Lumetics LINK™ Application Program Interface (API)

INTRODUCTION

LINK is a software solution for automated extraction, processing and reporting of data that has been produced by analytical instruments or process equipment. LINK will search network locations for any new datasets produced by 100's of different analytical instruments/process equipment, parse all useful data from these digital files (including 'xy' curve data and instrument parameter calculations), and copy this data to a centralized LINK database residing on your network. The powerful UI allows up to 5000 distinct sample datasets to be displayed individually, statistically aggregated, and grouped based on user-specified criteria and visualized in the form of comprehensive charts/tables/images. Metadata may be automatically extracted from several different sources and utilized directly to produce dynamic fully customized Word/PDF reports. All LINK functionality is optionally 21 CFR Part11 compliant.

The LINK software is a client/server-based architecture, where the LINK client is a dedicated portable web-based application that connects to the LINK server present on your network via port 8080 (default). Most LINK users will utilize the LINK client to automate data extraction/processing/reporting and utilize the LINK database for long term storage of project data and corresponding analysis visualization preferences. However, LINK is also equipped with several API capabilities that permit remote triggering of many key LINK functions, along with extraction of data after various degrees of processing with the LINK client. In this regard, LINK may be used as a front-end data parsing and manipulation engine for other information management systems/data lakes. Lumetics takes responsibility for fully maintaining the data parsers for all requisite instrument/process file formats and will add support for new file formats upon request.

A minimum of one Lumetics LINK™ Annual License Subscription, in addition to a single Lumetics LINK™ API Annual License Subscription, is required to enable the LINK API functionality.

DESCRIPTION

Below is a summary of basic LINK operations for which API functionality exists:

1. Project Creation: Create a new LINK Project, in which a project may contain up to 5000 measurement datasets.
2. Data Import: Search network locations for new data files and parse + copy data to a LINK Project. Optionally include an instruction set to locate an Excel Workbook and apply metadata to imported data.
3. Project Data Extraction (unprocessed data): Extract all available data from a LINK Project (analysis settings, instrument software parameter calculations, custom LINK parameter calculations, and sample metadata – excluding 'xy' curve data).
4. Tabular Summary Data: Extract results from custom tabular summaries for sample datasets grouped and averaged, as per LINK analysis template processing and display preferences. Tabular summaries may also include instrument/sample metadata and custom calculations specified by the user.
5. Raw 'XY' Curve Data: Extract 'xy' curve data for sample datasets grouped and averaged as per LINK analysis template processing and display preferences.
6. Raw 'XY' Curve Data (binned): Extract binned 'xy' curve data for sample datasets grouped and averaged as per LINK analysis template processing and display preferences.
7. Parameter Chart Data: Extract chart data for sample datasets grouped and averaged as per LINK analysis template processing and display preferences. Column Charts, Trend Charts, 'XY' Line/Scatter Charts, Heatmaps, Radar Charts, etc.
8. Report Generation: Create a report from an existing LINK project and Analysis Template in the form of a Word document or PDF report. Can be run as part of a Data Import operation, or as a standalone API call.

LINK Project Creation, Data Import & Report Generation (After Import)

Scanning network locations for new data files, the creation of new LINK Projects, and the copying of data file content to the LINK server can be accomplished remotely using a URL connection to the LINK server. There are two optional URL specifications including:

- applying an external metadata source in the form of an Excel Workbook and associated Worksheet may be specified that contains metadata to be applied to the measurement data imported.
- Generating a report utilizing the imported data and reflecting the visualization preferences of an existing Analysis template for all dashboards, a single dashboard, or a custom report.

The URL may be constructed using the following syntax:

http://LINK_Server:Port/lumeticslink/rest/imp/importdataapi?projectname=Project&importmethodname=Import_Method&instrumentname=Instrument&path=Network_Location&overwritemeasurements=Overwrite_Instruction&metafilelocation=Metadata_File_Location&metasheetname=Metadata_Sheet_Name&metastartcell=Metadata_Start_Cell&metadatakey=Metadata_Key&analysistemplatename=[Analysis_Template_Name]&dashboardname=[Dashboard_Name]

Where:

a. LINK_Server = name of LINK server computer
b. Port = 8080, unless otherwise configured within the LINK server Apache Tomcat during installation
c. Project = the name of the Project within LINK where data is to be copied (or the project to be created if it does not already exist)
d. Import_Method = the LINK Import Method to be applied to any data files found and copied to the Project
e. Instrument = the type of data that LINK should look for in the specified network location. Typically, this is the name of an analytical instrument producing data for which LINK has developed data parsing engines. Please consult the LINK Client UI for the complete set of options and correct syntax, as support for new instrument file formats are added on a regular basis!
f. Network_Location = Path where the LINK server should search for data files (please note that the 'path' parameter needs to have forward slashes and not backslashes. Or alternatively the backslashes would be written as %5. Using the backslash character itself will not work). Note: LINK will search the network location directory PLUS ALL subfolders, therefore caution is advised when selecting the network location.
a. Overwrite_Measurements = Overwrite Existing Measurements “true” or “false” denotes whether only new measurements should be imported.
g. Metadata_File_Location = Excel Workbook Path (Must be Accessible to LINK).
h. Metadata_Sheet_Name = This is the excel sheet name where the external metadata is retrieved from.
i. Metadata_Start_Cell = This is the top-left cell in the block of fields in the Excel worksheet, pointing to the first Metadata field name in the block of data to import. This does not have to be a cell containing the Cross-Reference Key field selected above; the software will scan through the data block and find this automatically.
j. Metadata_Key = This database field will be used to match LINK measurements to their respective data fields found in the data source. E.g., if Sample Name is selected, only source fields with a sample name matching that of the LINK measurement(s) will be imported and applied.
k. Analysis_Template_Name = The name of the analysis template that holds the visualization preferences to display the data imported
l. Dashboardname = [Dashboard_Name], or "AllDashboards" for all dashboards] = The name of the single dashboard that will be represented in the report

