

Mitutoyo

MeasurLink®
An Integrated Solution for Quality Data Management

Mitutoyo **Quality**

Measurement Data Network System **MeasurLink**

Small Tool Instruments
and Data Management



MeasurLink® is a registered trademark of Mitutoyo Corporation in Japan and Mitutoyo America Corporation in the United States.

MeasurLink makes it possible to visualize product quality

Preventive Measures against Product Scrapping

All data from measuring tools and instruments *1 connected to the network is collected in real time, allowing process failure prediction by implementing statistical process control.

*1: including third-party equipment with RS-232C or CSV data output

Causal Analyses Enabled with Accumulated Data

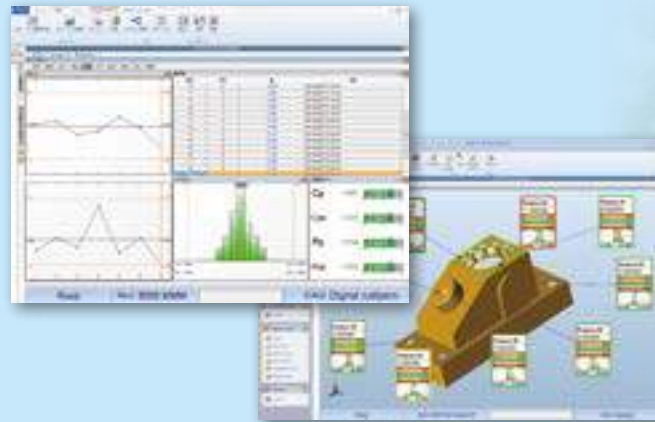
Immediate database access to measurement results enables statistical analysis to be applied for rapid identification of process issues.

Manufacturing

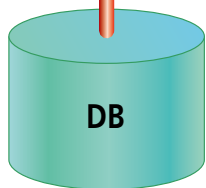


Data collection/Analysis module MeasurLink Real-Time (Refer to P4 and P5 for details.)

This SPC software allows data collection from each tool and instrument and still allows real-time display of statistical processing data such as control charts, histograms and process capability indexes.



MeasurLink Database Server (SQL Server)



Administrator



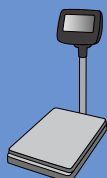
Process Management for Administrators MeasurLink Process Manager

(Refer to P6 and P7 for details.)

This administrative software enables centralized monitoring of information from all MeasurLink data collection terminals networked together on the shop floor.



In-line Coordinate Measuring Machines



Third-party equipment with RS-232C or CSV data output

Process Analysis module for Administrators MeasurLink Process Analyzer

(Refer to P8 for details.)

This administrative software allows confirmation of measurement results and various statistical analyses by access to the database where the measurement data collected with MeasurLink Real-Time is stored.



Inspection room



Evaluation/Analysis Software for Measuring System Analysis (MSA) MeasurLink Gage R&R

(Refer to P9 for details.)

This is evaluation and analysis software compliant with the MSA required in ISO/TS 16949.

Gage Management Software MeasurLink Gage Management

(Refer to P10 for details.)

This software plans and implements a complete calibration schedule and incorporates a powerful retrieval function in addition to recording and managing the operational state of gages.

MeasurLink Data Collection/Analysis Software

MeasurLink Real-Time

MeasurLink Real-time is the Statistical Process Control (SPC) MeasurLink module that collects data from Mitutoyo and third-party measuring devices and systems to provide analysis functionality in real-time by displaying control charts, histograms, or process capability indexes. Three versions are offered so that a customer can choose the version that best suits the requirements, from a standard version providing basic functionality through to the full-spec version offering data handling using Hoops 3D graphics. (Refer to Table 1 on page 5.)

Real-Time Standard: Acquisition and analysis of measurement data in real-time.

Real-Time Professional: Higher functionality with native Mitutoyo integration (DDE) connectivity.

Real-Time Professional 3D: The full-spec version, able to display analysis results in 3D.

The Use of MeasurLink Real-Time

- Allows prevention of product scrapping by implementing measurement data collection and statistical process control (SPC).

MeasurLink Real-Time common functions

• Various data views

The measurement results are displayed in various views, including statistical analysis results, data lists, and work process imaging. The display can be switched instantly according to the needs of the operator.

[Data sheet] NEW
Individual data can be displayed in the list per measurement item.

