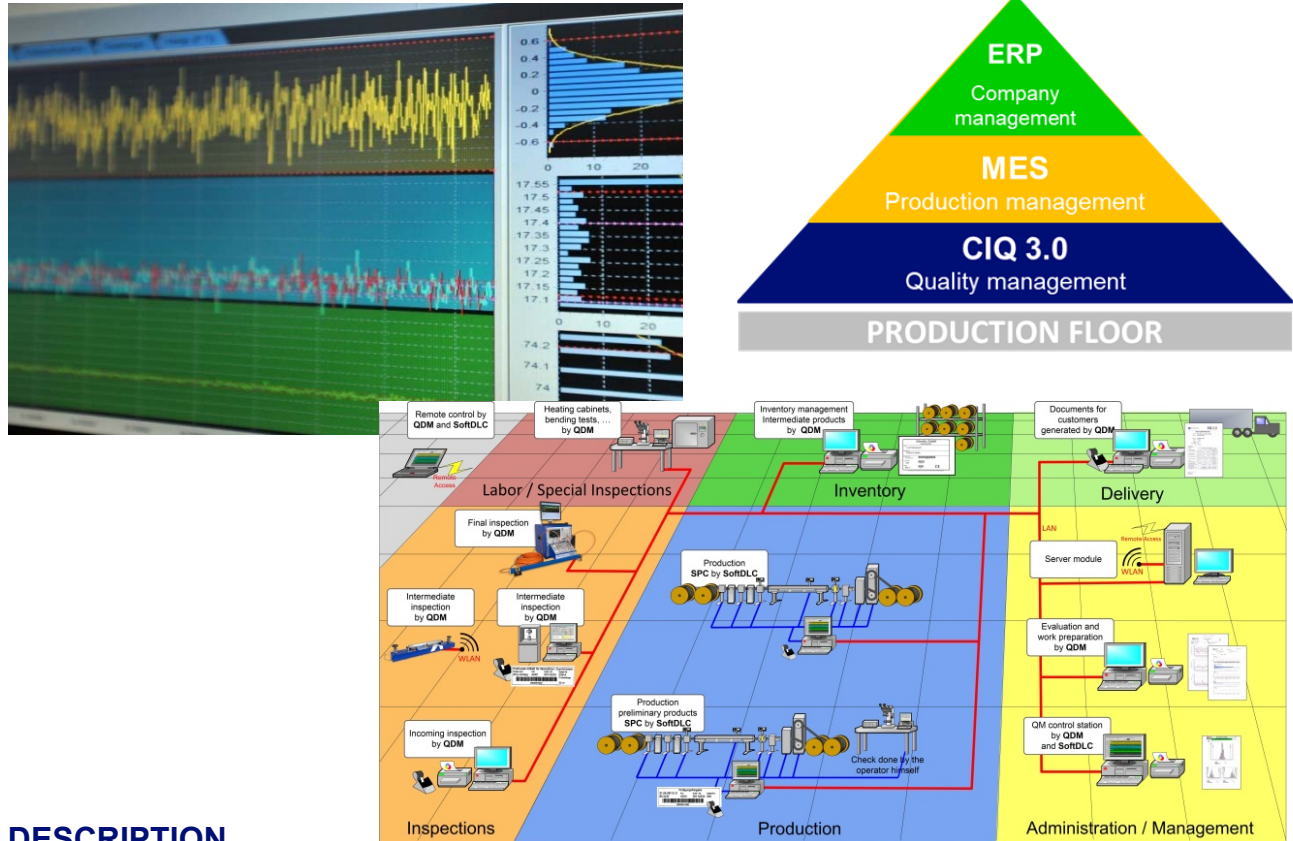


## CIQ 3.0

SMART Quality Data Management System developed specifically for the wire & cable industry



### DESCRIPTION

CIQ 3.0 is a comprehensive and structured system designed for quality and production management as required by the electrical wire and cable industry. It allows capturing, networking, processing and archiving data issued by both manufacturing processes and quality control. It has been specially developed with and for this industry with specific “Time & Length” based data management.

### KEY FEATURES

- **Missing layer for Industry 4.0**
  - The bridge between production quality data and ERP / MES information
  - A centralised and structured datapool
  - Global overview of production status
- **Coherent system for production efficiency**
  - Simplification of inspection planning
  - On time delivery of instructions to operators
  - Optimal production control and reduced scrap
  - Full forward and backward traceability
- **Quality data management tool**
  - A «Quality and Test data» acquisition tool
  - A «Process data» acquisition tool
  - The bridge between various quality islands
  - The solution for distributing and archiving data



AESA Cortailod

## TECHNICAL SPECIFICATIONS

<p>Compatibility</p>	<p>CIQ 3.0 comes with a wide range of <b>interfaces</b> connecting with most of the common measuring devices. This is a small extract from the complete list :</p> <ul style="list-style-type: none"> <li>• Mechanical dimensions (Mitutoyo, Sylvac, Werth,...)</li> <li>• Diameter (Beta Laser Mike,...)</li> <li>• Camera systems (iiM, ACM,...)</li> <li>• Scales (Kern, Mettler, Precisa, Sartorius,...)</li> <li>• Adhesion (KMF,...)</li> <li>• Handheld systems (Metrologic, Erichsen,...)</li> <li>• High Frequency (Agilent, Rhode-Schwartz, AESA, Wandel&amp;Goltermann,...)</li> <li>• High Voltage (AESAs, MEA,...)</li> <li>• Low Frequency (AESAs)</li> <li>• OTDR (Ando,...)</li> <li>• Tensile (Zwick, TMT, Hounsfield,...)</li> <li>• Resistance (AESAs, Burster, Fischer, KTL, Schütz, Sefelec,...)</li> </ul> <p>If your equipment is not included in the above list, please contact us for more information</p>
<p>Main modules</p>	<p><b>QDM</b> (Quality Data Module – products data)</p> <ul style="list-style-type: none"> <li>• Allows the acquisition, processing and evaluation of data related to product specifications</li> <li>• Supports management of test plans</li> <li>• Documents: Reports, labels, statistics,...</li> <li>• Imports, exports and archives</li> </ul> <p><b>SoftDLC</b> (Data Logger Control – process data)</p> <ul style="list-style-type: none"> <li>• Allows the continuous acquisition and processing of data related to parameters and events recorded during production.</li> <li>• Supports process improvement with statistical Process Control (SPC)</li> <li>• Allows remote monitoring &amp; visualisation</li> <li>• Complements the QDM</li> <li>• module Allows the acquisition and management of data related to the manufacturing process</li> </ul>
<p>PC requirement</p>	<p>Minimum requirements:</p> <ul style="list-style-type: none"> <li>• Computer: Ordinary computer, at least 2 GB of free space on storage drive</li> <li>• Display: Graphics card (800x600 pixels, more than 256 colours)</li> </ul> <p>Recommendation:</p> <ul style="list-style-type: none"> <li>• Computer: Ordinary computer, at least 4GB memory, at least 2GB of free space on storage drive</li> <li>• Display: Graphics card (1280x1024 pixels or 1920x1080 pixels, 16.7 million colors) with a color monitor</li> <li>• Other: Network card for connection to the data server (optional)</li> </ul>
<p>OS requirement</p>	<p>Minimum requirements:</p> <ul style="list-style-type: none"> <li>• Operating system: Windows 7 "SP2"</li> </ul> <p>Recommendation:</p> <ul style="list-style-type: none"> <li>• Operating system: Windows 7 x64, Windows 10 x64</li> </ul>
<p>Article Nb</p>	<p>52.0100.0003.0</p>

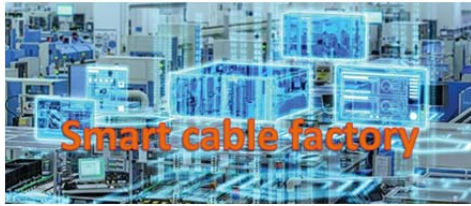
## AVAILABLE Add-on

The system can be complete with the following options:

- **MEC:** MEchanical Cycling test
- **TYPLAB:** Type Validation and LAB tests
- **DMS:** Scattered tests (for eg. with heating cabinets,...)
- **DRES:** Defect Recording and Evaluation System
- other specific modules are available or can be developed upon demand

*AESA also proposes all kind of equipment for the measurement of electrical parameters of wires and cables (high frequency, RCKE, EMS, Resistance,...).*

**KEY BENEFITS**



**QUALITY 4.0**

- Connects the quality islands
- The link between discrete and continuous data streams
- Centralises all quality data (big data)
- Can link several plants (intranet)
- Open system, data exchange with MES / ERP

**POWERFUL**

- One single software for most of the test devices
- Full product and/or process evaluation, analyses and documentation
- Raw quality data for further work
- Each data related to time and length
- Provide statistical reports and evaluation tools
- Anticipation of problems and support of preventive actions for process optimization

**EVERYWHERE**

- Online monitoring, remote view and alarms
- At each inspection station, whether at incoming inspection, production, intermediate platform, laboratory or final quality control.,
- In the office, eg quality or production manager
- Wherever information is required

**OPTIMAL PRODUCTION**

- Improved resources usage (less stops and tests)
- Optimization of raw material usage
- Support for decision making process
- Cost reductions thanks to automatized evaluation
- Tracing of individual events
- Optimization of processes
- Reduction of human errors

**SCALABLE**

- CIQ is organised in modules allowing an optimal adaptation to specific requirements
- it can be started according to priorities
- it can be customized

**QUALITY ↗ PRODUCTIVITY ↗ COSTS ↘**

**QUALITY IS NO LONGER A COST BUT AN INVESTMENT**

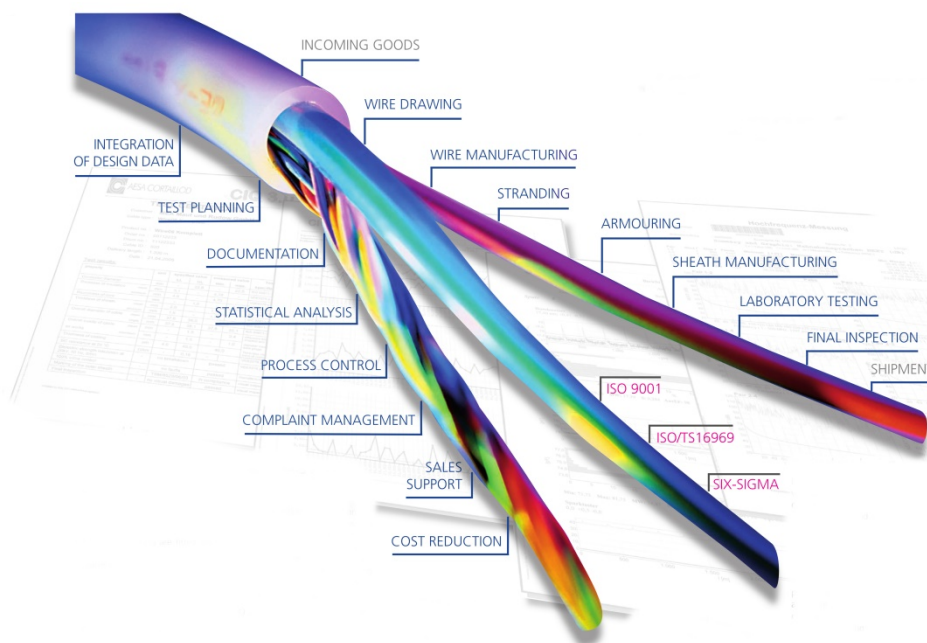
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## 1. Introduction and basic functions

The CIQ 3.0 (Computer Integrated Quality management system) is a specific data management system especially developed with, and for, cable manufacturers. CIQ networks all measuring and testing devices into one common system and stores all the acquired data in a central datapool. This enables all the entities involved in managing production to have direct and near real-time access to process and testing data. The acquisition of time tracking and length-associated measurement values is of pivotal importance as well as the management of all the available data. Tracked values shall be comparable not only on a global level, but also on a discrete or individual level in order to allow for the checking of which segments of a wire or cable have been combined.