Report Generation Optional Additions

a. &wordreporttemplatename = [Word_Report_Template_Name]
   Note: if this is used, it should be place of &dashboardname=[Dashboard_Name]
b. &saveaspdf = [true/false (if missing, defaults to 'true']
c. &exportNotesBlockAsHTML = [true/false (if missing, defaults to 'false']
d. &exporttablesasdata = [true/false (if missing, defaults to 'false']
e. &attachcsvs = [true/false (if missing, defaults to 'false']
f. &largetablesinlandscape = [true/false (if missing, defaults to 'true']
g. &savtopath = [path-to-save] (save report output to folder. If missing, defaults to saving to the LINK database)

Notes:

- Following data import, the Owner of any new Project created shall be named 'System' vs. a specific LINK user. It will be Shared and Unlocked by default. Any Analyst or Admin will be able to manage its attributes within the Project Management Table.
- To convert a piece of text (dashboard name, or path string, etc.), one can use this website and scroll down to the "URL Encoding Functions" section, enter the text, and press the "Encode URL" button. https://www.w3schools.com/tags/ref_urlencode.ASP

Example: Import Data Only:

LINK_Server = localhost
Port = 8080
Project_Name = My Import API Project
Import_Method = Default Method
Instrument = MFI 4200/5200
Network Location = C:\MFI Test Import File
Overwrite Measurements = True

Applicable URL:
http://localhost:8080/lumeticslink/rest/imp/importdataapi?projectname=My%20Import%20API%20Project&importmethodname=Default%20Method&instrumentname=MFI%204200/5200&path=C%3A%5CMFI%20Test%20Import%20File&overwritemeasurements=true

Example: Import Data with Optional Metadata Import:

LINK_Server = localhost
Port = 8080
Project_Name = My Import API Project
Import_Method = Default Method
Instrument = MFI 4200/5200
Network Location = C:\MFI Test Import File
Overwrite Measurements = True
Metadata_File_Location = C:/meta/metadata.xls
Metadata_Sheet_Name = Metadata
Metadata_Start_Cell = A1
Metadata_Key = Sample Name

Applicable URL with additional parameters:
http://localhost:8080/lumeticslink/rest/imp/importdataapi?projectname=My%20Import%20API%20Project&importmethodname=Default%20Method&instrumentname=MFI%204200/5200&path=C%3A%5CMFI%20Test%20Import%20File&overwritemeasurements=true&metafilelocation=C:/meta/metadata.xlsx&metasheetname=Metadata&metastartcell=A1&metadatakey=Sample%20Name

Example: Import Data with Optional Report Generation:

LINK_Server = localhost
Port = 8080
Project_Name = My Import API Project
Import_Method = Default Method
Instrument = MFI 4200/5200
Network Location = C:\MFI Test Import File
Overwrite Measurements = True
Analysis Template Name = Demo All Instruments
Word Report Template Name = Sample Results Set eg.docx
Save as PDF = True

Applicable URL with additional parameters:
http://localhost:8080/lumeticslink/rest/imp/importdataapi?projectname=My%20Import%20API%20Project&importmethodname=Default%20Method&instrumentname=MFI%204200/5200&path=C%3A%5CMFI%20Test%20Import%20File&overwritemeasurements=true&analysistemplatename=Demo%20All%20Instruments&wordreporttemplatename=Sample%20Results%20Set%20eg.docx&saveasPDF=True

LINK Report Generation (Standalone API call)

A Report can be created at any time from a standalone API call, which will immediately add the report job to the jobs queue.

The URL may be constructed using the following syntax:

http://LINK_Server:Port/lumeticslink/rest/ad/reportapi?projectname=
[Project_Name]&analysistemplatename=[Analysis_Template_Name]&dashboardname=[Dashboard_Name]

Report Generation Optional Additions

a. &wordreporttemplatename = [Word_Report_Template_Name]
   Note: if this is used, it should be place of &dashboardname=[Dashboard_Name] or AllDashboards" for all dashboards
b. &saveaspdf = [true/false (if missing, defaults to 'true']
c. &exportNotesBlockAsHTML = [true/false (if missing, defaults to 'false']
d. &exporttablesasdata = [true/false (if missing, defaults to 'false']
e. &attachcsvs = [true/false (if missing, defaults to 'false']
f. &largetablesinlandscape = [true/false (if missing, defaults to 'true']
g. &savtopath = [path-to-save] (save report output to folder. If missing, defaults to saving to the LINK database)

EXAMPLE – Project Data Extraction (unprocessed data)

All data copied from instrument data files to a LINK Project (except 'xy' curve data), can be extracted using a URL connection to the LINK server. Any additional User Fields (e.g., custom parameter calculations defined by the user, or metadata that has been applied to sample measurement datasets) will also be extracted from the project using this command. The URL for a given project may be extracted directly from the LINK client. Alternatively, it may be constructed using the following syntax:

http://LINK_Server:Port/lumeticslink/rest/dbdata/dataapi?projectname=Project

Where:

a. LINK_Server = name of LINK server computer
b. Port = 8080, unless otherwise configured within the LINK server Apache Tomcat during installation
c. Project = the name of the Project within LINK where data resides

Example Results Returned (excerpt):

