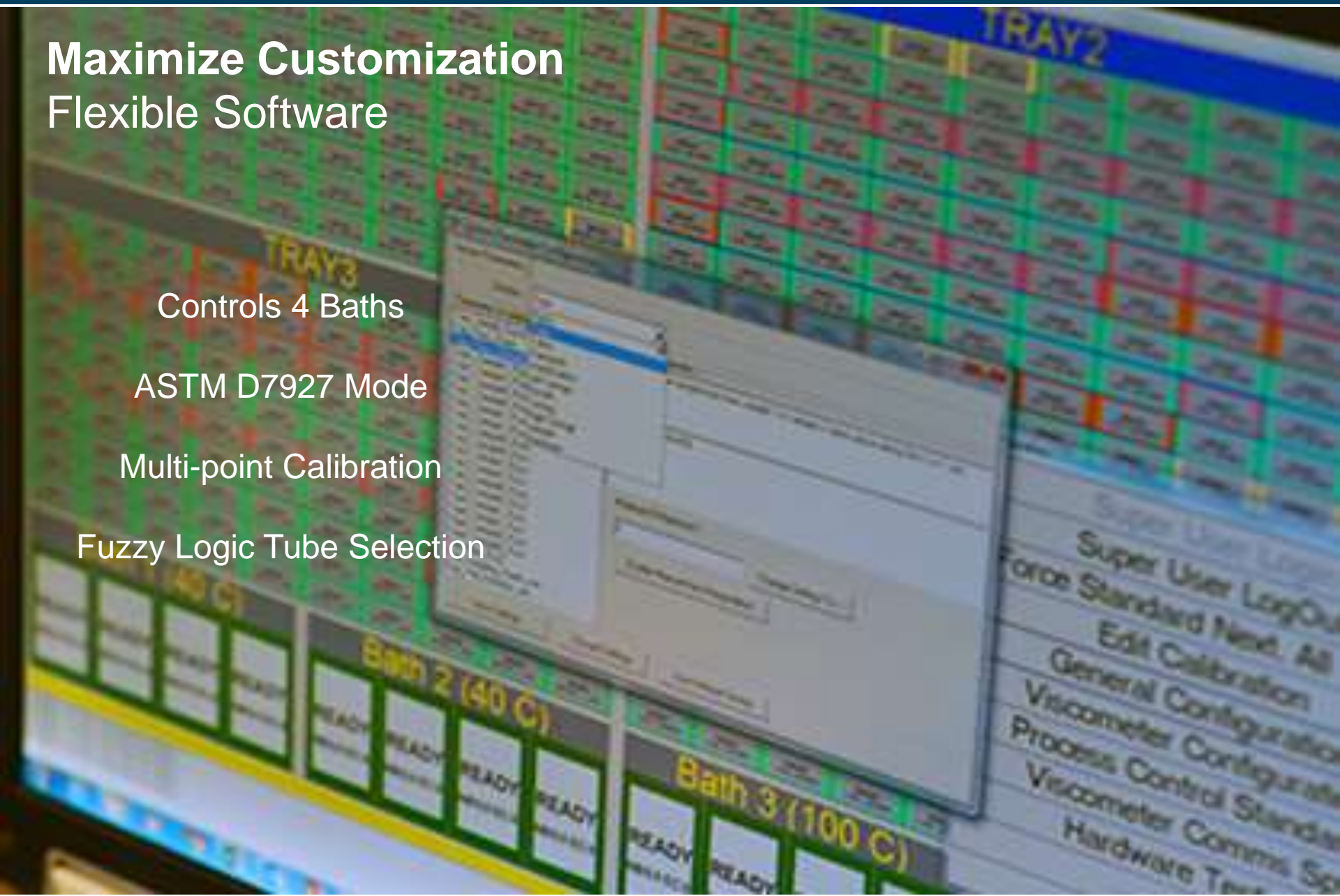
Maximize Customization Flexible Software