All manufacturing industries are following the same trend towards efficiency improvement coupled with overall cost reduction, increase of productivity connected with the introduction of quality management systems. Several concepts have been developed for this purpose, such as: continuous improvement, lean manufacturing, six sigma or other quality development strategies.

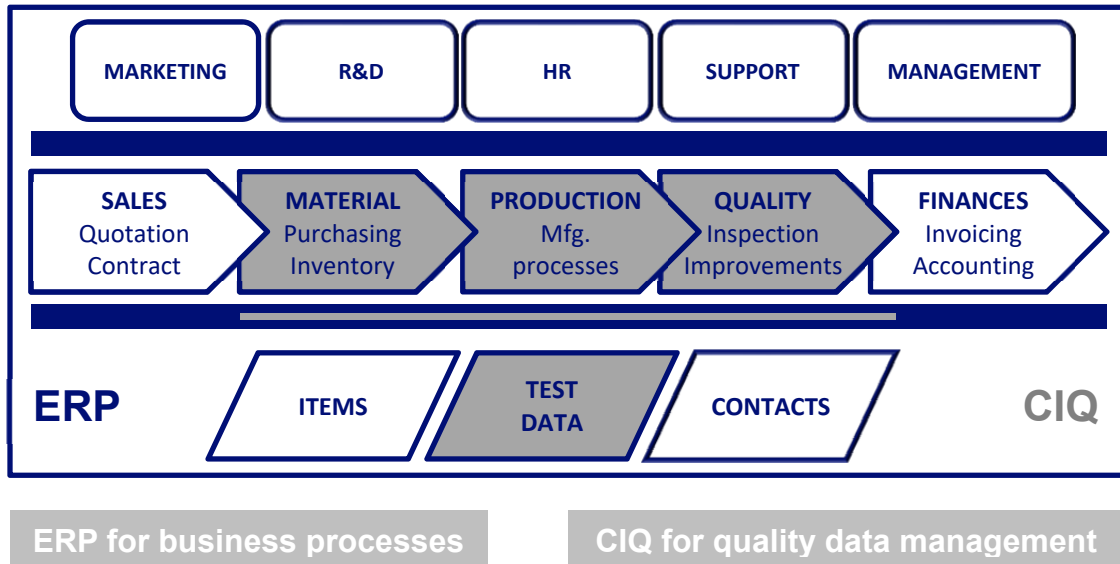


The constant growing needs for digitalization in cable production, Industry 4.0 and Smart Manufacturing are requiring the interconnection and integration of systems (production islands, quality islands) as well as the evaluation of massive amounts of data in order to enable the optimization of the complete value chain. Production plants are filled with sensors, measurement gauges and testing equipment using a wide range of different inspection technologies. The generated data is enormous and their comparison and analysis is made difficult due to the various formats that can be found. The CIQ 3.0 system enables the combination of all data into a single datapool and format, providing consolidated reporting and traceability including global evaluation functionalities.

CIQ 3.0 is finding its place within a complete production environment. Often factories are already equipped with extensive ERP or MES resource planning systems. But CIQ was developed to close the missing link between ERP (Enterprise Resource Planning)/MES (Manufacturing Execution System) and the shop floor, thanks to its capability to handle:

- a) Product traceability
- b) Quality control
- c) Data acquisition
- d) Process Management
- e) Performance Analysis

Those capabilities are traditionally part of normal MES functionalities, but without the specificities of the wire and cable industry. For the manufacture of any goods produced on a length basis, the situation is somewhat specific: most of the data to be processed is not related to discrete quantities, but to length and/or packages (reels, coils, boxes, etc.). Additionally, accurate time stamping is needed for the optimal traceability of each segment of length. This specific type of data is not handled by traditional systems.



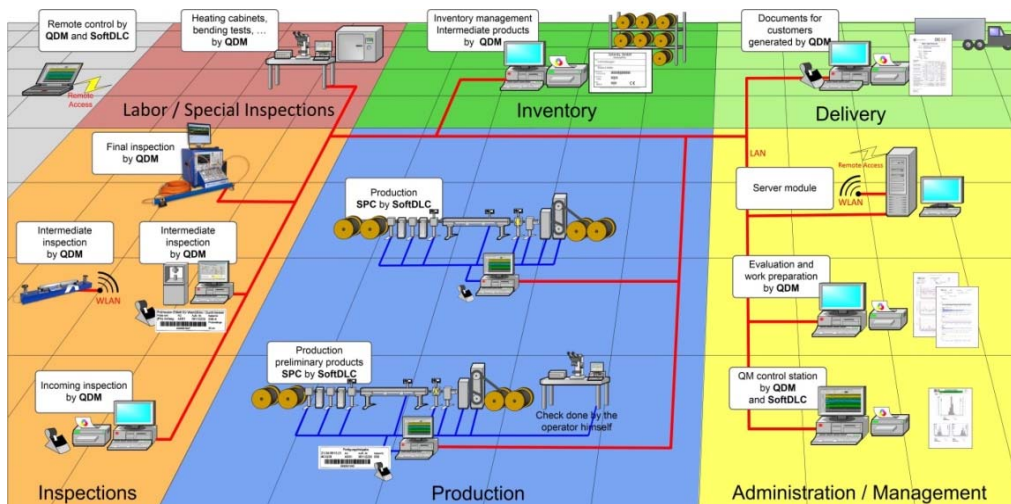
AESA's CIQ 3.0 is the software solution for automatizing quality processes. It provides quality assurance and data acquisition that is order-specific, product related and that stretches across all manufacturing steps.

The interconnection of data from manufacturing processes and test data from quality control enhances overall product quality and reduce costs throughout the global production.

Automated processes are reducing the work load and the costs involved in test planning and their execution. Direct access to stored data allows actualized analysis starting from quality control of individual products up to the detection of root cause defects including overall weak-point analysis used for continuous improvement processes.

In addition, the possibility of continuous in-line process data acquisition enables the operator to react quickly, to produce with optimal quality and to use efficiently input materials.

CIQ 3.0 supports monitoring and recording of all production steps, from intermediate to final testing, including inspection of incoming goods and delivery. Thus it is an essential tool for improving quality and productivity while supporting simultaneously cost savings. The seamless integration of production and quality data within a plant is more and more required by industries having deep traceability needs such as in the aerospace or the automotive industry. Industry 4.0 and further stringent legal certification requirements will only accelerate the pace of this transformation.



## 2. CIQ 3.0 - Quality Data core Module “QDM”

The CIQ 3.0 QDM module forms the centerpiece of the quality management solution supported by various communication, visualization and reporting modules. It contains the essential functions for test planning, data acquisition and analysis, as well as for archiving. It allows direct access to process and testing data practically in real time and provides a variety of tools and interfaces with other systems.

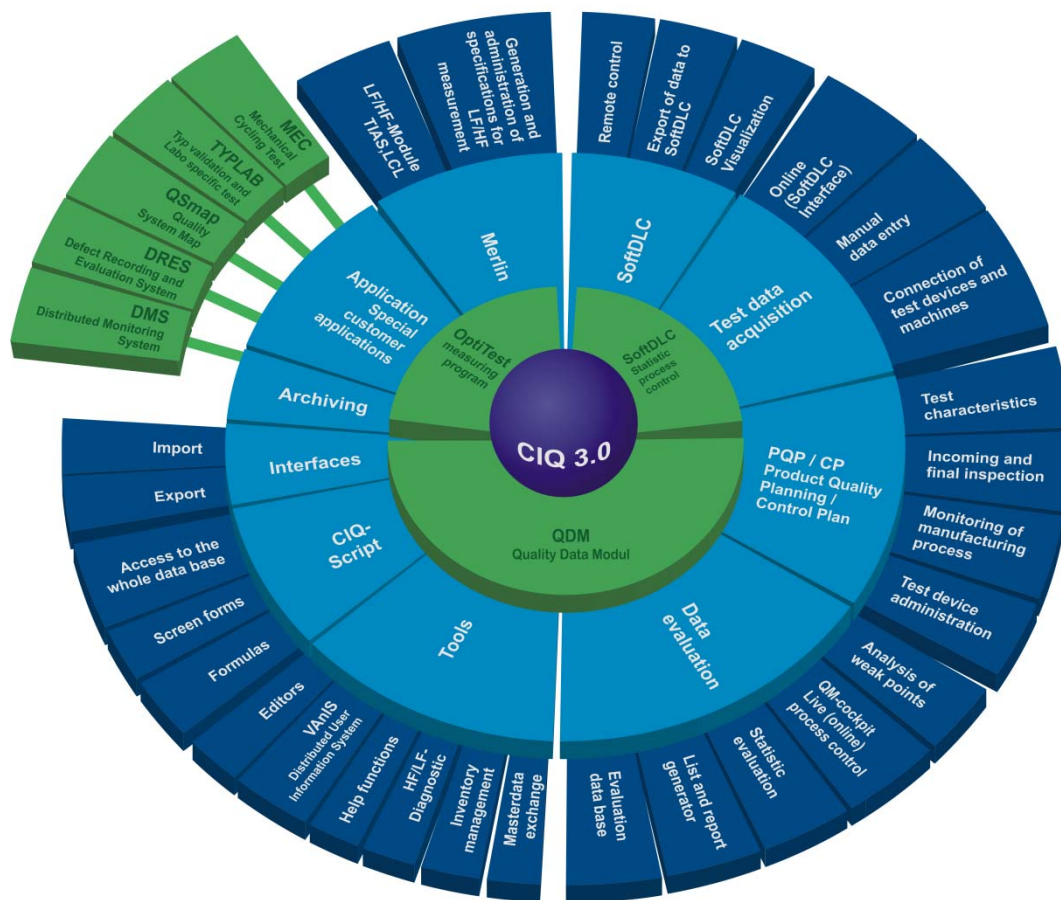
CIQ 3.0 supports and monitors all manufacturing related processes such as machine set-up data, process & quality data acquisition, defect management, repairs, as well as the management of testing equipment.

Avoidance of expensive double or missed tests, reduction in testing set-up and of planning or human errors combined with a coherent, unified system are maximizing the efficiency of quality tracking.

The special requirements of the cable industry are taken into account, e.g. traceability, connection of various measuring devices, complex low and high frequency transmission measurements, testing of network and communication channel capabilities, management of industry specific test methods such as fatigues and cycle tests, etc...

Keeping and storing all raw measurements can be relatively difficult due to the high amount of generated values. The specific design of QDM allows the storage of the totality of the raw measurements enabling immediate or subsequent analyses. The **100% backward and forward traceability** is possible and is supported with appropriate filtering and sorting tools allowing deep assessment capabilities including automated evaluation procedures.