Project Name:	Demo - LINK API			
Last Refresh Date:	2020/05/13 12:02:21 EDT			
LINK Record ID #	1		LINK Record ID #	2
Sample Name	Sample A		Sample Name	Sample A
File Name	a_S1_Formulation=ABC_Final Container=Syringe_F		File Name	a_S11_Formulation=XYZ_Final Container=Syringe_Repl
Analysis Date	2013-02-17 13:44:37		Analysis Date	2013-07-17 12:36:49
Blank as % 3000/ml - MFI 5200	0.04259259259259667		Blank as % 3000/ml - MFI 5200	0.09407407407407001
ECD Average - MFI 5200	1.8563218390803219567479191 4		ECD Average - MFI 5200	2.2510746385303969262394591 9
ECD Average - MFI 5200 (1)	1.8563218390803219567479191 4		ECD Average - MFI 5200 (1)	2.2510746385303969262394591 9
ECD Avg 3.5-6.5 µm - MFI 5200	4.7163043478260260491493383 8		ECD Avg 3.5-6.5 µm - MFI 5200	4.6279527559055355609461218 9
ECD Avg 3.5-6.5 µm - MFI 5200 (1)	4.7163043478260260491493383 8		ECD Avg 3.5-6.5 µm - MFI 5200 (1)	4.6279527559055355609461218 9
ECD Avg 8-12 µm - MFI 5200	9.3750000000000000000000000		ECD Avg 8-12 µm - MFI 5200	9.8173076923074926035502958 7
ECD StdDev - MFI 5200	1.795578227176475		ECD StdDev - MFI 5200	2.9815429191192906
ECD StdDev - MFI 5200 (1)	1.795578227176475		ECD StdDev - MFI 5200 (1)	2.9815429191192906
ECD StdDev 3.5-6.5 µm - MFI 5200	0.8263639263174731		ECD StdDev 3.5-6.5 µm - MFI 5200	0.8048040403689668
ECD StdDev 3.5-6.5 µm - MFI 5200 (1)	0.8263639263174731		ECD StdDev 3.5-6.5 µm - MFI 5200 (1)	0.8048040403689668
ECD StdDev 8-12 µm - MFI 5200	1.0198413287751846		ECD StdDev 8-12 µm - MFI 5200	1.1557692909470016
ECD StdDev 8-12 µm - MFI 5200 (1)	1.0198413287751846		ECD StdDev 8-12 µm - MFI 5200 (1)	1.1557692909470016
Edge Particle Count	25		Edge Particle Count	86
Fill Hollow	Disable		Fill Hollow	Disable
Flow Cell Model	100µm(SP3)		Flow Cell Model	100µm(SP3)
Flow Cell Position	3268		Flow Cell Position	3268
Flow Cell Serial	2763		Flow Cell Serial	2763
Image Format	Jpg		Image Format	Jpg
Images Result Folder	\\ImageFolder\\		Images Result Folder	\\ImageFolder\\
Images Stored	949		Images Stored	1115
Import Date	2020-04-14 13:51:58.806000		Import Date	2020-04-14 13:51:58.806000
LNK_Container_Fill_Volume	5.0		LNK_Container_Fill_Volume	5.0
LNK_CPPs	AspectRatio_StdDev, Circularity_StdDev, Geodesic		LNK_CPPs	AspectRatio_StdDev, Circularity_StdDev, Geodesic Asp
LNK_Dilution_Factor	1.0		LNK_Dilution_Factor	1.0
LNK_Edge_Particles_Included	0		LNK_Edge_Particles_Included	0
LNK_Import_Path	C:\Users\DJTHO\Box Sync\Sales\1_SW Demonstra		LNK_Import_Path	C:\Users\DJTHO\Box Sync\Sales\1_SW Demonstration\
LNK_Import_Template_Name	MFI 5200 - AR and SF		LNK_Import_Template_Name	MFI 5200 - AR and SF

EXAMPLE – Tabular Summary Data Extraction

All Project data grouped and averaged as per the Analysis Template, Dashboard definition and Measurement Summary Table Template definition, can be extracted using a URL connection to the LINK server. The URL may be extracted directly from the LINK client. Alternatively, it may be constructed using the following syntax:

http://LINK_Server:Port/lumeticslink/rest/dbdata/metadatatableapi?projectname=Project&templatename=Analysis Template&dashboardname=Dashboard&msttname=Measurement Summary Table Template

Where:

a. LINK_Server = name of LINK server computer
b. Port = 8080, unless otherwise configured within the LINK server Apache Tomcat during installation
c. Project = the name of the Project within LINK where data resides
d. Analysis Template = the name of the Analysis Template to be applied to the Project data
e. Dashboard = the Dashboard within the Analysis Template that identifies which Project measurements to be included
f. Measurement Summary Template = the table template that should be applied to the Project Measurements

Example MSTT in LINK:

Storage Time (mos)	Sample Descr.	# Meas.	Conc. ≥10µm AVG	Conc. ≥10µm RSD	Conc. ≥25µm	Conc. ≥25µm RSD	LMW % Area	Monomer % Area	HMW % Area	A280
6	z	2	24	0.40	2	0.61	0.45	96.68	2.88	3.00
3	b	2	57	0.02	9	0.16	0.45	96.60	2.94	2.97
0	a	2	83	1.17	11	1.12	0.39	96.41	3.20	0.04

Example Results Returned:

Dashboard Name:	Tabular Summary Data									
Analysis Template Name:	Demo - LINK API									
Project Name:	Demo - LINK API									
Last Refresh Date:	2020/05/13 12:08:50 EDT									
URL Type:	Metadata Table Report									
Metadata Table Report Template:	LINK MSTT API									
Storage Time (mos)	Sample Descr.	# Meas.	Conc. ≥10µm AVG	Conc. ≥10µm RSD	Conc. ≥25µm	Conc. ≥25µm RSD	LMW % Area - AVG	Monomer % Area - AVG	HMW % Area - AVG	A280 - AVG
0	a	2	82.77777778	1.167438041	10.55555556	1.116484391	0.39	96.41	3.2	0.041
3	b	2	56.66666667	0.016637807	9	0.15713484	0.455	96.605	2.935	2.966
6	z	2	24.22222222	0.402207527	2.333333333	0.606091527	0.45	96.675	2.875	3.0035

EXAMPLE – LINK Chart Data Extraction

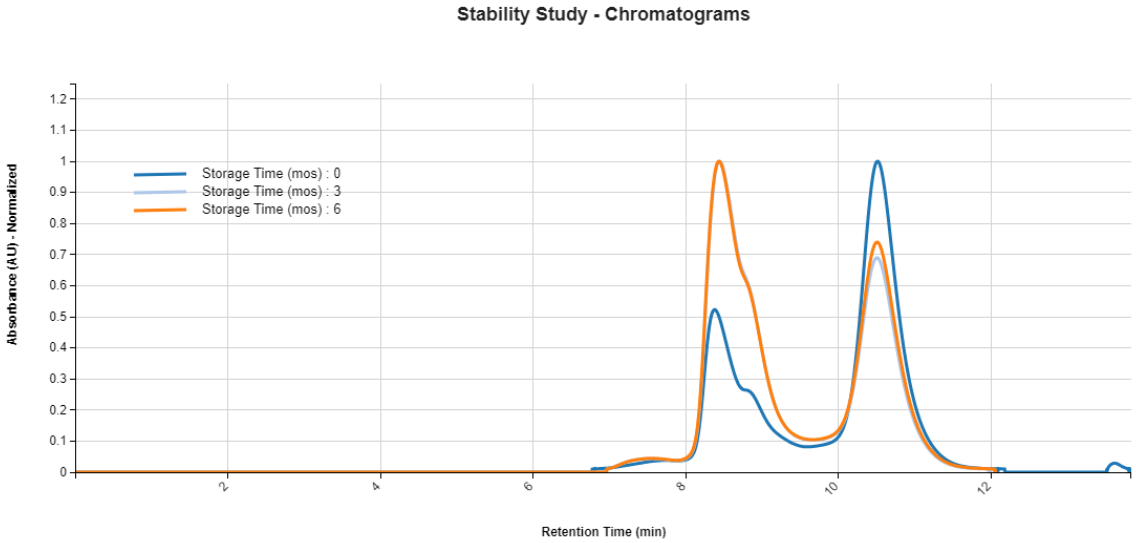
All Project data grouped and averaged as per the Analysis Template's Dashboard definition and Chart display preferences can be extracted using a URL connection to the LINK server. The URL may be extracted directly from the LINK client. Alternatively, it may be constructed using the following syntax:

http://LINK_Server:Port/lumeticslink/rest/dbdata/ chartdataapi?projectname=Project&templatename=Analysis Template&dashboardname=Dashboard

Where:

a. LINK_Server = name of LINK server computer
b. Port = 8080, unless otherwise configured within the LINK server Apache Tomcat during installation
c. Project = the name of the Project within LINK where data resides
d. Analysis Template = the name of the Analysis Template to be applied to the Project data
e. Dashboard = the Dashboard within the Analysis Template that identifies which Project measurements to be included

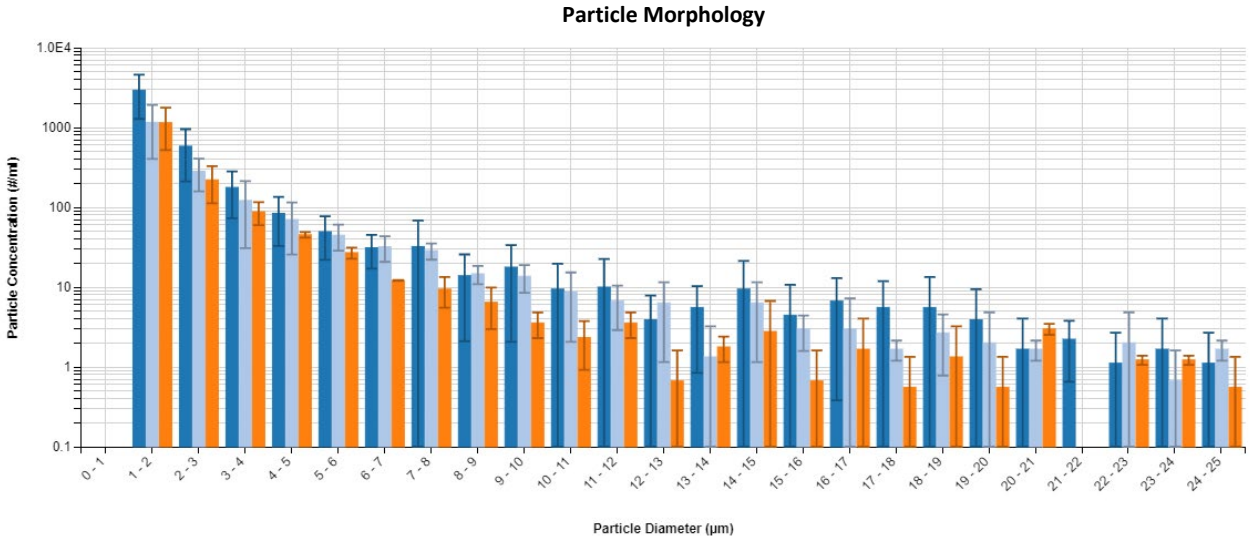
Examlpe Line Chart in LINK:



Example Results Returned (excerpt):

Dashboard Name:	XY Curve Data			
Analysis Template Name:	Demo - LINK API			
Project Name:	Demo - LINK API			
Last Refresh Date:	2020/05/13 11:52:55 EDT			
SeriesName	Retention Time (min)	Absorbance (AU)	Stdev	NumberOfMeasurements
Instrument : Empower (ASCII Export), Subpopulation Id : Total Population, Storage Time (mos) : 0	6.80666700000	0.005483595122630898	3.65112889409E-4	2
Instrument : Empower (ASCII Export), Subpopulation Id : Total Population, Storage Time (mos) : 0	6.81333300000	0.010554553502550492	3.7631798631E-5	2
Instrument : Empower (ASCII Export), Subpopulation Id : Total Population, Storage Time (mos) : 0	6.82000000000	0.010708451710579527	3.7363098054E-5	2
Instrument : Empower (ASCII Export), Subpopulation Id : Total Population, Storage Time (mos) : 0	6.82666700000	0.010853408967331278	3.7489599457E-5	2
Instrument : Empower (ASCII Export), Subpopulation Id : Total Population, Storage Time (mos) : 0	6.83333300000	0.010981827747513228	3.8179735675E-5	2
Instrument : Empower (ASCII Export), Subpopulation Id : Total Population, Storage Time (mos) : 0	6.84000000000	0.011094660662278212	3.902274838E-5	2
Instrument : Empower (ASCII Export), Subpopulation Id : Total Population, Storage Time (mos) : 0	6.84666700000	0.011194041263249473	3.932828922E-5	2
Instrument : Empower (ASCII Export), Subpopulation Id : Total Population, Storage Time (mos) : 0	6.85333300000	0.011283926550600325	3.9033284271E-5	2
Instrument : Empower (ASCII Export), Subpopulation Id : Total Population, Storage Time (mos) : 0	6.86000000000	0.01137143933704211	3.9085893016E-5	2
Instrument : Empower (ASCII Export), Subpopulation Id : Total Population, Storage Time (mos) : 0	6.86666700000	0.011465438800096515	3.9349361002E-5	2
Instrument : Empower (ASCII Export), Subpopulation Id : Total Population, Storage Time (mos) : 0	6.87333300000	0.011569330763584214	3.9112268098E-5	2
Instrument : Empower (ASCII Export), Subpopulation Id : Total Population, Storage Time (mos) : 0	6.88000000000	0.0116748826281108	3.8237718431E-5	2
Instrument : Empower (ASCII Export), Subpopulation Id : Total Population, Storage Time (mos) : 0	6.88666700000	0.011776717503746724	3.7073396406E-5	2
Instrument : Empower (ASCII Export), Subpopulation Id : Total Population, Storage Time (mos) : 0	6.89333300000	0.011874673966974447	3.6125166212E-5	2