[2D view]
A word-balloon function is available having a picture or a diagram of the workpiece on the back. It can be used in work process instructions. Also, tolerance judgment results are displayed in a specific frame color.

[Classic SPC view]
Graphs and lists can be freely selected to display data for a single measurement item. It is useful for checking detailed information such as date and time of the acquired data.

Click the tab to switch the display.

• A wide choice of statistical analysis functions

[Chart]

Measurement value: Xbar-R, Xbar-S, X-Rs, EWMA control charts, Histograms, Run chart, Pre-control chart, Tear chart, Box plot chart, Meter chart, Indicator bar, multivariate data control chart, etc.
Countable number of value: p, np, c, u control charts, Pareto chart, and pie chart.

[Statistics]

Maximum value, Minimum value, Standard deviation, Average $\pm 3\sigma/4\sigma/6\sigma$, Process capability indexes (Cp, Cpk, Pp, Ppk), Defect ratio.

• Alarm function

The operator is notified when an "Out of Tolerance" or "Out of Control Limit" situation occurs. The method of notification can be selected from a pop-up window, e-mail (Fig. 1), or log file recording.



Fig. 1 Alarm notification by E-mail

• Report print out function

Measurement values, analysis calculation results and various charts can be arranged to output according to requirements.

• Adding traceability information

Traceability information for each workpiece can be added, for example, serial no., lot no., inspector name, machine no., or cause of problems and remedies.

This information can be used as search criteria when extracting data using the filtering function (RT Pro / RT Pro 3D) when a problem occurs.

• Exporting data to an Excel file

Measurement data can be exported to an Excel file. This function is useful if the data needs to be used in a department that does not have MeasurLink. (Fig. 2)

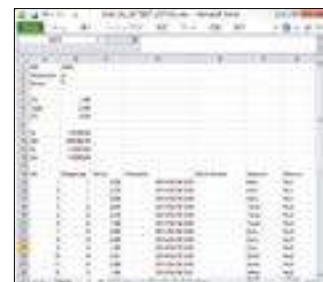


Fig. 2 Export to Excel

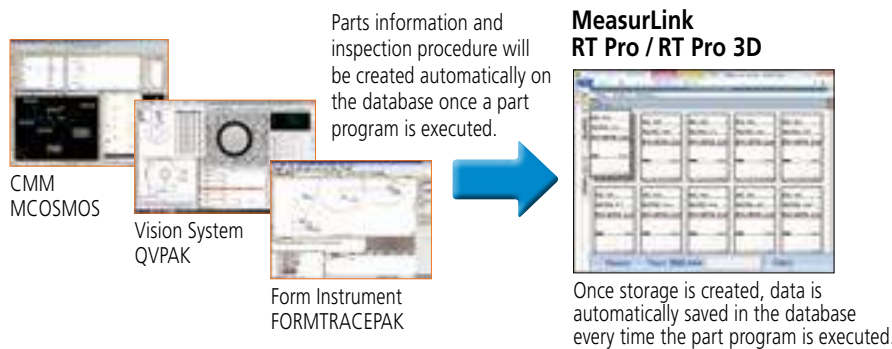
• Security function

Once the access authorization is set, it requires "User name" and "Password" input before the program will start. Data editing actions such as reference, entry and changes require authorization according to the user's role in order to preserve data reliability.

MeasurLink Real-Time Professional / Real-Time Professional 3D common functions

• Automatic linking with part programs

Linking with software created in CMM or Vision Measuring Systems, data such as part name; measurement item; target value; tolerance and more can be downloaded from a part program. MeasurLink parts information and inspection procedure are automatically created on the database.



• Filtering function

Required data can be easily extracted based on the date and time of the measurement, added comments, or alarms.

• Import function

Measurement data saved in default format files (text files with the dedicated format for MeasurLink, Q-DAS files, etc.) can be loaded. Also, a feature to customize a template for loading according to the format is provided.

MeasurLink Real-Time Professional 3D functions

• Real-time Professional 3D is a full-spec package

The feature to be measured can be displayed in detail using 3D CAD data.



[3D view]

3D graphics library HOOPS displays real view of the workpiece using an hsf file created from 3D CAD data. The displayed workpiece image can be freely turned, translated, or scaled so that you can easily get a view of the feature to be measured. The word balloons and lead lines that display the measurement result and measured feature will move following the CAD data.