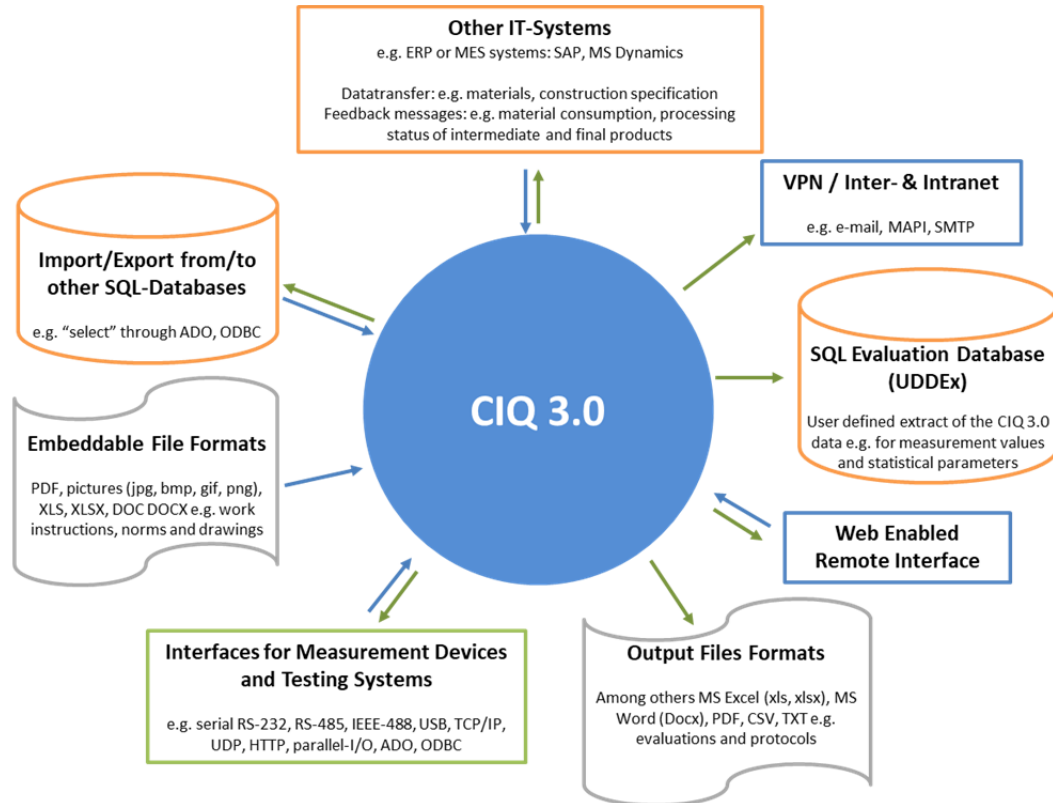
All these functionalities are offered with the industry specific requirement: **Time and Length related data tracking.**



The modules of the CIQ 3.0 System

### 3. CIQ 3.0 – The Open System

CIQ is finding its place within a complete production environment. CIQ 3.0 was developed to close the missing link between ERP and the shop floor and therefore offers a wide range of possibilities for being interconnected.



CIQ 3.0 is an "open system" containing multiple open interfaces for data exchange:

The multiple interfaces of CIQ include:

- **Measuring and inspection systems:** For connecting measuring and inspection systems the usual interfaces are available.
- **Other EDP systems:** At any manufacturing or testing stage, data can be exchanged with other EDP systems. These include e.g. material data and design values (tolerances) or downloading of complete product specifications from any CAD system. Vice versa, it is possible to send out feedback data, for example data about the production status of intermediate and final products or material consumption data.
- **Creation of outputs in different file formats:** Multiple reporting features enable the generation of e.g. reports and evaluations in different file formats for further processing by other programs.
- **Integration of existing documents and files:** Existing documents (work instructions, standards, drawings) can be integrated into and displayed by the system.
- **Import from and export to SQL databases:** CIQ 3.0 can retrieve data from, and send feedback data to various databases, additionally, an automated export to SQL is possible via the Superevaluation Module UDDEx (see § 12.1).
- **Communication via VPN / Internet and Intranet:** For example, alarm messages can be realized via e-mails. If Internet/VPN connections are available, all evaluation features of the CIQ 3.0 and the monitoring functions of production lines by the SoftDLC 2.0 are remotely accessible.



CIQ 3.0 eliminates the limitations of the ERP and MES in term of CAQ (Computer Aided Quality) by interconnecting all the enterprise resources and allowing to regroup, centralize and synchronize with each produced cable segment all the process and quality data generated during manufacturing.

#### 4. Testing with CIQ 3.0 QDM

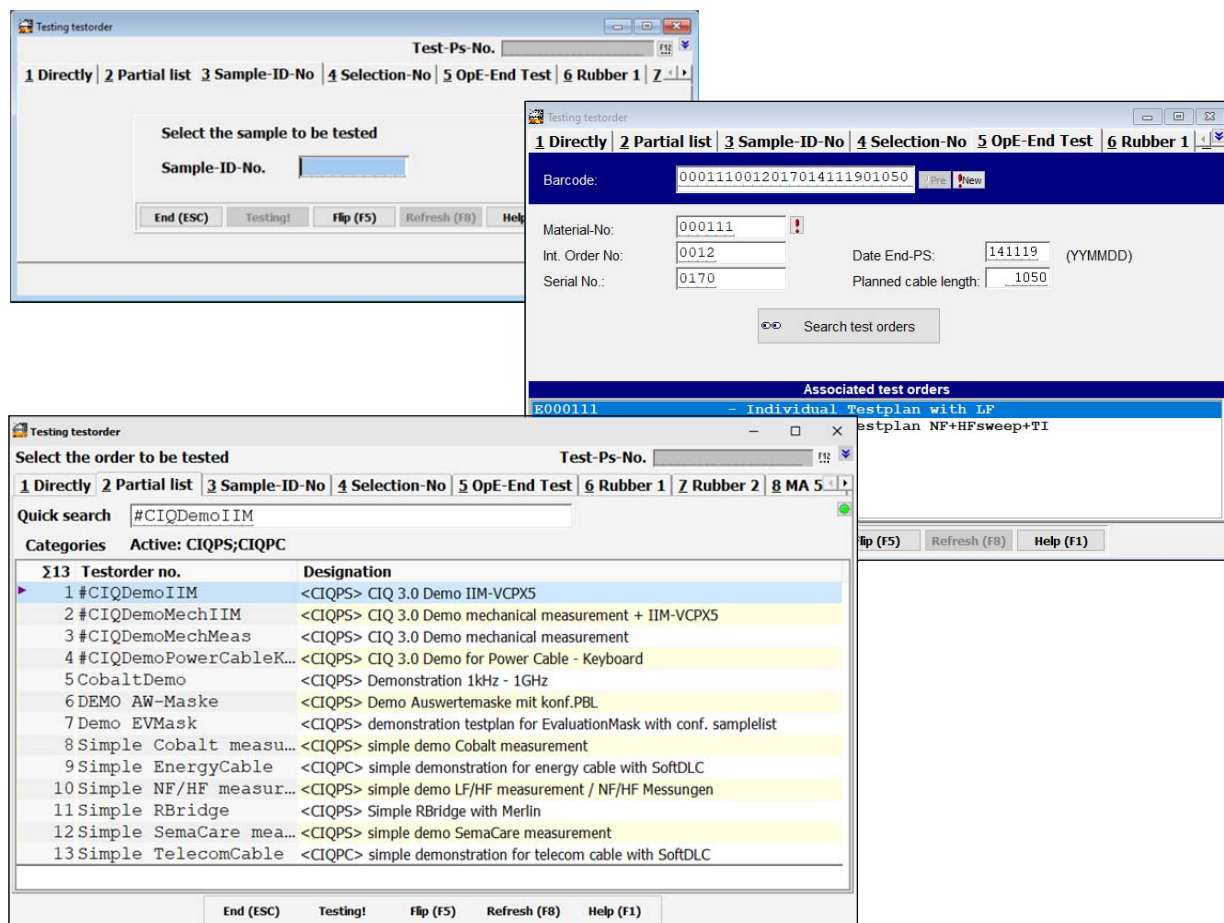
The global testing procedure is based on the processing of the related test plans and test orders.

When working with standard test order, all relevant data such as the order number, sampling ID number, number of values or limits, are continually displayed on screen masks. This also applies to masks that require keyboard entry e.g. coil number or colour. The user at the production line can also be assisted by work instructions and drawings.

Testing as well as many other procedures can be adapted to user duty and responsibility level by using a "User-Group" parameter. The purpose of this approach for example is to give the rights to supervision personnel for the creation of test plans and allows testing and the processing of the test order to other User-Groups with more restricted rights. For instance, an inspection plan handled and released by the "QS Technician" User Group can be processed in the production by the User-Group "Final Inspection".

Testing can be triggered by following actions:

- Selection of test order manually
- Testing using sample no. or sample ID no.
- Start by using special masks (user-configurable)
- Starting through specific CIQ applications (MEC, TypLab,...)
- Starting from the main menu bar (MEC, TypLab,..)
- Automatic start of checks, triggered by external systems connected via the network (Automatic sequences, start via Windows task planner,...)



Examples of Test Order Screen Masks/Templates

Testing testorder

1 Directly 2 Partial list 3 Sample-ID-No 4 Selection-No 5 O

OrderNo: 0039653F0080

Operator: MacDonald

Remark measurement:

Elongation at tear  
Before aging: 50.30 % Limit:0.9/50.6  
After aging: 45.20 % Limit:30/50

Strength  
Before aging: 72 N/mm²  
After aging: 55 N/mm²

Light-fastness: [dropdown]  
Printing: [dropdown]  
Burn test: [dropdown]

Remark Testing

Check and conc

Test productionsstep

Select the productionsstep to be tested

Testorder no. Simple TelecomCable

Testorder designation simple demonstration for telecom cable with SoftDLC

Quick search #0000

Σ3 ProductionstepNo.	Designation
1 #0000	work preparation
2 ZSD2	Standard SoftDLC - production step
3 #8000	final test

Check PS:"#CIQMechMeasForms" CE:"#CIQStandard" CO:"#CIQSheathDia" PP:"#CIQSheath...

"#CIQDemoMechMeas" CIQ 3.0 Demo mechanical measurement  
SP-ID-No. 00000CVJHL

Nom. value 0.00

Upper limit 7.00 Alarm limit 6.50 Mean value limit 5.60

Lower limit 3.00 Alarm limit 3.50 Mean value limit 4.00

No.	Test value	Normalized [mm]
1	6.8	6.80
2	5.5	5.50

Min value 5.50 Max value 6.80

Average val. 6.15

Standard deviation 0.65

Median val. 6.15

Number of values Default 3

Tested - until now 2

TD: #Keyboard

Check PS:"#CIQMechMeasForms" CE:"#CIQStandard" CO:"#CIQVisualInsAsk"

"#CIQDemoMechMeas" CIQ 3.0 Demo mechanical measu  
SP-ID-No. 00000CVJHL

Visual Inspection

Selection No	Selection text
vs00	no visible errors
vs01	assembly wrong
vs02	number of elements wrong
vs03	permutation
vs04	dirty
vs05	cable sheath error
vs06	Drum wrong
vs07	bend
vs08	break

Remark to the error

Take over (F3)

Check PS:"#CIQMechMeasForms" CE:"#CIQStandard" CO:"#CIQStart" 0"

"#CIQDemoMechMeas" CIQ 3.0 Demo mechanical measurement  
SP-ID-No. 00000CVJHL

Introspection - Head Data

Testorder No: #CIQDemoMechMeas CIQ 3.0 Demo mechanical measurement

Drum No: 89756

Shift: 2

Length: 120 m (range from 1 ... to 9999)

Temperature: 22.0 °C (range from 1 ... to 50)

Maschine rubber 01 / m

Color black blue brown green green/yellow grey natural

Ok (F2) End (ESC) Help (F1)

AESA MEC - Mechanical Cycling Tests

Machine	Counter	St
Machine 1	21	Ac
Machine 2	43	Ac
Machine 3	29	Active
Machine 4	8	Active
Machine 5	17	Active
Machine 6	87	Active

27 / 0 Stop machine Status SKP interface  
7 / 0 Stop machine OK  
16 / 0 Release machine  
85 / 0 Release machine

No/	Test SPID/No Install date	Testorder no	Sample number Internal order no	Length [m]	Temp. [°C]	Start pos.	Interval	Status	Next test	Act. Counter Last test	Machine
1	00000CK1TU 22.05.2018	SKP Paare1	SPaar-001 20180522-001	100	18.6	1	5	Counting active Testing is active	209	205 SKP AN03 204	
2	00000CK46P 22.05.2018	SKP Paare1	SPaar-002 20180522-002	100	21	2	3	Counting active Testing is blocked	130	422 SKP AN02 127	
3	00000CKEC7 22.05.2018	SKP Paare1	SP-225-01 20180522-003	100	20	1	100	Counting active Testing is active	100	92 SKP AN05 0	

Cycles stop New Edit Delete Add Counting stop Testing stop Testing now Delete error states Show Refresh Help Demo End

Examples of Test Order Screen Masks/Templates (cont.)