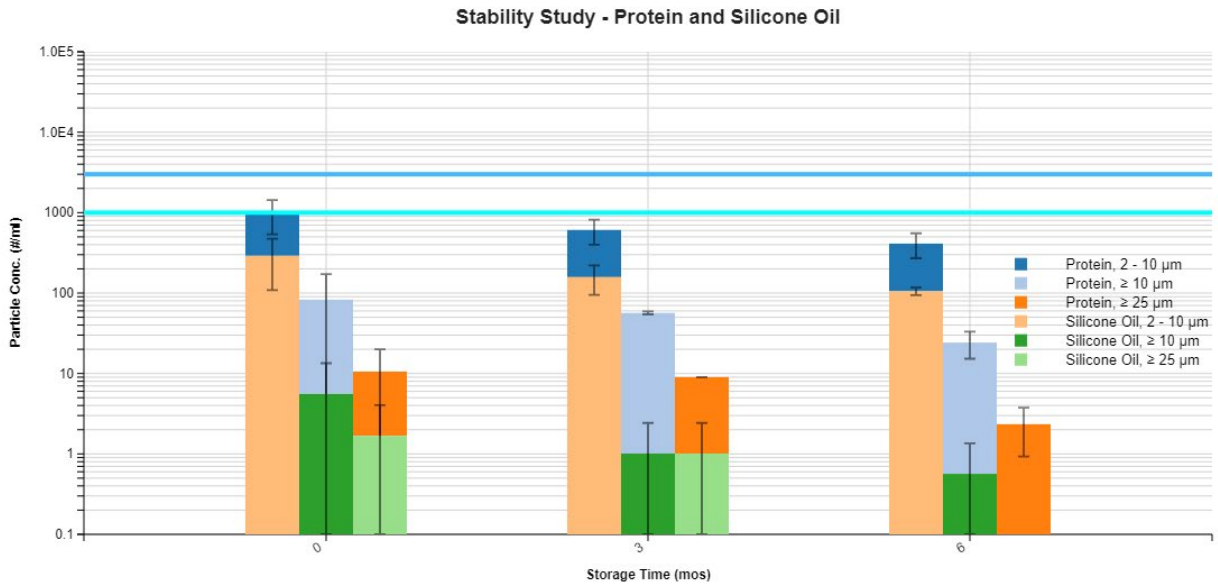
Example Histogram in LINK:



Example Results Returned (excerpt):

Dashboard Name:	Binned Curve Data			
Analysis Template Name:	Demo - LINK API			
Project Name:	Demo - LINK API			
Last Refresh Date:	2020/05/13 12:00:37 EDT			
SeriesName	Particle Diameter (µm)	AspectRatio_StdDev	Stdev	NumberOfMeasurements
Instrument : MFI 4200/5200, Subpopulation Id : Total Population, Storage Time (mos) : 0	1 - 2	2932.7778	1652.2728453725686	2
Instrument : MFI 4200/5200, Subpopulation Id : Total Population, Storage Time (mos) : 0	10 - 11	9.4444	10.213764617135878	2
Instrument : MFI 4200/5200, Subpopulation Id : Total Population, Storage Time (mos) : 0	11 - 12	10.0	12.57078722109575	2
Instrument : MFI 4200/5200, Subpopulation Id : Total Population, Storage Time (mos) : 0	12 - 13	3.8889	3.928371006588002	2
Instrument : MFI 4200/5200, Subpopulation Id : Total Population, Storage Time (mos) : 0	13 - 14	5.5556	4.714045207905603	2
Instrument : MFI 4200/5200, Subpopulation Id : Total Population, Storage Time (mos) : 0	14 - 15	9.4444	11.785113019778148	2
Instrument : MFI 4200/5200, Subpopulation Id : Total Population, Storage Time (mos) : 0	15 - 16	4.4444	6.285393610540804	2
Instrument : MFI 4200/5200, Subpopulation Id : Total Population, Storage Time (mos) : 0	16 - 17	6.6667	6.285393610540804	2
Instrument : MFI 4200/5200, Subpopulation Id : Total Population, Storage Time (mos) : 0	17 - 18	5.5556	6.285393610540804	2
Instrument : MFI 4200/5200, Subpopulation Id : Total Population, Storage Time (mos) : 0	18 - 19	5.5556	7.856742013183077	2
Instrument : MFI 4200/5200, Subpopulation Id : Total Population, Storage Time (mos) : 0	19 - 20	3.8889	5.499719409223204	2
Instrument : MFI 4200/5200, Subpopulation Id : Total Population, Storage Time (mos) : 0	2 - 3	582.2222	370.8382230222822	2
Instrument : MFI 4200/5200, Subpopulation Id : Total Population, Storage Time (mos) : 0	20 - 21	1.6667	2.357022603952802	2
Instrument : MFI 4200/5200, Subpopulation Id : Total Population, Storage Time (mos) : 0	21 - 22	2.2222	1.571348402635201	2
Instrument : MFI 4200/5200, Subpopulation Id : Total Population, Storage Time (mos) : 0	22 - 23	1.1111	1.571348402635201	2
Instrument : MFI 4200/5200, Subpopulation Id : Total Population, Storage Time (mos) : 0	23 - 24	1.6667	2.357022603952802	2