Controls 4 Baths

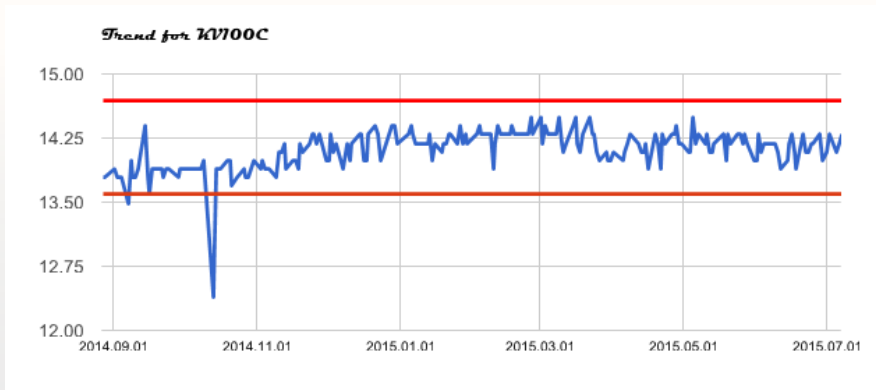
ASTM D7927 Mode

Multi-point Calibration

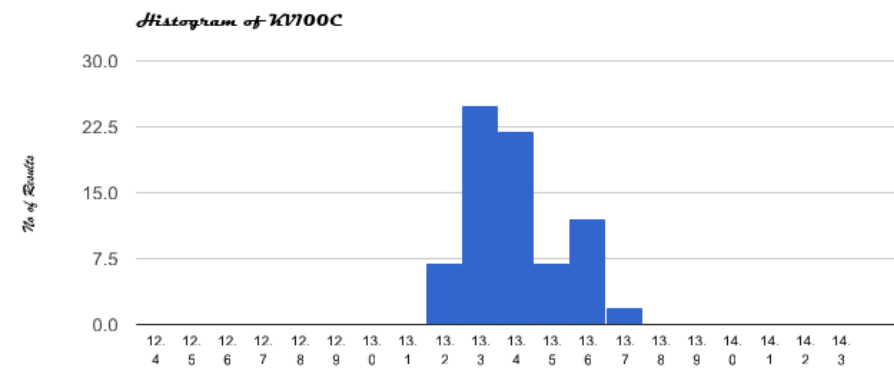
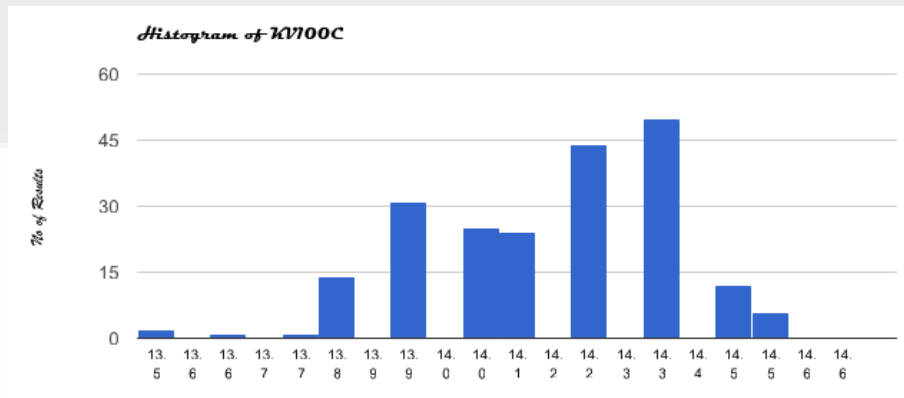
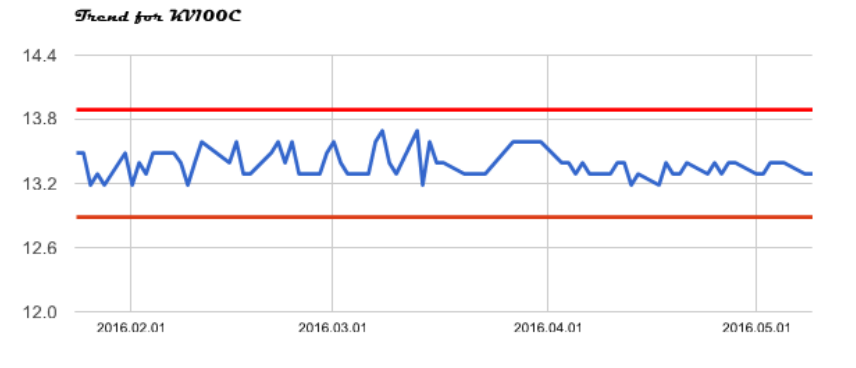
Fuzzy Logic Tube Selection



Internal Standard 2014 n:210



Internal Standard 2016 n:75





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