## 5. Generating Test Plans and Test Orders

Test plans and the related test orders are the basis for specific and detailed tests, reports, and further evaluation steps. Generally a test order is created that refers to a test plan for a specific product. This method offers the user a variety of options for designing test plans and test orders. In the Merlin module (see § 12.2) standardized test plans are available for performing usual or common testing procedures.

With the definition of the test plan, the definition of the data that is saved during the tests and that will later be available for evaluations, reporting, etc. is undertaken.

- The Test Plan is consisting of multiple components and various functional blocs.
- It can be structured using basic Test Plans and/or family Test Plans related to the elements of which the product is made up.

A Test Plan can be created in different ways:

- With Test Plan editor by assembling various components (limits, machine limits, etc....).
- With the Merlin CIQ add-on that generates Test Plans / Test Orders.
- Thanks to the automatic generation of test plan or test order creation based on specifications and data provided by imports or files (e.g. retrieve characteristics and limit values from Excel files).
- Job-specific report formats, selection filters and layouts may be entered during test order creation and processing.

Extendable master data related to production steps, components and parameters are available for the creation of test plan or their modification. Work instructions, documents and drawings may be inserted to instruct and advise the operating personnel on the production floor.

All parameters, limit values, formulas, master data, reports, control charts etc. may be defined and altered by the user himself.

Likewise, customizable labels, queries and reports that may be needed by a test plan can be defined. Their output can be triggered, manually or automatically, either subsequent to an intermediate step, or after full test completion.

The screenshot displays the CIQ 3.0 software interface. The main window, titled 'Simple EnergyCable EN', shows a hierarchical tree of test plan components. The tree includes:

- #0000 work preparation
- ZSD2 standard SoftDLC - production step
- #8000 final test
- #CIQAdmin administrative data
- #CIQMeasurement measurement cable
  - #CIQSheathDia sheathing - diameter [TD=!Diameter]
    - #CIQSheathOutDia outer sheath - diameter [n=3; Limit;Alarm Limit;Average value]
    - #CIQSheathOutOval outer sheath - ovality [n=1; Limit]
  - #CIQSheathThick sheathing - thickness [TD=!Thickness]
    - #CIQSheathThick outer sheath - thickness [n=1; Limit;Special value]
- #CIQTemperature Temperature [TD=#Keyboard]
- #CIQInfo Information

Below the tree, a table titled 'Edit - testplan characteristic Variable' shows details for the selected characteristic:

Testplan-No.	Prod.-step	Component	Designation
#CIQDemoMechMeas	#CIQMechMeas	#CIQStandard	#CIQSheathOutDia
#CIQSheathDia			cable outer sheath - diameter

Below the table, a table titled 'Edit - testorder head data "#CIQDemoPowerCable", modified' shows test order details:

Field	Value
Number	#CIQDemoPowerCable
Competence	#CIQTestOrder
Designation	CIQ 3.0 Demo for Power Cable
State	Active
Category	CIQPS
Testplan number	#CIQDemoPowerCable
Archive postfix	
Customer number	#AESA S.A.
Production ordernumber	123
Purchasing ordernumber	xyz
Min.Length	1000 m
Number of samples	0
Size of batch	0 m

Work and maintenance efforts can be reduced by using basic and product family test plans and through data transfer from ERP or cable design systems.

When several similar production machines are used in one process step, test parameters and limit values can be individually specified for each machine.

The module can receive “test production orders” from an ERP system and give feedback about various data such as measurement values, production parameters or the testing status (inspected, blocked, to be scrapped, to be repaired,...).

In the event of a defect, suitable measures are initiated by the system or the user (for example by generating defect messages or mails, giving instructions for re-measuring, defect treatment or scrapping).

## 6. User Interface

The operating interface, as well as the help texts, can extensively be adapted to user needs. The amount and design of the displayed information can be driven by User-Groups and adjusted to the existing test equipment.

Depending on the field of activities or area of responsibility it can be:

- Simple as dedicated interface for operators:
  - Allow on the representation of evaluations, e.g. monitoring in factory workshop.
  - User-specific main menu items for quick access to frequently used functions.
- Complex with many possibilities such as creation, testing, evaluation, configuration changes.

Addition of user-specific main menu items for quick access to frequently used functions:

- Browsers can be configured user-specifically (Browser / Views).
- Search filter and sorting options for convenient retrieval of master data, test orders, etc.

The screenshot displays two windows from the CIQ 3.0 interface. The top window, titled 'Overview Formulas', shows a table with columns for 'Number', 'St', 'Designation', and 'Date/Time'. A search filter is applied to the 'Number' column. A callout box labeled '« Simple Filtering » Zone' points to the search filter. To the right, a 'Text Reportformat Editor TAGs' window shows various HTML tags and their effects, such as bold, italic, underline, and strikethrough, with a preview of the resulting text.

The bottom window, titled 'Overview Help text', shows a table with columns for 'Field', 'Ak', 'Filter', 'Date/Time', and 'Name'. A search filter is applied to the 'Number' column. A callout box labeled '« Complex Filtering » Zone' points to the search filter. This window also includes buttons for 'Apply', 'Save', 'Read', and 'Help'.

The CIQ-Browser is a tool that can be used to search and select various objects (e.g. test plans, test orders, samples, etc.). It allows to sort data according to most of the existing columns. In order to simplify further retrieving of one or more objects several other functions are available:

- "Quick Search" Function: For simplified retrieving of one object
- "Quick Filter" Function: The objects are filtered out.
- "Simple Filter" Function: Using various categories and search criteria.
- Design of "Complex Filter": Filtering of each column by using logical conditions.

## 7. Statistics and Evaluations

All data are available for evaluation at any time. Thus, all test data of a cable can be collectively evaluated and printed or sorted / filtered by queries.

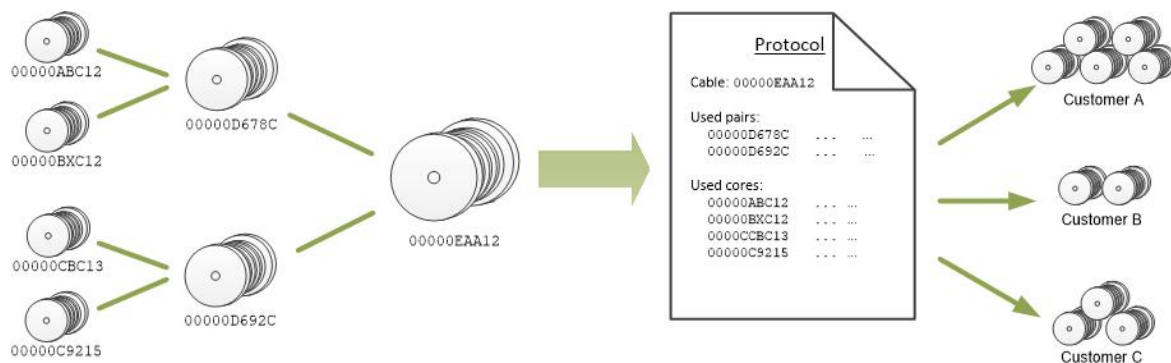
This includes process data from production lines (see SoftDLC in §11), complex test values from HF (High Frequency) measurements, mechanical and electrical measurement values, as well as administrative information on semi-finished and finished products.

Some examples of how to perform evaluations are:

- Sample list sorted by test order and production step
- Search with pre-defined filters or filters defined by the user (e.g. searching for the last 20 samples by cable number, date, certain characteristics)
- Queries through the global data pool with user-specific search criteria
- Sample list configured specifically for or by the user
- Use of the EV evaluation mask (see § 7.1) for a simplified and efficient retrieval of sample data
- When using CIQ Superevaluation module UDDEx (see § 12.1), specific SQL commands are allowing an easy retrieval of needed information

100% backward and forward traceability can be realized by different methods depending on customer specific conditions and the availability of information. For example with appropriate filtering within an interlinked data pool, a defect in the end-product can be connected with intermediate product or raw materials. Other way around, it is also possible to determine other products that have been affected by the defective material.

When fully implemented, the "Backtrace" functionality can display for each sample the list of processed materials taken-over from the previous production step and the list of consumers, of the tested sample, in the next production sequence.



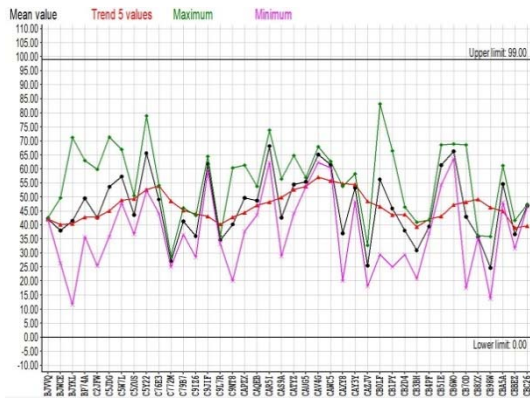
Filters and search criteria normally generate sample lists which facilitate further actions.

Examples are:

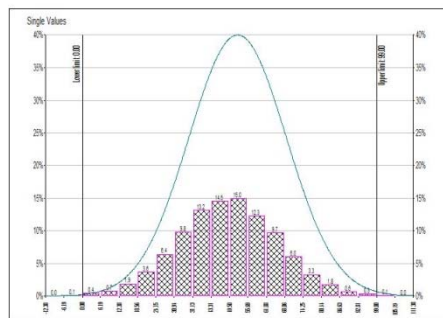
- Display and process measured values
- Print reports and labels
- Generate quality charts (statistics)
- Export data to other EDP systems

The screenshot displays the CIQ 3.0 software interface. At the top, there is a menu bar with options like 'File', 'Testing!', 'Edit', 'Data', 'Evaluating', 'Archiving', 'Options', 'Window', 'Help', 'Applications!', 'QA-Cockpit!', and 'MEC-Simulator'. Below the menu is a search bar with '000007HHMU' entered. A table lists various samples with columns for 'Sample-ID-No', 'Sample no.', 'User identifier', 'Status', 'Su...', 'Actual ITDN', 'Original ITD...', 'I-Date', 'I-TL...', and 'I-Name'. Sample '000007HHMU' is highlighted in green. An 'Evaluation sample' dialog box is open for '000007HHMU', showing details such as 'Testorder: FEBS', 'Productionstep: FEBS', 'Sample-ID-No: 000007HHMU', 'Status: Partially tested', 'Number: 000018', and 'Testplan: FEBS'. It also shows 'Tested' and 'Changed' dates and times.

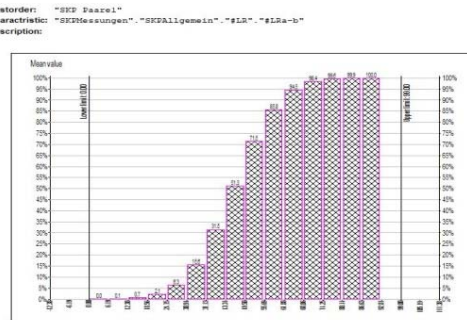
The retrieved samples can then be evaluated in numerical or graphical form depending on user's requirements.