Table 1 Data collection/analysis software Real-Time functional comparison

Functions		Data collection software		
		Real-Time Standard	Real-Time Professional	Real-Time Professional 3D
Collected data display	Classic view	x	x	x
	Data sheet	x	x	x
	2D view	x	x	x
	3D view (HOOPS)			x
Data extract	Filter		x	x
Input from tools and devices	Measuring tools (RS-232C, USB)	x	x	x
	Measuring instruments (DDE)		x	x
Text input	Import		x	x

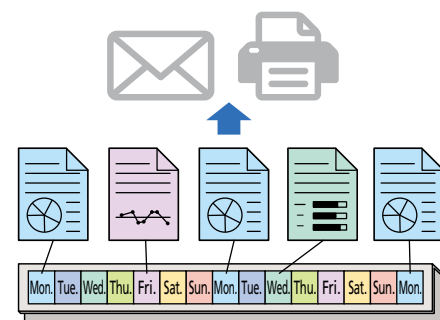
Automatic Report Generation Program MeasurLink Report Scheduler

Automatically generates a report created by the Real-Time (Standard, Professional or Professional 3D) or Process Analyzer (Lite or Professional) modules, each of which is connected to the network according to a specified schedule.

The Use of MeasurLink Report Scheduler

• Examples of use

- Automatic generation of a weekly report specified from among last week's data
- Automatic report generation by extracting only data with tag information about "tool replacement" (due to wear, breakage, etc.)
- Automatic generation of a daily report for each shift by filtering inspection record data on the basis of a shift



MeasurLink Report Scheduler common functions

• Report output destinations

- Printer, file, E-mail (as an attached document)

Process Management for Administrators

MeasurLink Process Manager

MeasurLink Process Manager enables centralized monitoring of real-time measurement information from all MeasurLink data collection terminals networked together on the shop floor.

The Use of MeasurLink Process Manager

- Allows prevention of product scrapping by real-time capture of production status on the shop floor.

