

Archimedes – Malvern Panalytical

INTRODUCTION

The Lumetics LINK™ software platform scans network locations for new measurement data files, copies data directly to a centralized database, and provides a powerful user interface for rapid multi-measurement multi-technique data aggregation, visualization, analysis, and reporting. LINK employs a client/server-based architecture where the LINK server hardware is provided by the end user and resides on the end user's network. The LINK client is a portable web-based application that may be placed on any computer with network connectivity to the LINK server. For successful import, the LINK webserver requires read access to the folders where user data resides.

Archimedes harnesses the technique of resonant mass measurement in order to detect and count particles in the size range 50nm - 5µm* and to measure particle mass and size.

DETAILS

LINK requires the ARCHY file. The ARCHY file is generated automatically by the Archimedes software.

The following raw curve data may be imported, in addition to all available instrument/analysis settings and parameters calculated by the instrument software:

- Particle Concentration vs. Size (Total Population, Negatively Buoyant Population, Positively Buoyant Population)

Other notes

- Particle size distribution data will be binned at 1nm, across a measurement range of 1nm to 5µm regardless of sensor. If present, both the positively and negatively buoyant particle populations will be imported as independent sub-populations, in addition to the total particle population.
- Particle Volume % for the number of particles in each 1nm bin is calculated automatically and imported to LINK. (Particle Volume % = volume of particles in a given size range bin divided by the volume of particles in all bins, assuming particles are spherical in volume).
- The default Import Method does not adjust results based on Acceptance Rate/Coincidence effects. One must create an Import Method and request this option.
- A wide range of Import Method options are available for the Archimedes instrument. These options are noted below.

Import Method options can be defined and calculated each measurement during import if it is first created/defined and then requested within an Import Method. More information and instructions can be found in the Users Manual (section 4.6). The following is the default Archimedes-specific import method settings:

- Particle Coincidence Adjustment: **None**
- Buoyancy Sub-Populations: **None**
- Automated Metadata import: **None**
- Dilution Factor: **1 (no dilution)**

Acceptance Rate/Particle Coincidence Adjustment

The default Import Method does not adjust results based on Acceptance Rate/Coincidence effects. Requesting such adjustment may be specified within an Import Method.

Buoyancy Sub-Populations

Archimedes permits a maximum of two material/density values to be defined in the measurement file. New values can be defined in LINK and applied to the measurements during import. LINK will re-calculate particle size based on these new



values. This feature can harmonize inconsistencies with material names for different measurements (e.g. "Protein", "protein", "prot", etc) or to modify the density assumption from the original experiment. Note: the source data file is not modified.

LINK can create particle size distribution for multiple additional sub-populations based on different materials/densities. For example, creating three materials called "Protein1, Protein2, Protein3" with densities "1.2, 1.25, 1.3" will show the effect of these densities on the corresponding particle size distributions.

Automated Metadata Extraction

Specify criteria for automated metadata extraction from measurement file fields (e.g. Comments, File Name, Import Path etc...) utilizing specified delimiters. Both metadata name and value may be extracted or only the value only.