Testorder: "SEK Paarel"  
Characteristic: "SEKPaarel", "SEKPaarel", "SEKPaarel", "SEKPaarel", "SEKPaarel"

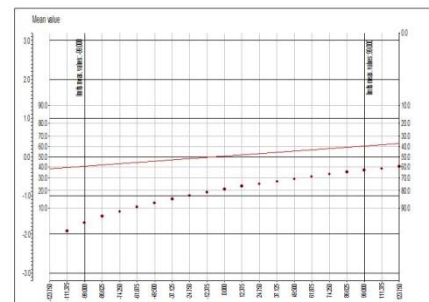


Number: 11362  
Mean value: 49.14  
Standard deviation: 16.430



Number: 5681  
Mean value: 49.03  
Standard deviation: 11.904

Testorder: "SEK Paarel"  
Characteristic: "SEKPaarel", "SEKPaarel", "SEKPaarel", "SEKPaarel", "SEKPaarel"



Number: 5681  
Standard deviation: 395.1700  
Mean value: -5.035  
Mean value +/- 5: -400.205 390.135  
Mean value +/- 2S: -795.375 785.305  
Mean value +/- 3S: -1190.545 1180.475

## 7.1. EVmask -The Evaluation Mask

Further possibilities are offered by using the optional EV evaluation mask which is a convenient way to find samples in the data pool using search criteria and to carry out further evaluations, for example in the form of quality charts, report formats or also when doing queries.

Regardless of the timing of the measurements, the generated measurement samples can be viewed, evaluated or recorded.

The EV input mask allows:

- Searching for samples in the global data pool
- Searching for samples only in the specified test order and production step
- Investigate function: Assign certain samples to another test order in order to perform other evaluations.

First the EV input mask evaluates the underlying test plan and then provides relevant input possibilities for search criteria as:

- Fields of the sample and
- Characteristics of the underlying test plan

Then the search criteria can be entered, such as the sample identification number, sample number, period, etc. In the table (Characteristics for Search Criteria), you can then explicitly search for the contents of each characteristic.

Quite often, search criteria are used multiple times or only slightly modified. For this purpose, search criteria can be stored and retrieved again.

There are also situations in which, for example, it is needed to evaluate data with different limits, report forms or control tables. The search function enables to assign samples from any test order/operation to another target operation of the same or of another test order. These samples then behave as if they had been tested with the new target operation/test order.

Characteristic	Active	Type	Tested	Condition
Customer	<input checked="" type="checkbox"/>	TX		BG;Rhein
FONo	<input type="checkbox"/>	TX		
SAP No	<input checked="" type="checkbox"/>	TX		00001
Measuring length	<input checked="" type="checkbox"/>	VA		80-
Drum number	<input type="checkbox"/>	TX		
Machine	<input checked="" type="checkbox"/>	AT		'CV-{23};PM-411'
Color of cable sheath	<input type="checkbox"/>	AT		
Temperature	<input type="checkbox"/>	VA		-24
Outer sheath-diameter	<input checked="" type="checkbox"/>	VA		4,98
Outer sheath - ovality	<input type="checkbox"/>	VA		
Outer sheath - thickness	<input type="checkbox"/>	VA		

Sorting factor (Drum number)	Sample ID No	Sample no	Status	Error	Customer	FOno	SAP No	Measuring length	Drum number	Machine	Color of cable s...	Temperature	Outer sheath-d...	Outer s...	Resis...	I-Date	I-Name	M-Date	M-Name		
501-2	00000CPFSJ		FZ		BG - AESA	001703	000010703	100	501-2	CV-3	bl	21	4,98 / 4,98 / 4,98	0,00	0,200	0,448	03.03.2020	13:03:52	DemoEN	03.03.2	DemoEN
2 502-7	00000CPQJ1		FZ		Rheinster	0012-07	000010207	100	502-7	CV-2	ge	22	4,98 / 4,98 / 4,98	0,00	0,450	0,447	03.03.2020	13:06:12	DemoEN	03.03.2	DemoEN

## 8. Documentation and Reports

CIQ 3.0 QDM offers various types of output possibilities such as:

- Test certificates for the customer
- Creating control charts
- Graphical representation of shift protocols
- Graphical evaluation High Frequency (HF) measurement data
- Daily and weekly reports
- Product manufacturing cards
- Individual cable overviews
- User definable evaluations in graphic and tabular form

The results may be printed, stored as PDF files, or sent as emails. It is also possible to create data files for Office products such as Microsoft Excel.

### Examples of Excel or csv exports

The image displays two overlapping Excel spreadsheets. The background spreadsheet (M6) contains test data with columns for Meas. frequency, #HIL/D1/L/f, #HIL/D2/L/f, and #HIL/L/f/normalized. The foreground spreadsheet (C11) is a 'Test Protocol' report for 'Simple EnergyCable'.

**Test Protocol Report (C11):**

- Test order no:** Simple EnergyCable
- Test order desc.:** simple demonstration for energy cable with SoftDLC
- Sample-ID-No.:** 0000C25K4
- Tested by:** DemoN
- Tested date:** 01.04.2016 14:41:36
- Status:** blocked
- Example IDNo SD2:** 0000C20Si
- Example IDNo LF/HF measurement:** 0000C20Si
- Example IDNo work preparation:** 0000C2GG2

**Measurements Table:**

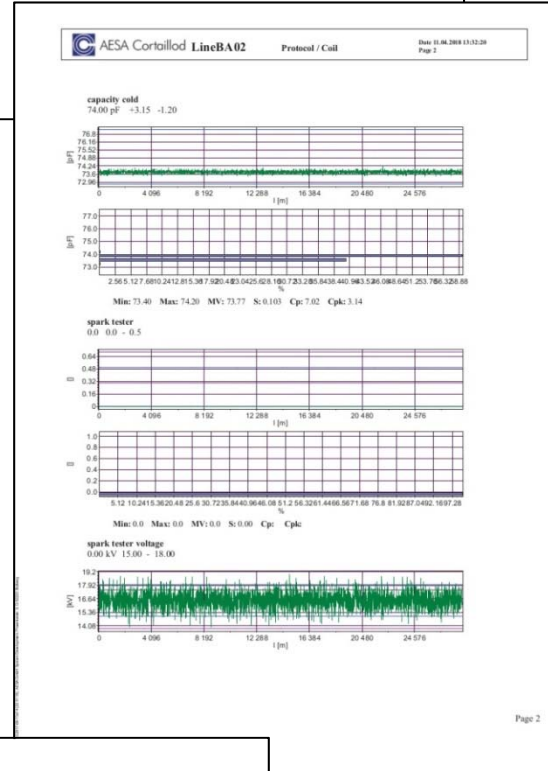
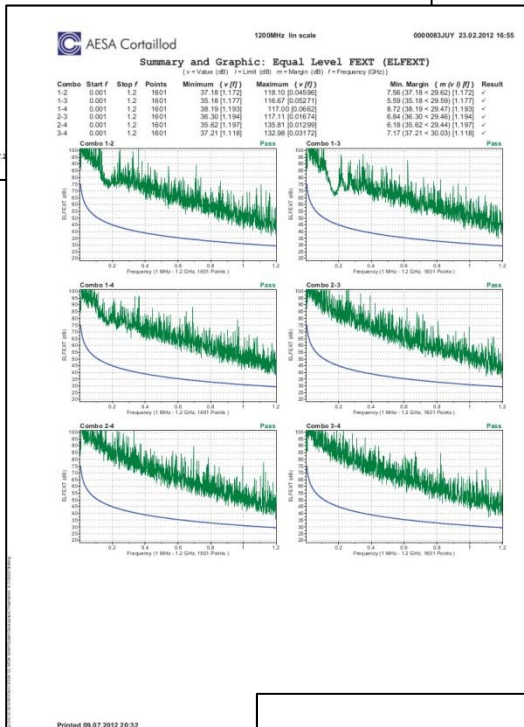
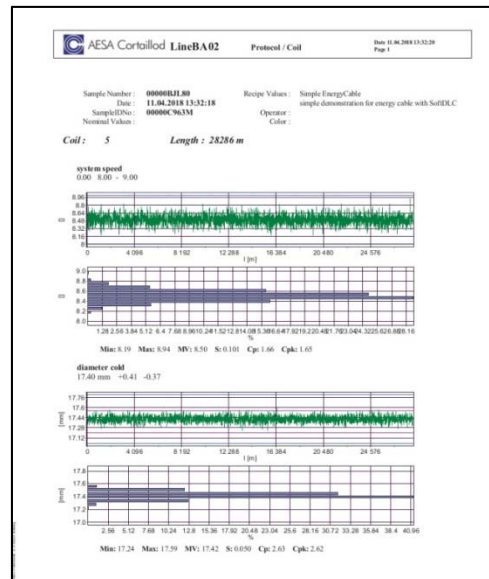
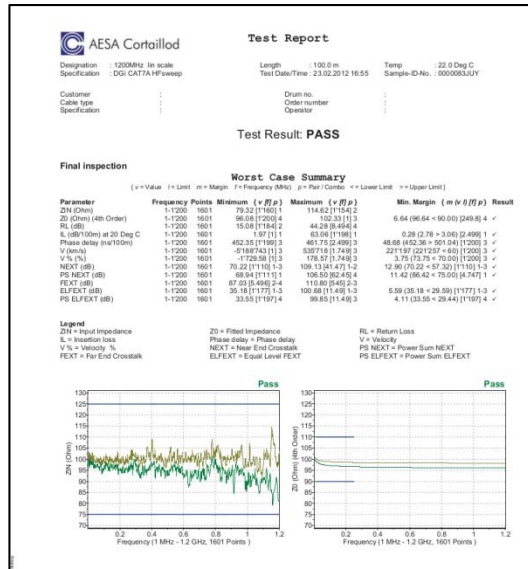
Characteristic	Tested	Dim.	Nom. Val.	MV	LV	HV	Values
Outer sheath-diameter	Yes	mm	0,00	3,37	4,90	3,70	3,50 3,70 4,90
Outer sheath - ovality	Yes	mm	0,00	0,80	0,80	0,80	0,80
Outer sheath - thickness	Yes	mm	0,00	0,45	0,45	0,45	0,450
Resistance	Yes	Ohm/km	0,00	0,45	0,45	0,45	0,451
Temperature	Yes	°C	0,00	21,00	21,00	21,00	21

**Other Results Table:**

Characteristic	Tested	Text
Visual inspection - question	Yes	Yes
Visible error* (1)	Yes	v504
Visible error remark* (1)	Yes	blue point
General remark	Yes	



Examples of Reports




**AESA Cortailod Test Protocol** Date: 18.02.2020



Test order: #CIQDemosMachMess  
Sample ID-No: 00000CDOGX  
Tested by Date: CIQ3RD / 11.04.2018 10:23:30  
Status: Tested  
Drawn number: 159  
Sketch: B  
Length: 89.0  
Temperature: 19  
Color cable sheath: be - black  
Machine: PMS-411 - PMS-411 plastic sheath machine



Characteristic	Dim	Nom. Val.	MV	LV	HV	Values
Outer sheath-diameter	mm	0.00	4.63	3.77	5.92	3.77 / 4.60 / 5.92 /
Outer sheath-ovality	mm	0.00	2.15	2.15	2.15	2.15 /
Outer sheath - thickness	mm	0.000	0.400	0.400	0.400	0.400 /
Reinforce	Ohm	0.000	0.454	0.454	0.454	0.452 /
Visual inspection - quotient	No - No					
Visible error (1)	-					
Visible error remark (1)						
General remark						


### Examples of Labels

Artikel	0,5/0,94 02Y		
Länge [m]	34530		
Maschine	A502	Durchmesser [mm]	Ist Soll
Kommission		Mittelwert	0,94 0,94
		Maximum	0,96 0,96
Spule	6	Minimum	0,92 0,92
Farbe		Kapazität [pF/m]	Ist Soll
Signierung		Mittelwert	155,01 155,00
Datum	12.04.2006	Maximum	157,44 158,00
Uhrzeit	12:35	Minimum	152,00 152,00
Bediener	abc	Spark Tester	
		Sparkfehler	0
		Prüfspannung [kV]	1,50
Spule	i.o.		