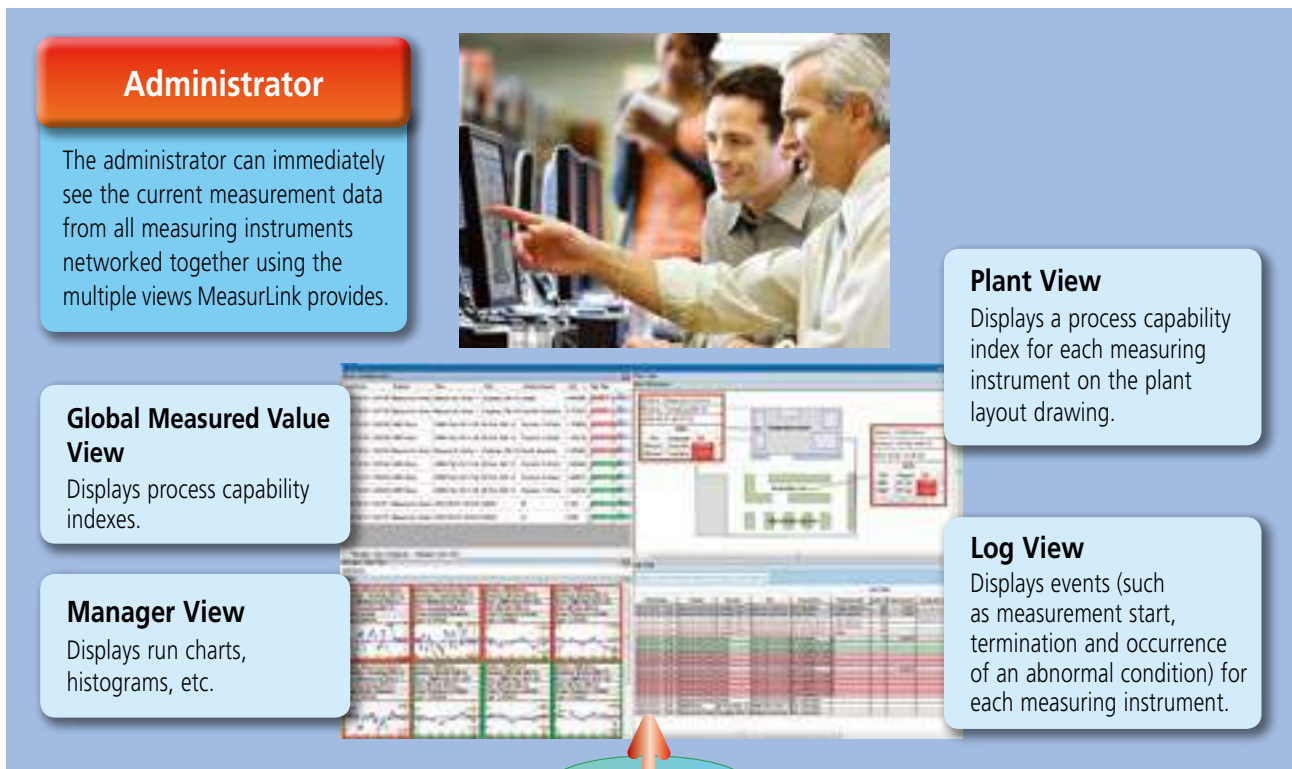
Functions of MeasurLink Process Manager

- **Capability of real time monitoring of measurement results**

This allows monitoring of current measurement results collected from all tools and instruments networked together. Measurement results can be checked without visiting the shop floor.

- **Capability of early detection of an abnormal trend**

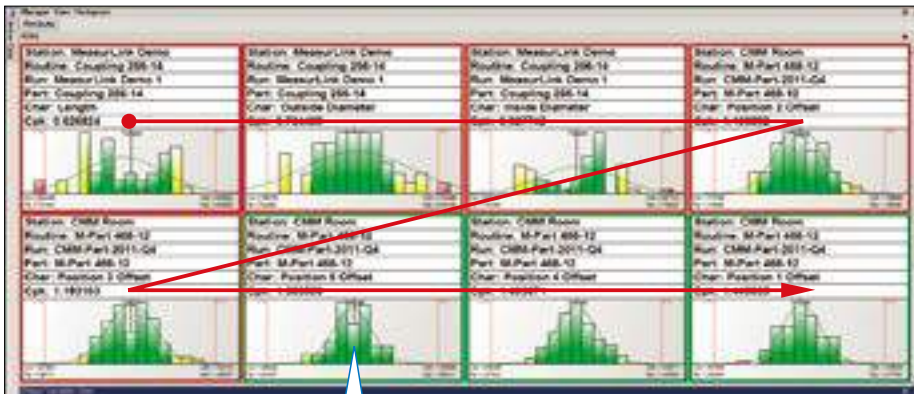
This allows early detection of a trend toward process abnormality using tools such as control charts, histograms and process capability indexes as well as simple GO / NG judgments.



Detailed Functions of MeasurLink Process Manager

• Manager view

Displays various types of charts as an at-a-glance guide. The administrator can narrow down all items of data currently being measured into a specific monitoring range of those of critical importance or sort those data (in ascending or descending order) on the basis of process capability index.



Possible to sort charts in the view and narrow down the monitoring range.



Selects various charts such as run charts and histograms to display as an at-a-glance guide. (Multiple types of charts can be displayed in Manager View.)



Run chart



Capability bar



Column indicator



Box plot



Meter

• Global measurement value view



Displays bar graphs that can determine good or bad process capability indexes at a glance. This allows the administrator to sort all current measurement data (in ascending or descending order) on the basis of process capability index, measurement date and time, part name, etc.

• Log view

Displays various types of events that occur during measurement. This allows the administrator to grasp the state of measurement operation (measurement start/termination, etc.) and the occurrence of an abnormal event (out-of-tolerance or an abnormal trend) for all current measurement data.



[Events possible to be logged]

- Measurement start/termination
- Recollection / change of measurement data
- Occurrence of outliers (Out-of-tolerance / out-of-control / run / trend, etc.)
- Out-of-recognition cause
- Change of process capability index (Acceptance to rejection / rejection to acceptance)

• Plant view

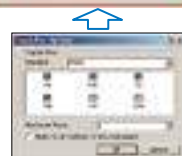
Displays a process capability index for each measuring instrument on the plant layout drawing. This allows the administrator to quickly identify the location where an abnormality has occurred.



Displays graphics files (bmp, jpg, gif, png) in the plant layout drawing in the background.

Call-out boxes with a leader can be arranged on an instrument-by-instrument (station-by-station) basis in conformity with the plant layout drawing in the background.