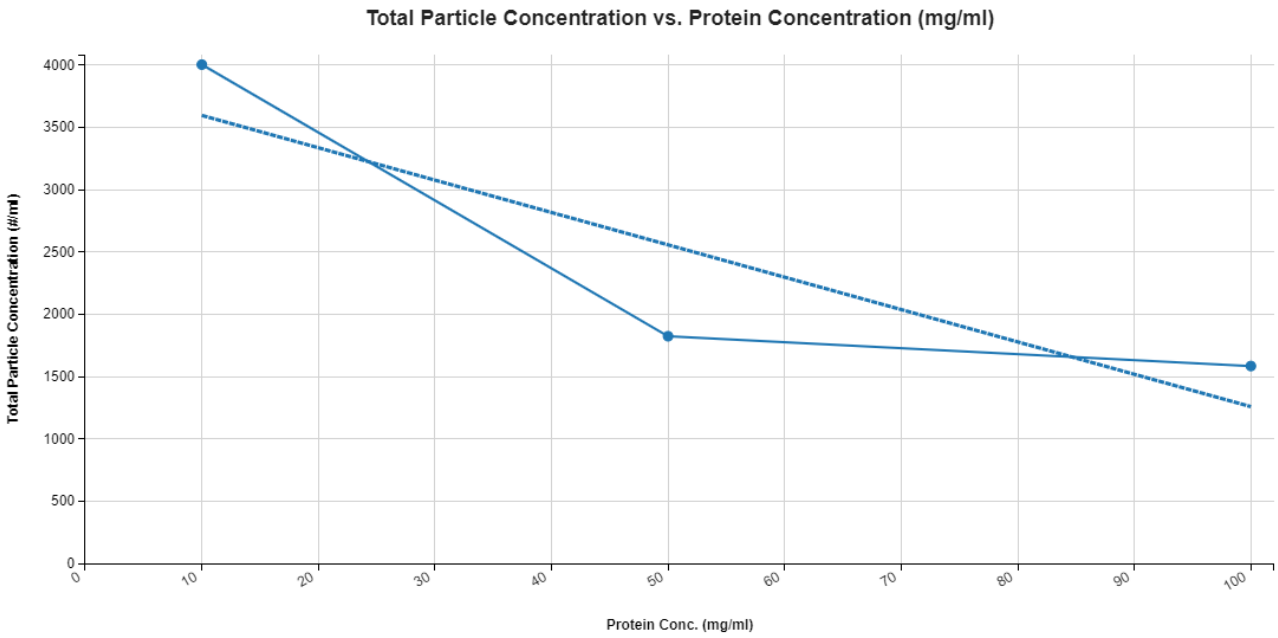
Example Column Chart in LINK:



Example Results Returned:

Dashboard Name:	CQA Chart Data - Column Chart			
Analysis Template Name:	Demo - LINK API			
Project Name:	Demo - LINK API			
Last Refresh Date:	2020/05/13 12:35:09 EDT			
SeriesName	Storage Time (mos)	Particle Concentration (#/ml) >=2	Stdev	NumberOfMeasurements
Instrument : MFI 4200/5200, Subpopulation Id : Protein, Particle Concentration (#/ml) : 2 - 10 µm	0	697.22222222221	450.1913173554447	2
Instrument : MFI 4200/5200, Subpopulation Id : Protein, Particle Concentration (#/ml) : 2 - 10 µm	3	450.33333333333	208.83220271043174	2
Instrument : MFI 4200/5200, Subpopulation Id : Protein, Particle Concentration (#/ml) : 2 - 10 µm	6	306.666666666625	141.42135623733074	2
Instrument : MFI 4200/5200, Subpopulation Id : Protein, Particle Concentration (#/ml) : >= 10 µm	0	77.222222222155	88.781184748903	2
Instrument : MFI 4200/5200, Subpopulation Id : Protein, Particle Concentration (#/ml) : >= 10 µm	3	55.66666666663	2.357022603903304	2
Instrument : MFI 4200/5200, Subpopulation Id : Protein, Particle Concentration (#/ml) : >= 10 µm	6	23.66666666663	8.956685895039032	2
Instrument : MFI 4200/5200, Subpopulation Id : Protein, Particle Concentration (#/ml) : >= 25 µm	0	8.88888888888	9.428090415811205	2
Instrument : MFI 4200/5200, Subpopulation Id : Protein, Particle Concentration (#/ml) : >= 25 µm	3	7.99999999999	1.4142E-11	2
Instrument : MFI 4200/5200, Subpopulation Id : Protein, Particle Concentration (#/ml) : >= 25 µm	6	2.33333333333	1.414213562373095	2
Instrument : MFI 4200/5200, Subpopulation Id : Silicone Oil, Particle Concentration (#/ml) : 2 - 10 µm	0	290.555555555535	181.4907405045354	2
Instrument : MFI 4200/5200, Subpopulation Id : Silicone Oil, Particle Concentration (#/ml) : 2 - 10 µm	3	157.666666666665	62.69680126520957	2
Instrument : MFI 4200/5200, Subpopulation Id : Silicone Oil, Particle Concentration (#/ml) : 2 - 10 µm	6	105.333333333335	11.313708498977702	2
Instrument : MFI 4200/5200, Subpopulation Id : Silicone Oil, Particle Concentration (#/ml) : >= 10 µm	0	5.55555555555	7.856742013176005	2
Instrument : MFI 4200/5200, Subpopulation Id : Silicone Oil, Particle Concentration (#/ml) : >= 10 µm	3	1.0	1.414213562373095	2
Instrument : MFI 4200/5200, Subpopulation Id : Silicone Oil, Particle Concentration (#/ml) : >= 10 µm	6	0.555555555555	0.7856742013176	2
Instrument : MFI 4200/5200, Subpopulation Id : Silicone Oil, Particle Concentration (#/ml) : >= 25 µm	0	1.666666666665	2.357022603952802	2
Instrument : MFI 4200/5200, Subpopulation Id : Silicone Oil, Particle Concentration (#/ml) : >= 25 µm	3	1.0	1.414213562373095	2
Instrument : MFI 4200/5200, Subpopulation Id : Silicone Oil, Particle Concentration (#/ml) : >= 25 µm	6	0.0	0.0	2