Sample for Lab		
Date/Time	Article	MSD IDNo
11.04.2018/13:32	Simple EnergyCable	
		Length
00000C963M		28286
		<b>OK</b>

	simple demonstration for energy cable with SoftDLC
Order No:	<b>Simple EnergyCable</b>
Serie:	<b>00000BJL80</b>
	

	AESA Cortailod
23.03.2012	09:53
simple demonstration for energy cable with SoftDLC	
Order No	<b>Simple EnergyCable</b>
Length	1672
C-No	00000BBAV9
Coil No	2
Diameter MW	17,80 mm
	17,71 / 17,83 mm
<b>OK</b>	
	

Label Production Simple EnergyCable				
Date/Time	Diameter MW	Capacity MW	Spark Error	
11.04.2018/13:32	17.42 mm	73.77 pF	0	
			Length	
00000C963M			28286	
			<b>OK</b>	

## 9. Connecting Measurement Equipment

CIQ 3.0 comes with a wide range of interfaces connecting with most of the common measuring devices as well as AESA automatic measuring systems. These are examples of the type of devices that can be interfaced:

- Mechanical dimensions gauges such as calipers or profile projectors
- Diameter, ovality, thickness and eccentricity gauges
- Camera systems for cross section and wall thickness measurements
- Weight scales
- Friction and adhesion tester
- Force and elongation measurement gauges
- Various types of manual handheld systems
- Low and High-frequency cable measuring devices
- High-voltage testers
- Optical Time Domain Reflectometer (OTDR)
- Tensile testers
- Resistance and insulation measuring equipment
- Transfer impedance evaluation
- Screening attenuation testing
- Various "Type Approval" tests
- .....

Other type of devices can be added on request and any type of drives developed upon demand.

## 10. Product Development

When developing a new product it can be helpful to reuse existing knowledge and experience from a product that has already been manufactured in the past. CIQ 3.0 QDM enables access to older stored data (in current datapool or in archived data). These sets of stored data contain the test orders with the measured values and the corresponding test plans as well as other master data. Based on the available measured values it can be checked whether the product will also meet new requirements. (see also § 7 for describing some evaluation methods)

The test plans may be used as a basis for the development of a new product. Using the accumulated experience, non-productive times, testing cycles as well as issues due to production-related defects can be minimized.

## 11. Process Data Acquisition with SoftDLC 2.0

The SoftDLC 2.0 module is specialized in continuous, concurrent manufacturing process supervision by means of measured data acquisition and visualization. It monitors and records process data and events of all existing measuring devices and displays the data on an interface tailored to individual needs.

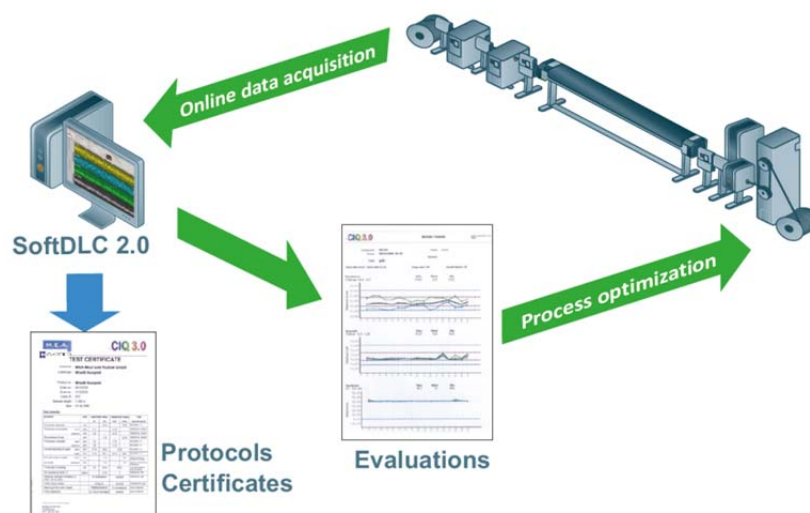
By displaying the measured values at the production equipment and at the supervision station it is possible to identify trends at a very early stage during production and to take corrective measures before defects are occurring.

In the event that a defect occurs or a tolerance limit is exceeded by a measurement value or an operating data, SoftDLC can immediately trigger different types of alarms. The earlier deviations are noticed and corrected, the fewer defects will occur meaning: constant quality at reduced production costs.

The recorded and archived data provide the basis for demonstrable quality documentation to the end-customers. SoftDLC 2.0 fulfils the requirements of statistical process control (SPC). It provides the basic data for the analysis of weak points and hence the prerequisites for continuous process improvement. Quality monitoring, tests and evaluations can be compiled not only in the form of reports, labels or certificates but also as corresponding transfers to ERPs or other EDP systems. For quality monitoring, tests and assessments all the output features of CIQ 3.0 can be used such as exports or printable document.

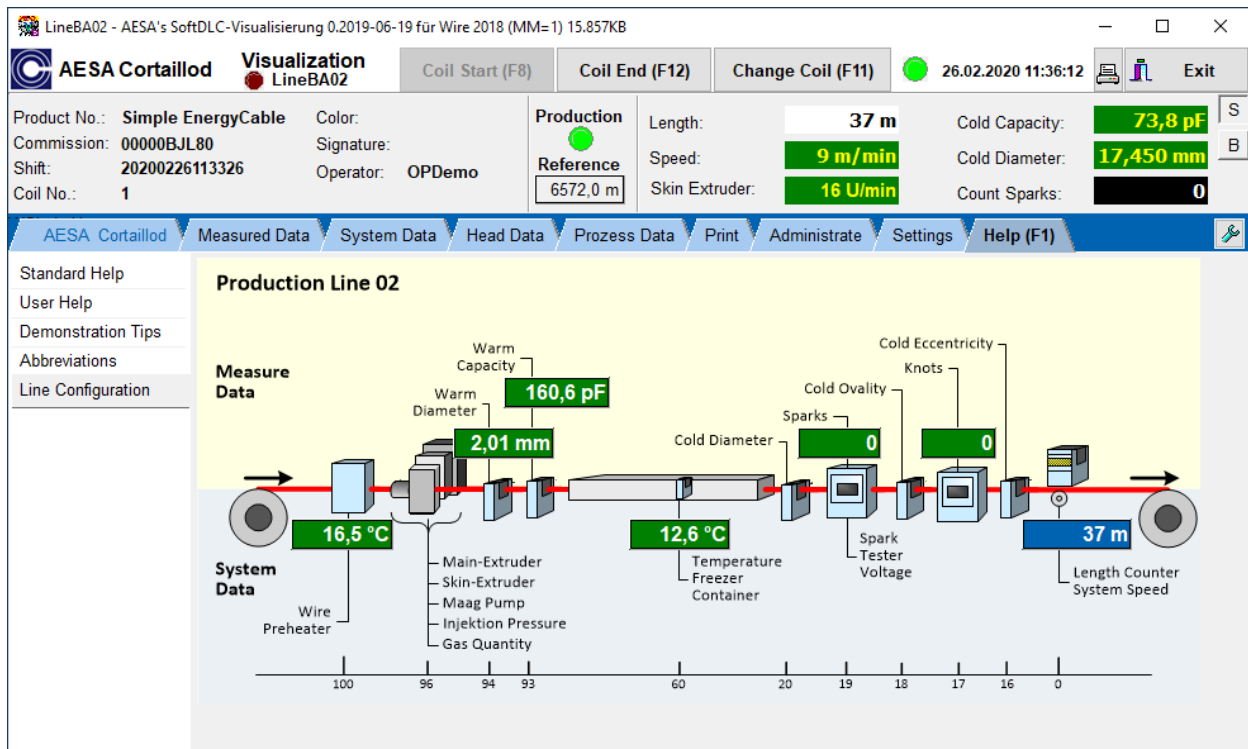
Process monitoring can make manual intermediate tests redundant as process data is continuously captured. This reduces testing efforts and cuts cycle times, resulting in increased machine throughput rates and cost savings.

In connection with CIQ 3.0-QDM, the program centrally stores the measured, operating and administrative data. Various data (such as design data or tolerance values) can also be retrieved from other EDP systems.



As the user interface of SoftDLC 2.0 and the system drivers can be adapted and configured to individual requirements, operation of the system is handy and extremely user-friendly. Help menus and instructions – configurable by the user - support the operating staff at the production line.

SoftDLC 2.0 not only captures the data generated by all measurement equipment installed along the production line but also by the current status of production (for example: stable production / start up production) or by events. Events can be generated by the control of the production line, by physical buttons or by soft keys on the touchscreen of the Graphical User Interface (GUI).



## Alarm function

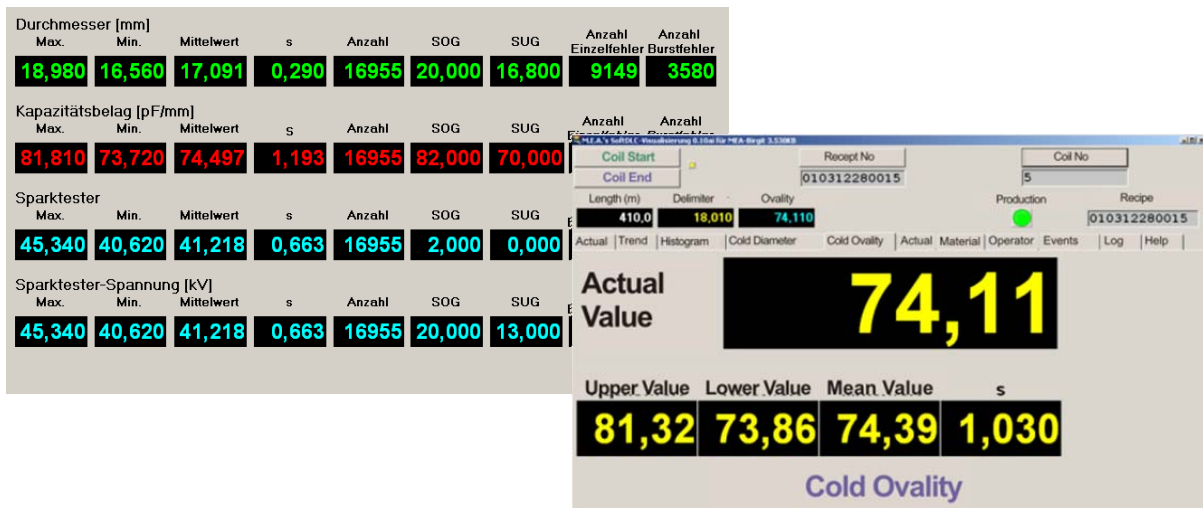
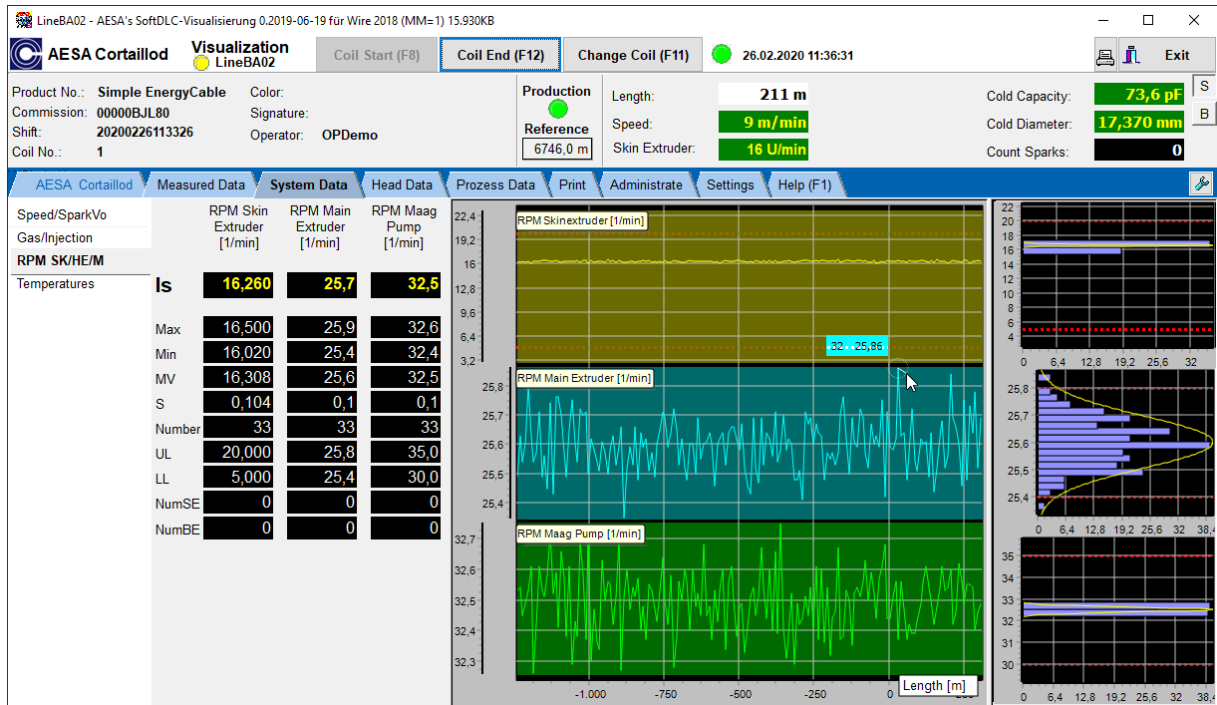
SoftDLC 2.0 recognizes and signals tolerance violations. The alarm can take different forms:

- The operator at the line can be made aware of an alarm directly on the display by switching colours, graphical effects or message windows.
- The alarm can be displayed on all visualization devices (also remote control devices) interfacing with the respective SoftDLC 2.0 driver of the production line.
- Sending of error emails or SMS, in connection with CIQ 3.0.