Call-out for each station



[Contents of call-out display]

- Station name (terminal name of each instrument)
 - Inspection procedure (measuring procedure name for each part)
 - Final revision date/time (data input time, etc.)
 - Measured item information: Display of items for the specified number from top down
 - (1) Inspection record file name *
 - (2) Measured item name *
 - (3) Process capability index * (Cp, Cpk, Pp, Ppk, etc.: two or more selectable)
- * Measured items can be sorted (in ascending or descending order).

Process Analysis module for Administrators MeasurLink Process Analyzer

MeasurLink Process Analyzer is a software package provided for administrators who are authorized to access the database storing measurement data collected by MeasurLink Real-time for the purpose of checking and analyzing measurement results. Two types of packages are made available: Process Analyzer Lite, the basic version; and the full-spec Process Analyzer Professional version. (see Table 1)

MeasurLink Process Analyzer Lite: A cost-effective package for viewing the measurement data database.

MeasurLink Process Analyzer Professional: A full-spec package that provides additional data check and analysis capability.

The Use of MeasurLink Process Analyzer

- Confirmation of measurement results and various statistical analyses by accessing the database is a powerful aid to verification of abnormal process operation.

MeasurLink Process Analyzer common functions

- **Measurement data viewer function**

Data stored in the MeasurLink database can be checked from a selected list.

- **Display and output functions**

The functions equivalent to MeasurLink Real-Time Standard are available, such as measurement result, statistical analysis result (charts and statistics), reporting, data export, and more.

Target data can be selected from the list of the Windows Explorer type tree format and the measurement result and the statistical analysis result (charts and statistics) can be displayed.



MeasurLink Process Analyzer Professional functions

- **Filtering function that allows data extraction and grouping**

Data can be extracted or grouped by selecting the date and time and other traceability information as keywords.

Example) Filtering data by an operator name Displays statistical analysis result in charts (Xbar-R, for example).



Filtering item selection menu

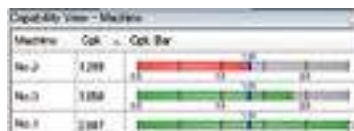


Result of filtering the chart

Example) Grouping by Machine No. Cp, Cpk comparison



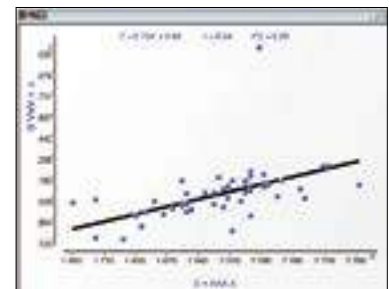
Item selection for grouping



Cpk value and bar graph per machine

- **Scatter plots**

The relationship between two items can be plotted.



- **Data management capability**

Files can be managed by merging, copying, and editing.

Also, the data archive allows hiding the old archived data from the Real-Time side.

Table 1 Process Analyzer functional comparison (an option available for administrators)

Function	Process analysis software	
	Process Analyzer Lite	Process Analyzer Professional
Result display	Classic SPC view	X
	Data sheet	X
	2D view	X
Data extract	Filter	X
Data processing	Data file merging, Copying, Editing	X
Masking	Archive data	X

Evaluation/Analysis Software for Measuring System Analysis (MSA) MeasurLink Gage R&R

This is evaluation and analysis software conforming to Measurement System Analysis (MSA) required in ISO/TS 16949.

ISO/TS 16949 requires that a proper measurement system be achieved by analyzing the accuracy of each instrument and variations in operator effects on repeatability using statistical methods.

The Use of MeasurLink Gage R&R

- Allows evaluation / analysis of a measurement system conforming to the MSA analysis method, thus implementing MSA evaluation easily and quickly.

Functions of MeasurLink Gage R&R

- Automatic calculation of MSA evaluation results.

This allows the operator to simply input an evaluation method/evaluation condition and measurement data with the Wizard function. The operator can implement MSA evaluation simply by selecting an "investigation type option", "gage option", "data input source option", "parameter option", etc. Measurement results, charts, and statistical calculation results are presented with the look and feel of Windows Explorer.



Investigation type options



Parameter options



Overview

- Evaluation method compliant with MSA (fourth edition)

The software can implement evaluation using the following methods compliant with MSA (Measurement System Analysis).