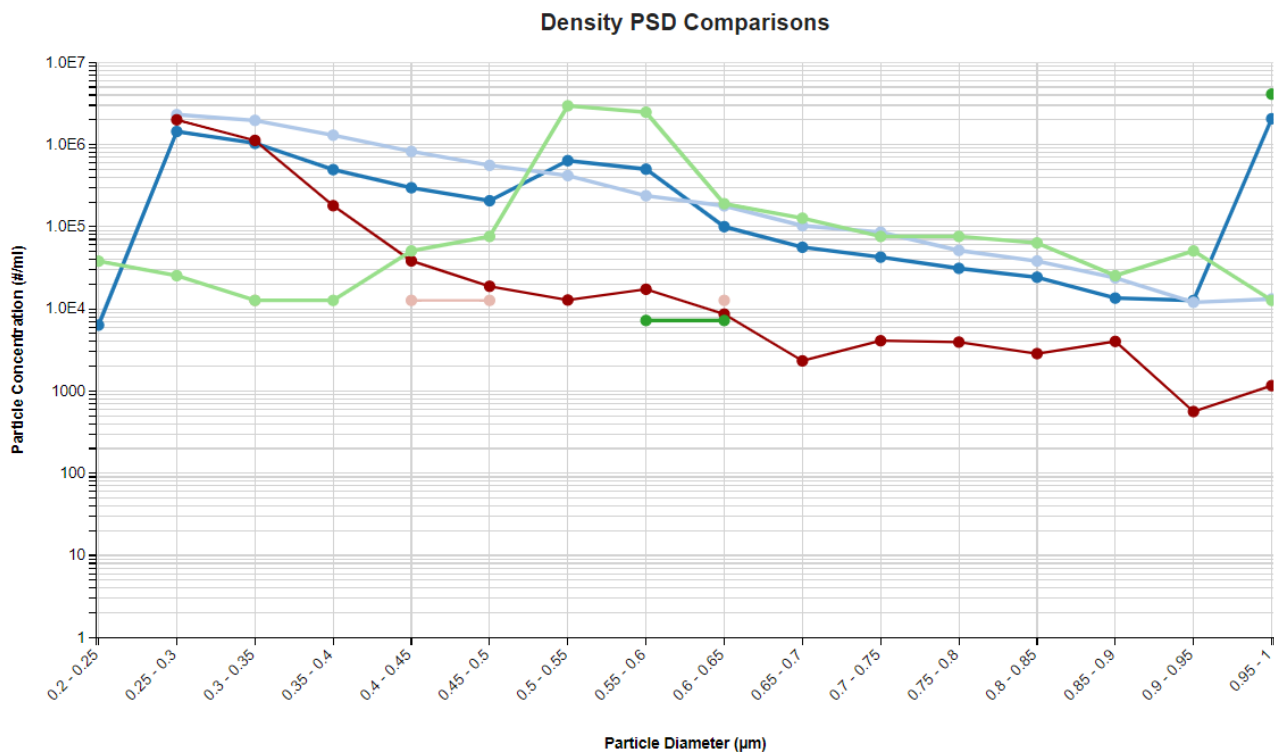
Dilution Factor

Specify a dilution factor for automated particle count/concentration data adjustment. This selection applies to the total particle population and all defined sub-populations. A LNK_Dilution_Factor may also be applied after import, utilizing the Add/Edit LINKdb Fields feature.

EXAMPLES

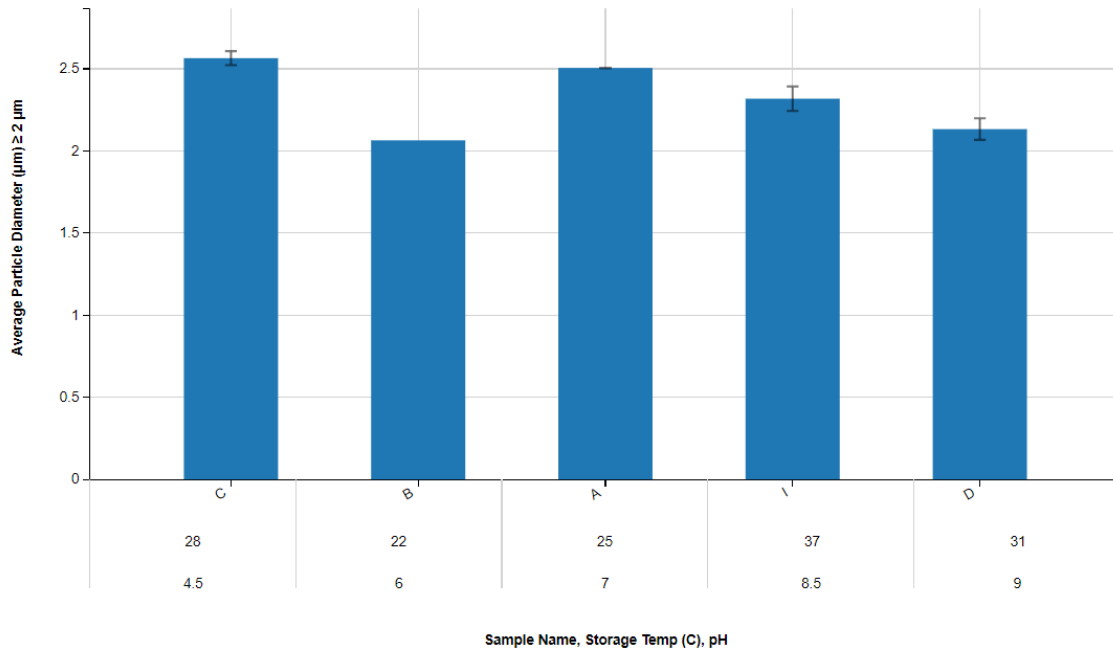
Included below are example dashboards from Archimedes measurement files:

- 1. Histogram plotting binned raw data for Particle Concentration vs. Diameter and split by subpopulation



2. Multi-layered x-axis Column Chart plotting metadata categories

Multi-Factor Visualization: Average Particle Diameter vs. Sample Name, Storage Temp, & pH



3. Tabular Summary examples

Measurement Summary Table – Instrument Settings

LINK Record ID #	Sub-Population	Sample Name	Analysis Date	Baseline Noise	BandwidthErrorTolerance	BandwidthErrorThreshold - AVG	Acceptance Rate - AVG	Record Real Time Data	Fluid Density - AVG	Experiment Duration (s) - AVG	DetectedViscosity - AVG	Coincidence (%) - AVG	Bulk Sensitivity - AVG
1876	Multiple (3 Values)	Sample 1	2014-04-10 12:...	0.00	1500	200	76.33	False	1.13	3626	9.55	11.83	-55000
1877	Multiple (3 Values)	Sample 1	2014-04-10 13:...	0.00	1500	200	92.69	False	1.13	3621	8.65	3.66	-55000
1878	Multiple (2 Values)	Sample 2	2017-08-08 09:...	0.00	1500	200	88.76	False	1.00	231	1.06	5.62	-55000
1879	Multiple (2 Values)	Sample 2	2017-08-08 09:...	0.00	1500	200	91.46	False	1.00	224	1.10	4.27	-55000
1880	Multiple (2 Values)	Sample 3	2017-08-08 10:...	0.00	1500	200	91.46	False	1.00	226	1.05	4.27	-55000
1881	Multiple (3 Values)	Sample 3	2018-11-21 14:...	0.00	1500	200	89.29	True	1.00	329	1.10	5.36	-55000

Measurement Summary Table – Measurement Results

LINK Record ID #	Sub-Population	Sample Name	Total Particle Concentration (#/ml) - AVG	Total Particle Count (#) - AVG	Volume Analyzed (ml) - AVG	Particle Conc. (#/ml) (Particle Diam. (µm) >=1) - AVG	Positive Buoyancy Density Value (g/cc) - AVG
1876	Multiple (3 Values)	Sample 1	21014898.87	17477	0.00	32064.85	0.96
1877	Multiple (3 Values)	Sample 1	2111306.84	1876	0.00	14255.45	0.96
1878	Multiple (2 Values)	Sample 2	6915068.53	300	0.00	2996529.70	
1879	Multiple (2 Values)	Sample 2	6536491.95	300	0.00	2374925.41	
1880	Multiple (2 Values)	Sample 3	6497704.41	300	0.00	2230878.51	
1881	Multiple (3 Values)	Sample 3	6339414.74	500	0.00	16905.11	0.90

ARCHIMEDES DASHBOARD

LINK contains an extensive built-in dashboard library from LINK version 2.4.0.210401 and later. This function contains specific pre-created dashboards for all instruments and application groups.

CONTACT LUMETICS

For direct assistance, please contact Lumetics LINK™ Support:

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