### 11.1. Visualization with SoftDLC

SoftDLC 2.0 regularly scans and displays the measured and process data.

Measured values, operating data as well as computed and statistical values are displayed discretely or in graphical form as line diagrams or bar charts. The line diagrams have a zoom-in function allowing displaying selected line values or the magnification of a chosen area.



All elements - fields (labels), buttons, graphics, histograms as well as event, log and operator lists -, which are connected to visualization/measuring channels, events or lists, are continuously displaying the most current values. The visualization is made according to predefined rules or is product-related. The display is freely configurable and can, at any time, be adapted to specific requirements.

Predefined thresholds or limits are also indicated on the diagrams.

Apart from current measured values, SoftDLC 2.0 also displays evaluations (for example, statistical values) and the results of computations (for example, mean values or ovality).

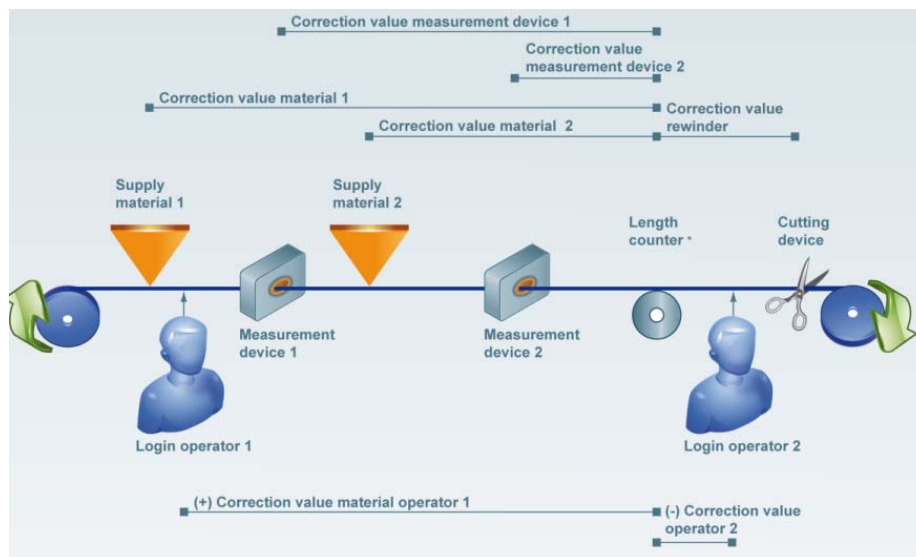
Likewise it can display texts and drawings, such as work instructions, help texts, standards or recipes.

## 11.2. Running Length Correction

Due to the special requirements of the cable manufacturing process, it is of utmost importance to store the measured values and operating data in relation with the product length.

The problem: a specific point of the cable length is scanned by the measuring devices at different moments.

For this reason SoftDLC 2.0 automatically takes into account the distance existing between the different locations of the measuring devices and of the length counter when displaying and storing the measured values. The distances between the measuring devices as well as operators and material feeding equipment are entered as correction values according to the specific machine configuration.



## 11.3. Interconnection of CIQ 3.0-QDM and SoftDLC 2.0

In connection with the CIQ 3.0-QDM, additional functionalities are available, for example:

- Expanded alarm functions in the event of violations of tolerances of measured values or operating data; alarm messages can be sent as emails or SMS
- Messaging and recording in the CIQ 3.0-QDM quality data module
- Messages to other EDP systems (e.g. SAP)
- Storage and logging of all data
- Editing of reports and labels
- Comprehensive evaluation possibilities
- Further processing of data using Office products such as Microsoft-Excel
- Import of design data (e.g. tolerances) from other EDP systems (e.g. SAP)
- Export of data to other EDP systems – e.g. SAP – or SQL evaluation databases
- Data transmission to all PCs within a network
- Long-distance data transmission
- Multiple reporting options, including
  - Test certificates for end-customer
  - Generation of quality control charts
  - Graphical display of shift logs
  - Labels in freely configurable formats

The SoftDLC is made of two separate process visualisation and data acquisition driver modules. The driver module is running as an independent process without graphical user interface. This provides high functional reliability against external failures (e.g. network failure).

Process data are continuously captured and stored by dedicated measuring device drivers.

Standard drivers are available for digital and analog PC I/O boards as well as various other sources, e.g. OPC.

The modular arrangement facilitates the implementation of special drivers for other interfaces and measuring devices.

## 12. Specific CIQ Applications and add-ons

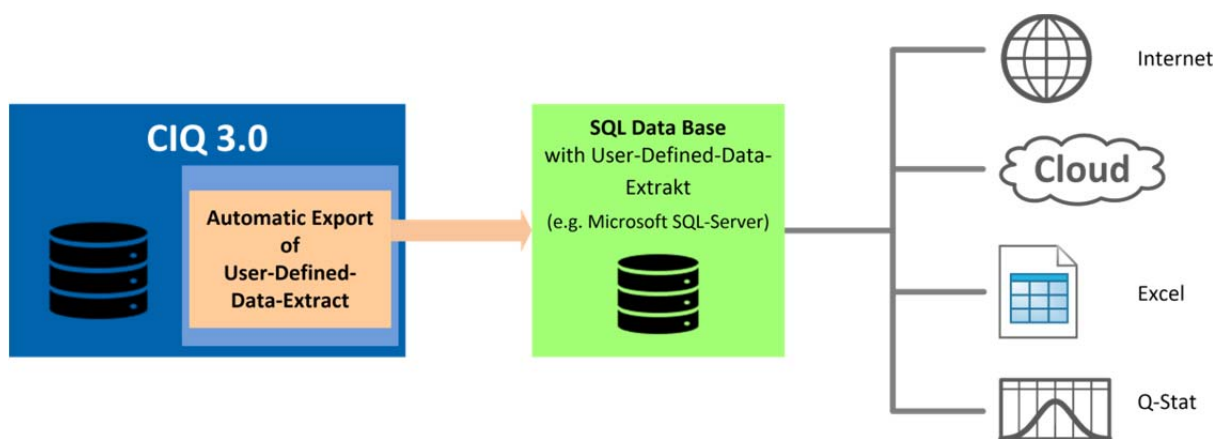
Additional special modules are available for supporting special tasks required by the cable industry:

- UDDEx: Superevaluation module
- MERLIN: Automated Test Plan Creation
- MEC (Mechanical Cycling Test): To perform and monitor performances during long-term tests (e. g. bending tests, drag chain tests)
- TYPLAB (Type Validation Lab Test): To perform and administrate specific laboratory tests
- DRES: Defect Recording and Evaluating: To record and evaluate defects detected during and after the production process
- DMS (Distributed Monitoring System): To acquire, display and store measurements from different locations (e.g. heating cabinets)
- QUALITY COCKPIT: Enables a global overview/summary of production situation
- And more.....

### 12.1. Superevaluation Module (UDDEx)

For data transmission, CIQ 3.0 QDM features flexible import and export functions. Depending on the applications, it can be defined which data are exported or imported and in which form. For example, using the Super Evaluation module UDDEx: (User-Defined-Data-Extract), it is possible to write in an existing SQL database defined sets of data that can be read, modified, processed by any external system without accessing and risking damaging the original set of data stored in the core datapool.

Each time defined data, such as master data or actual values (samples) in the CIQ 3.0 database are changed, the CIQ 3.0 data server module updates an entry in the corresponding SQL database.



## 12.2. Automatic Complex Testing Plan Creation (Merlin)

Merlin is an editor supporting the design of specifications and the related test orders and test plans in the area of complex tests. The creation of specifications is carried out by using predefined function blocks and the relevant measurement parameters. They consist of different set-up parameters, already prefilled with default values, but easily edited by the user.

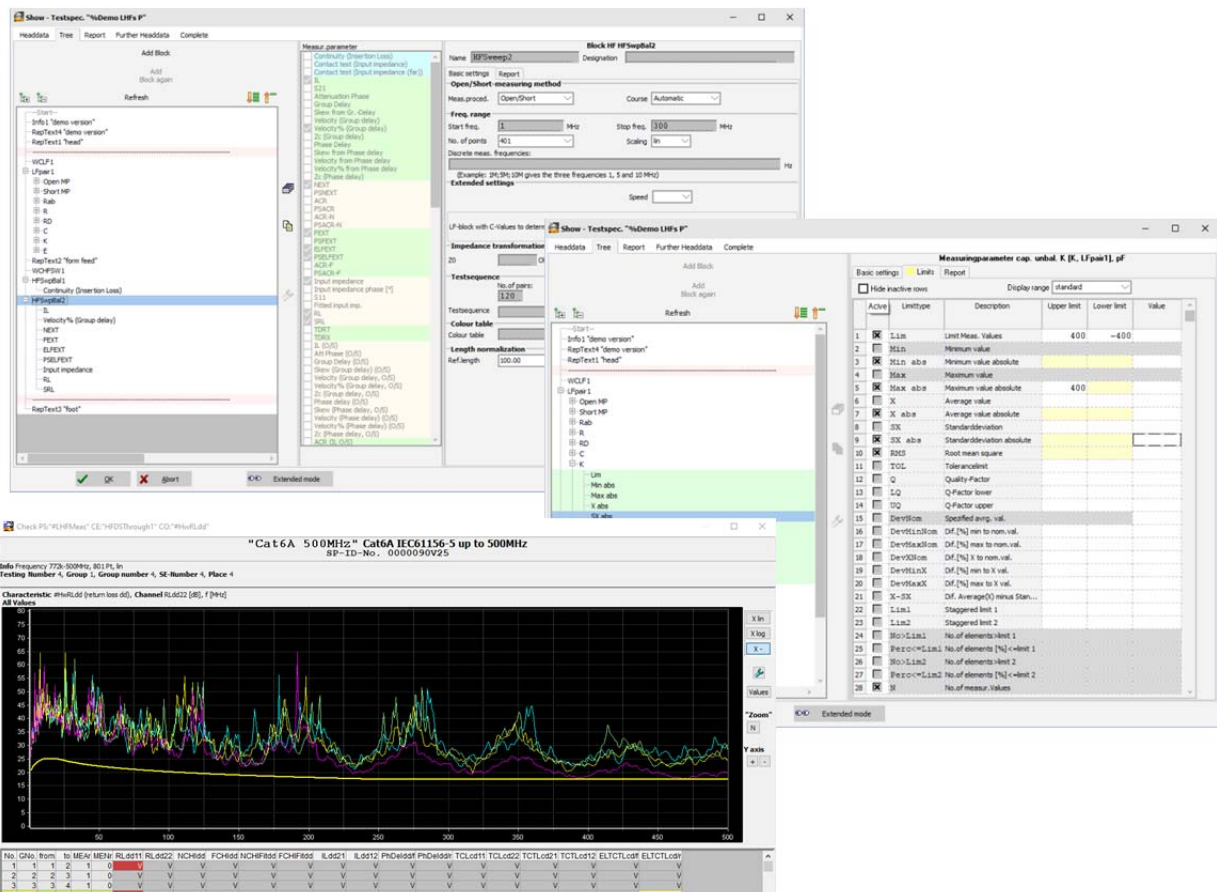
The test plans creation with Merlin is very powerful and user friendly. The generated plans can replace or be combined with test plans created in the standard CIQ 3.0 environment.