1. Measurement value tolerance gage R&R variance analysis method
2. Measurement value tolerance gage R&R range&average method
3. Measurement value branching gage R&R variance analysis method
4. Measurement value branching gage R&R average&range method
5. Measurement value range method
6. Measurement value simplified method
7. Measurement value MSA4
8. Deviation
9. Linearity
10. Stability

- Registration of gage-specific information

1. Registration of information on gages within the system

This allows registration of gage information on the following items and association with evaluated results.

Registration items: Gage name, maker, model, resolution, unit, measuring range, etc.

2. Information link between MeasurLink Gage Management and this software

This software can use gage information that has been registered in Gage Management directly as options.

Additionally, since R&R evaluation results are also linked with gage information, the schedule of gage R&R expiry dates can be managed by Gage Management.

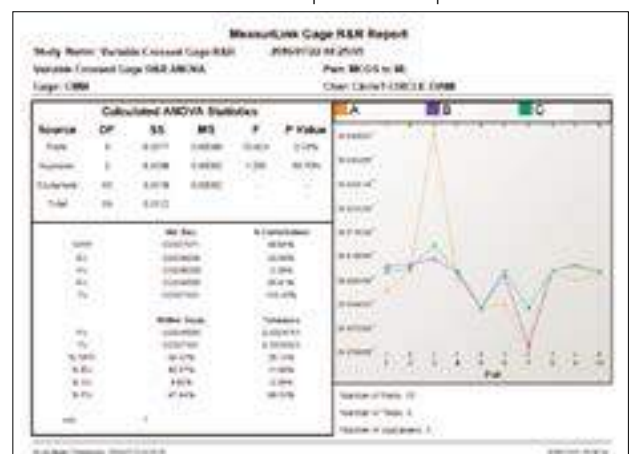
- Analysis chart view

Various charts such as the control chart are effective for analysis/ judgment on variations due to operator, the adequacy of gage accuracy, etc., and remedies for problems.



- Output of results as a report

Evaluated results and chart can be printed as a report.



Gage Management Software

MeasurLink Gage Management

This software can plan and implement a reliable calibration schedule with a powerful retrieval function in addition to recording and controlling the usage state of gages.

The Use of MeasurLink Gage Management

- Allows simple recording of gage usage state (operation, storage, calibration, gage R&R, repair, out-of-service) to speedily grasp the current location and state of all gages.
- Allows all common gage information to be viewed from all networked terminals in which this network-compatible software has been installed.
- Allows sharing of gage information between each software package in linkage with MeasurLink Gage R&R.

Functions of MeasurLink Gage Management

- **Creation of a list of calibration-targeted gages from the gage administration table**

The target gages are retrieved from a variety of search items such as gage ID, gage type, model, maker, distributor, calibration date, current usage state and location to create the list.



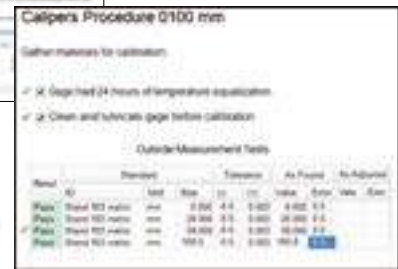
Gage management table

- **Registration and run of calibration procedure**

Allows simple registration of calibration procedure of each gage and implementation of its calibration.



Registration of calibration procedure



Run of calibration

- **Confirmation of detailed gage information**

Allows confirmation of detailed information on individual gages. The software allows you to display a list of gages depending on "Calibration Overdue", "Next Month Due", etc. by setting a calibration date and confirm detailed information on calibration history of gages.

MeasurLink common specifications

- **Operating environments (Recommended OS and DB)**

[Operating System]

- Windows7 (32bit/64bit)
- Windows8.1 (32bit/64bit) (Microsoft Windows 8.1 RT edition is not supported)
- Windows10 (32bit/64bit) (Microsoft Windows 10 Mobile and IoT edition are not supported)

[Data base]

- Microsoft SQL Server 2016 Standard Edition
- Microsoft SQL Server 2016 Business Intelligence Edition
- Microsoft SQL Server 2016 Enterprise Edition
- Microsoft SQL Server 2014 Standard Edition
- Microsoft SQL Server 2014 Business Intelligence Edition
- Microsoft SQL Server 2014 Enterprise Edition
- Microsoft SQL Server 2012 Standard Edition
- Microsoft SQL Server 2012 Business Intelligence Edition
- Microsoft SQL Server 2012 Enterprise Edition

- Microsoft SQL Server 2008 Standard Edition
- Microsoft SQL Server 2008 Enterprise Edition
- Microsoft SQL Server 2005 Workgroup Edition
- Microsoft SQL Server 2005 Standard Edition

• Operation languages

- Japanese, English, French, German, Dutch, Spanish, Swedish, Polish, Italian, Turkish, Korean, Chinese (simplified/traditional), Finnish, and Portuguese.