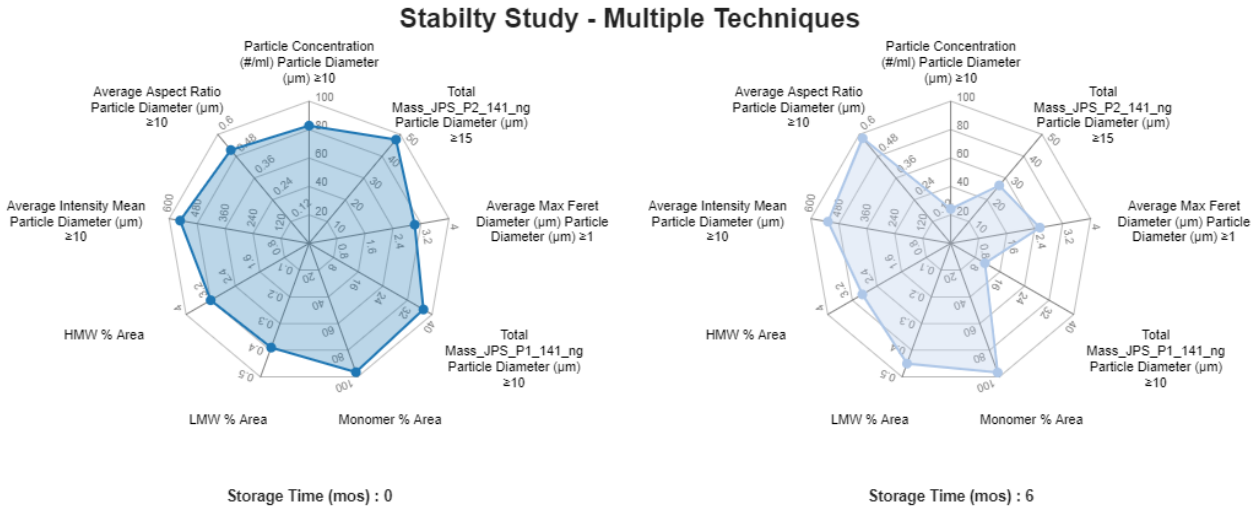
Example 'XY' Line/Scatter Chart in LINK:



Example Results Returned:

Dashboard Name:	CQA Chart Data - XY Line/Scatter			
Analysis Template Name:	Demo - LINK API			
Project Name:	Demo - LINK API			
Last Refresh Date:	2020/05/13 12:06:09 EDT			
SeriesName	Protein Conc. (mg/ml)	Total Particle Concentration (#/ml)	Stdev	NumberOfMeasurements
Instrument : MFI 4200/5200, Subpopulation Id : Total Population	10	4003.333333	2380.59283	2
Instrument : MFI 4200/5200, Subpopulation Id : Total Population	100	1584.333333	790.5453814	2
Instrument : MFI 4200/5200, Subpopulation Id : Total Population	50	1823.333333	1024.833428	2

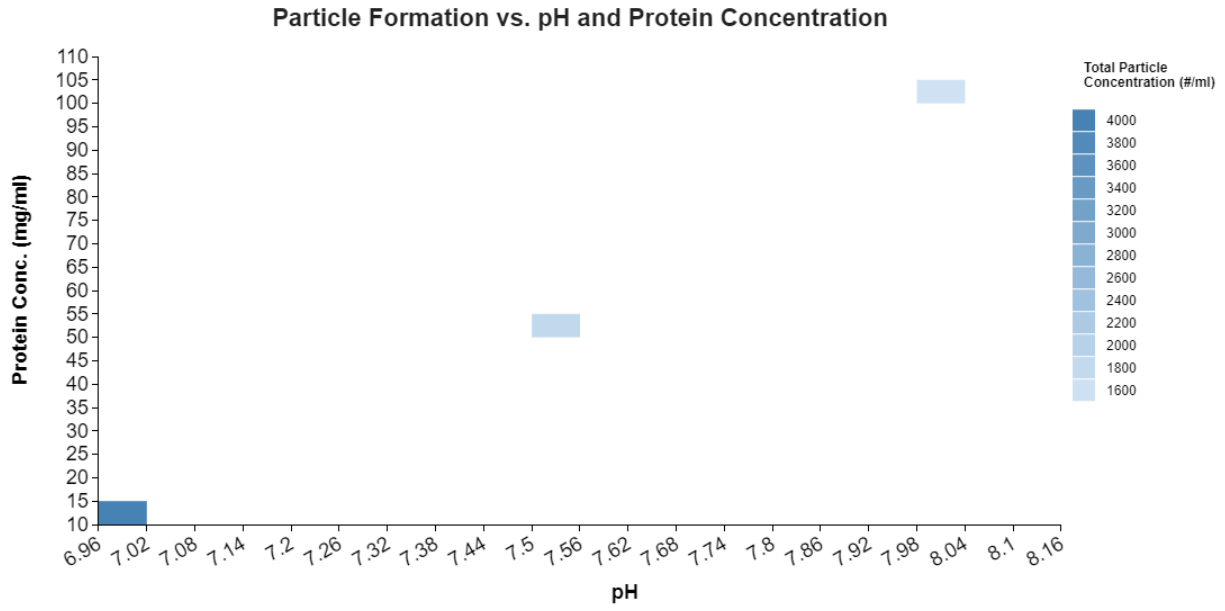
Example Radar Chart in LINK:



Example Results Returned:

Dashboard Name:	CQA Chart Data - Radar Chart					
Analysis Template Name:	Demo - LINK API					
Project Name:	Demo - LINK API					
Last Refresh Date:	2020/05/13 12:14:52 EDT					
Instrument : N/A, Subpopulation Id : Total Population, Storage Time (mos) : 0						
Instrument Field	Measurements	Mean	Stdev	MIN	MAX	RSD
Particle Concentration (#/ml) Particle Diameter (µm) >=10	2	82.777777777725	96.63792676210727	14.44444444443	151.11111111102	1.1674380414221743
Average Aspect Ratio Particle Diameter (µm) >=10	2	0.5142082550905015	0.09413143452964472	0.4476472794117722	0.5807692307692308	0.18306091665735205
Average Intensity Mean Particle Diameter (µm) >=10	2	553.1042674971754	95.4110577832447	485.6384615384615	620.5700734558892	0.1725010335121523
HMW % Area	2	3.2	0	3.2	3.2	0
LMW % Area	2	0.39	0.05656854249492379	0.35	0.43	0.14504754485877894
Monomer % Area	2	96.41	0.05656854249491757	96.37	96.45	0.000586749740638082 9
Total Mass_JPS_P1_141_ng Particle Diameter (µm) >=10	2	37.19588	41.92130635525567	7.55304	66.83872	1.127041660400444
Average Max Feret Diameter (ÃÅµm) Particle Diameter (µm) >=1	2	3.0220119745186014	1.3439165774799784	2.0717194492334925	3.9723044998037103	0.44470921651263834
Total Mass_JPS_P2_141_ng Particle Diameter (µm) >=15	2	47.61894	53.779529502160955	9.59107	85.64681	1.1293726719276185
Instrument : N/A, Subpopulation Id : Total Population, Storage Time (mos) : 6						
Instrument Field	Measurements	Mean	Stdev	MIN	MAX	RSD
Particle Concentration (#/ml) Particle Diameter (µm) >=10	2	24.222222222185	9.74236009635663	17.33333333329	31.11111111108	0.40220752691442396
Average Aspect Ratio Particle Diameter (µm) >=10	2	0.5790386401098901	0.022573276706783618	0.563076923076923	0.5950003571428572	0.03898405934101333
Average Intensity Mean Particle Diameter (µm) >=10	2	526.7208791208791	51.726648236759374	490.1446153846154	563.2971428571428	0.09820504613960526
HMW % Area	2	2.875	0.007071067811865324	2.87	2.88	0.002459501847605330 3
LMW % Area	2	0.44999999999999996	0.04242640687119283	0.42	0.48	0.09428090415820631
Monomer % Area	2	96.67500000000001	0.0353553390593203 4	96.65	96.7	0.000365713359806778 76
Total Mass_JPS_P1_141_ng Particle Diameter (µm) >=10	2	11.118545	5.135002373908897	7.48755	14.74954	0.46184121878437306
Average Max Feret Diameter (ÃÅµm) Particle Diameter (µm) >=1	2	2.5480261641618207	0.0890881162587143 4	2.4850313530321486	2.6110209752914932	0.03496357985319985
Total Mass_JPS_P2_141_ng Particle Diameter (µm) >=15	2	26.585945	23.941525453330037	9.65673	43.51516	0.9005331747030259

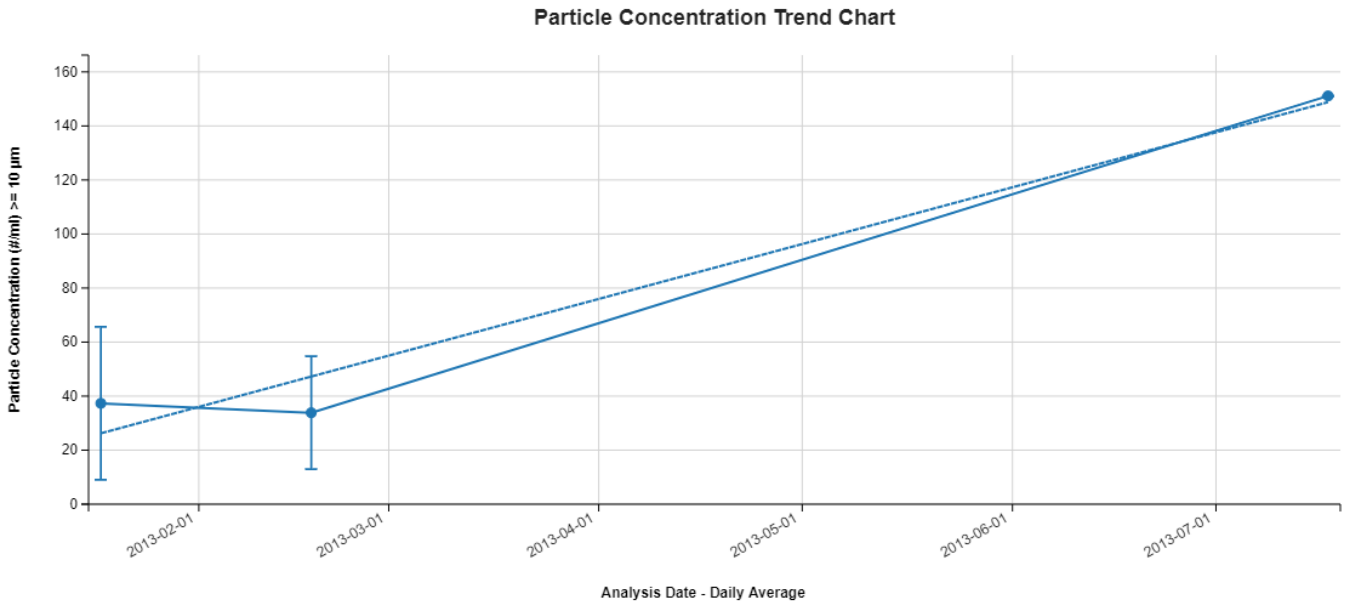
Example 2D Histogram/Heatmap in LINK:



Example Results Returned:

Dashboard Name:	CQA Chart Data - 2D Histogram/Heatmap			
Analysis Template Name:	Demo - LINK API			
Project Name:	Demo - LINK API			
Last Refresh Date:	2020/05/13 12:19:04 EDT			
pH	Protein Conc. (mg/ml)	Total Particle Concentration (#/ml) 2-10	Stdev	NumberOfMeasurements
6.96	10	4003.333333	2380.5928	2
7.5	50	1823.333333	1024.8334	2
7.98	100	1584.333333	790.5454	2

Example Output Trend Chart in LINK:



Example Results Returned:

Dashboard Name:	CQA Chart Data - Trend Chart			
Analysis Template Name:	Demo - LINK API			
Project Name:	Demo - LINK API			
Last Refresh Date:	2020/05/13 12:31:20 EDT			
SeriesName	Analysis Date	Particle Concentration (#/ml) >= 10	Stdev	NumberOfMeasurements
Instrument : MFI 4200/5200, Subpopulation Id : Total Population	19:18.0	37.33333333	28.2842712	2
Instrument : MFI 4200/5200, Subpopulation Id : Total Population	44:37.0	33.85185185	20.9129098	3
Instrument : MFI 4200/5200, Subpopulation Id : Total Population	36:49.0	151.1111111		1

Contact Lumetics

For direct assistance, please contact Lumetics LINK™ Support:

E-mail: support@lumetics.com
Phone: 1.613.417.1839
Website: http://lumetics.com/