MeasurLink Real-Time common specifications

- **Connectable measuring instruments**
- Measuring tools equipped with Digimatic output
- [Supported interfaces]**
- Wireless (USB) U-WAVE (VCP)
- Wired (USB) USB-TN (VCP or HID), IT-012U (HID), IT-016U
- Wired (D-sub 9 pin) IT-007R, MUX-10F, DP-1VA LOGGER, and others
- Various RS-232C devices (partially restricted)

MeasurLink Real-Time Professional /Real-Time Professional 3D common functions

- **Connectable software systems**
- Mitutoyo Measurement Data Management System (equipped with PC data processing unit)
- [Supported data processing software]**
- CMM: MCOSMOS V3.2 or later
- Vision System: QVPAK V10.0 or later / QSPAK V10.2 or later / QSPAK MSE V3.1 or later / QIPAK V4.1 or later
- Vision Unit: QSPAK VUE V4.1 or later
- Surface Roughness / Contour instruments: FORMTRACEPAK V5.3 or later
- Roundness instruments: ROUNDPAK V5.6 or later
- Hardness Testing Machines: AVPAK V2.0 or later

* The documentation supplied with this product is the Installation Manual. Refer to Online Help for information about how to operate the software.

Introduction of MeasurLink

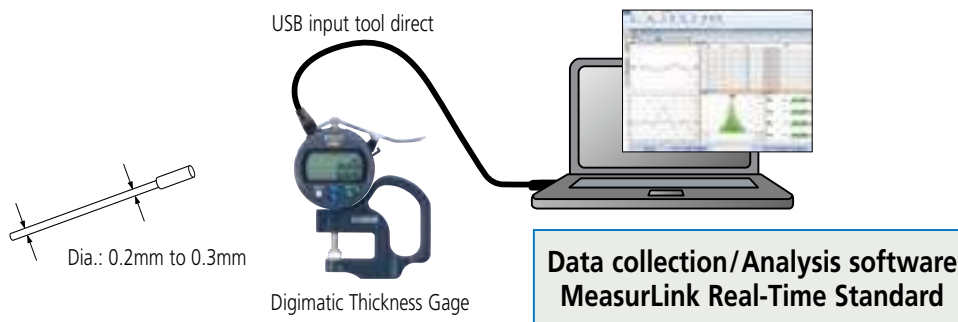
Example of a Stand-alone System

MeasurLink[®] ENABLED
Data Management Software by Mitutoyo

Single measuring tool input

• **Company A: Inspection department**

Workpiece	In-vehicle electronic product (molded cylindrical part)
Measuring instrument	Digimatic Thickness Gage to measure outside diameter at 2 points
Purpose	<ul style="list-style-type: none"> To check the condition of the mold (when the mold is worn, the diameter becomes enlarged). To calculate the control limits for the initial run (calculates per 30 pieces).
Background	SPC is requested when the production of parts is started.



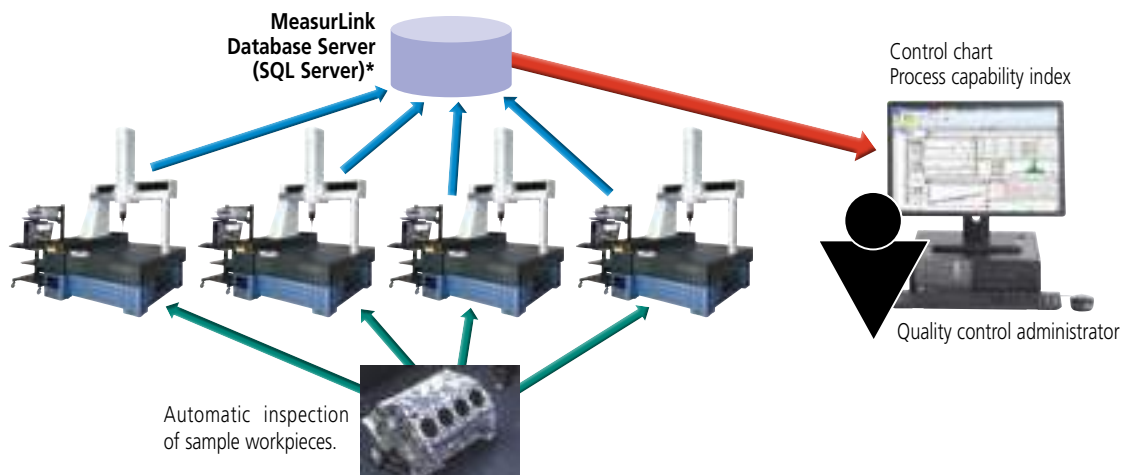
Example of a Networked System

MeasurLink[®] ENABLED
Data Management Software by Mitutoyo

Multiple CMM input

• **Company B: Quality control department**

Workpiece	Aluminum die-cast products; cylinder block or transmission casing for vehicle
Measuring instrument	CNC CMM, 4 units
Purpose	<ul style="list-style-type: none"> To analyze error trends and feedback to the process. To report the process capability index to the client when there is a change of facility or materials.
Operation and effectiveness	<ul style="list-style-type: none"> A database server consolidates all the part programs and measurement data. Same measurement can be performed with any machines in the system, and all the data management can be unified. Since there are multiple machines in the system, the operator can start measurement with any of the available machines.

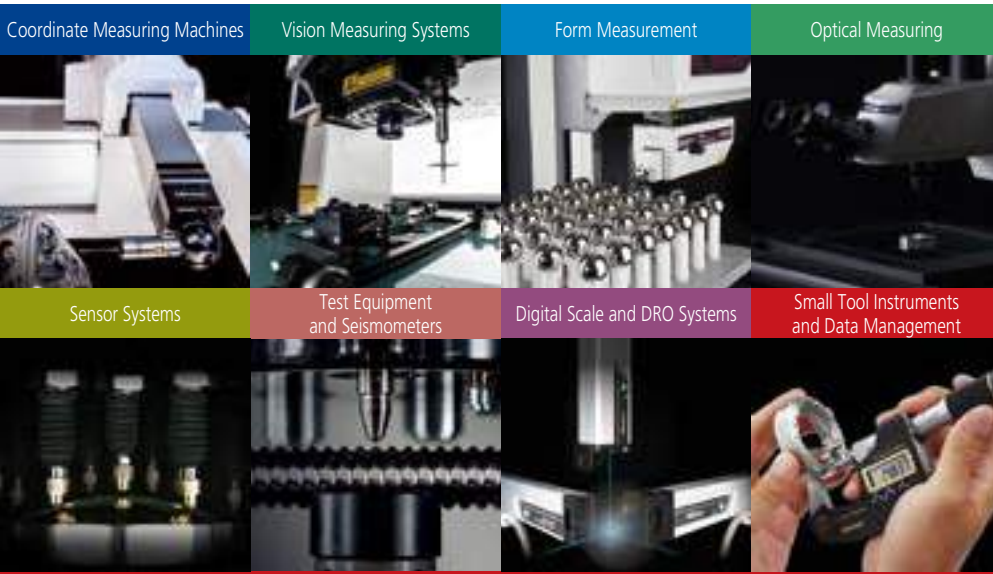


Data collection /Analysis software
MeasurLink Real-Time Professional
4 units (1 for each measuring machine)

+

Software for Administrator
MeasurLink Process Analyzer Professional
MeasurLink Process Manager

* For networked applications a Microsoft SQL Server is required.



Whatever your challenges are, Mitutoyo supports you from start to finish.

Mitutoyo is not only a manufacturer of top quality measuring products but one that also offers qualified support for the lifetime of the equipment, backed up by comprehensive services that ensure your staff can make the very best use of the investment.

Apart from the basics of calibration and repair, Mitutoyo offers product and metrology training, as well as IT support for the sophisticated software used in modern measuring technology. We can also design, build, test and deliver bespoke measuring solutions and even, if deemed cost-effective, take your critical measurement challenges in-house on a sub-contract basis.

Note: Product illustrations are without obligation. Product descriptions, in particular any and all technical specifications, are only binding when explicitly agreed upon.
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