All essential input parameters are presented to the user and regrouped in different tabs. The use of predefined parameters enables the generating of test plans and test orders in a short time without having to look at and understand all the relationships between different parameters. After editing, the coherence of all entries is checked by the system and only in the case of a successful result, will the test order be created.

Merlin offers a convenient way of generating test plans for HF (High Frequency) and LF (Low Frequency) measurement. Representation of the individual measurement blocks (e.g. HF Sweep, HF fixed frequency, LF quad, LCTL) and their parameters in a tree structure adds clarity. Measuring blocks can be freely added, removed, copied or moved, and parameters can be changed. This leads to high flexibility in test planning.

For example, the module implemented in connection with the execution of complex electrical allows to go far beyond the normal use of a simple Vector Network Analyzer (VNA) by:

- Driving and controlling the VNA.
- Performing measurements: sweep mode/frequency tables.
- Entering unlimited number of measurement points.
- Generating complex limit curves.
- Driving and managing fully automatic calibration procedure.
- Control of a wide range of measurement modes such as HF Sweep, HF Sweep(Alien), HF Coax-50, HF Coax-75, HF fixed frequency, LF single cores, LF pairs, LF triples, LF quads, LCL, LCTL, TCL, TCTL, TI, AS, worst case summaries for HF-Sweep/LF/HF discrete frequencies, inductance, conductance and high voltage.





### 12.3. The MEC (Mechanical Cycling) testing module

The additional CIQ 3.0 module MEC has been specifically designed to manage and track long-duration tests (e.g. bending tests, drag chain tests).

MEC is provided with a clearly arranged table containing the most important data and production stages of all the configured devices, among them: status, total running time, specifications (set values), actual values and defects.

MEC supports the definition and execution of test orders. Its integrated programmable timers are supporting the automatization of tests sequences.

The performed measurements can be documented with graphics and particularly with quality control charts.

Testing is started automatically according to the specifications and the related results, as well as current processing status and the most important data of the individual systems, are displayed. These include:

- Overall status of the complete system.
- Overview of the connected equipment and its status, reading of the actual counters with the display of the number of cycles that has been performed.
- Table of measurements to be carried out, including their current status, test intervals, actual results, errors that occurred, etc.

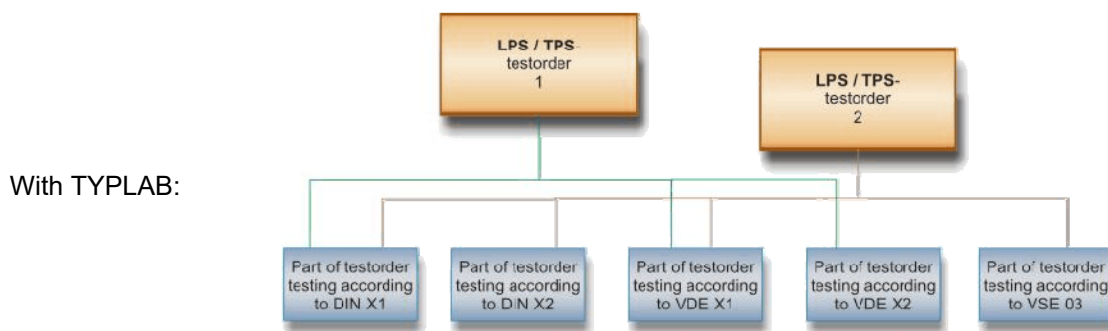
Test samples can be created, executed, stopped if necessary and deleted after completion of the tests. Using the evaluation function in CIQ 3.0, reports, exports and control charts can be created.

- The MEC displays the list of existing test samples, one line corresponding to a test sample.
- The MEC interface transfers the counter readings (number of cycles made by the system) and the statuses of the individual systems to CIQ 3.0.
- If an error occurs during a measurement, the associated system can be automatically stopped.

No.	Test SPID	Testorder no.	Sample number	Length [m]	Temp. [°C]	Start pos.	Interval	Status	Next test	Act. Counter	Machine	Error status	No of tests until now	Last test date time
1	00000CK1TU 22.05.2018	SKP Paare1	SPaar-001 20180522-001	100	18.6	1	5	Counting active Testing is blocked	8415	9290 8410	SKP AN03		1490	13.02.2020 12:00:52 00000GQ500
2	00000CK46P 22.05.2018	SKP Paare1	SPaar-002 20180522-002	100	21	2	3	Counting active Testing is active	13513	13511 13510	SKP AN02		4127	25.02.2020 15:04:21 00000H2PRG
3	00000CKEC7 22.05.2018	SKP Paare1	SP-225-01 20180522-003	100	20	1	100	Counting active Testing is blocked	802	5342 702	SKP AN05		7	29.08.2018 13:15:14 00000D5U7Z

## 12.4. Management module for laboratory testing (TYPLAB)

TYPLAB is specially designed for managing laboratory tests. It allows planning, performance evaluation and documentation of all kinds of investigations. The system fulfils the requirements in documentation depth, traceability and data protection. The advantage of TYPLAB, compared with standard test orders, is its capability in combining various individual orders into a single high-level test order. In a regular production mode, process tests are forced to be performed in sequential succession. If TYPLAB is applied for final inspection, the tests can be performed in any sequences or even simultaneously.



Within the TYPLAB system, all test orders and their respective partial orders can be checked and their current production status can be continuously monitored. Deadlines, status lists, various reports, certificates and evaluations can easily be generated.

**TPS01MaskeT**

**T-Probe**

Bestellnummer: BST001  
 SAP-Material-Nr.: 001001  
 Interne Nr.: INT001  
 Längennummer: LA100  
 Bemerkung: Test  
 Ext. Dokumente: <img alt="document icon" />

Tech. Datenblatt: L45468-113-C9 Test BSR Länge  
 Ausgabezustand: 07.03.2005  
 T-Prüfauftrag: T65-BSR-0009-00  
 T-Identnummer: 00000B1FKP

EWA-Nr. / Nachtrag: EWA001 001  
 VL-Nummer: VL001  
 Typprüfung: Erstprüfung  
 Sonderprüfung: E1/Brun  
 Datum - Anfang: 09.03.2012  
 Datum - Ende:

A-Identnummer	Baustufen	Prüfspezifikation	Ausgabe	Prüfgegenstand	Info Baustufe	Prüfzustand	Prüfbeginn	Prüfende	Prüfer
00000B1FKP	38-032-0321-00	Technisches Datenblatt	07.03.2005	Gesamtes Kabel	40 Stellen lang darf dieser 901234567890 40 Stellen lang darf dieser 901234567890	nicht vorhanden teilgeprüft	09.03.2012		CIQ308

**TPS05MaskeAK**

**Kopfdateneingabe**

Evakt Baustufen-Nr.: 30-019-0287-00  
 Bestellnummer: BST001  
 SAP-Material-Nr.: 001001  
 Tech. Datenblatt: L45468-113-C9 Test BSR Länge  
 Letzte Änderung: 07.03.2005  
 T-Prüfplan: T65-BSR-0009-00  
 Interne Auftrags-Nr.: INT001  
 Längennummer: LA100  
 Prüfgegenstand: Isolierung - Bezeichnung  
 T-Identnummer: 00000B1FKP  
 A-Identnummer: 00000B1FKP

Material-Nr.:  
 Grundmaterial:  
 Materialbezeichnung:  
 Fertigungsmaschine:  
 EWA-Nr. / Nachtrag: EWA001 001  
 VL-Nummer: VL001  
 Typprüfung: Erstprüfung  
 Sonderprüfung: E1/Brun  
 Prüfpezifikation: DIN EN 50290-2-23 ZPE-A  
 Ausgabedatum: 01.07.2002  
 Prüfer: DemoEN  
 Prüfbeginn: 13.02.2020  
 Prüfende:

**TPS11Maske**

**Auswertung / Messergebnisse**

Kopfdaten:  
 Bestellnummer: \_\_\_\_\_  
 SAP-Material-Nr.: \_\_\_\_\_  
 Interne Auftrags-Nr.: \_\_\_\_\_  
 Exakt Baustufen-Nr.: \_\_\_\_\_  
 T-Prüfplan: \_\_\_\_\_  
 Prüfpezifikation: \_\_\_\_\_

EWA-Nr. / Nachtrag: \_\_\_\_\_  
 VL-Nummer: \_\_\_\_\_  
 Typprüfung: \_\_\_\_\_  
 Sonderprüfung: \_\_\_\_\_  
 Material-Nr. / Bezeichn.: \_\_\_\_\_

A-Identnummer: \_\_\_\_\_  
 T-Identnummer: \_\_\_\_\_  
 M-Identnummer: \_\_\_\_\_  
 Fertigungsmaschine: \_\_\_\_\_  
 Prüfgegenstand: \_\_\_\_\_  
 Prüfstatus: \_\_\_\_\_

Parameter:  
 Prüfparameter: \_\_\_\_\_  
 Prüfverfahren: DIN EN60811-1-1 Ausg.05/02  
 Prüfmerkmal: Wandsdicke MW

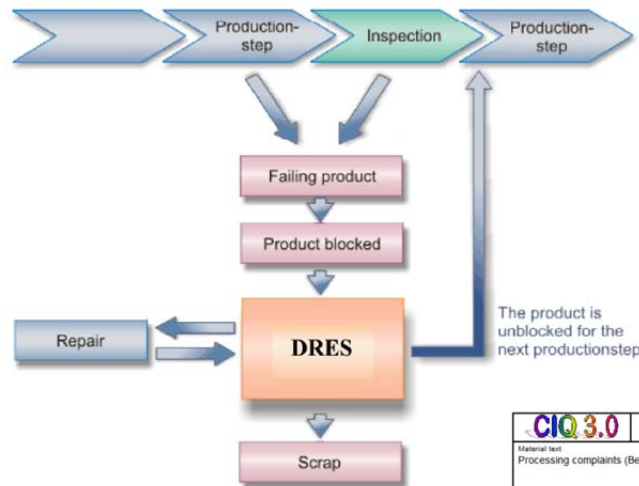
H-Id-Nr.	Prüfdatum	Interne	Maschine	Prüfgegenstand	Messwerte	Statistik
00000B1FKP	18.03.2016	INT001	MAG1	Isolierung - Bezeichnung	5,300	WZ 5,300
00000B24K	18.03.2016	INT001	MAG1	Isolierung - Bezeichnung	0,170 / 0,180 / 0,180	WZ 0,170
00000B27S	18.03.2016	INT001	MAG1	Isolierung - Bezeichnung	3,9 / 3,9 / 4,1	WZ 3,9
00000B20G	18.03.2016	INT001	MAG1	Isolierung - Bezeichnung	265 / 264	WZ 264
00000B29S	18.03.2016	INT001	MAG1	Isolierung - Bezeichnung	260 / 271 / 264	WZ 271
00000B24N	18.03.2016	INT001	MAG1	Isolierung - Bezeichnung	3,1 / 3,2 / 3,4 / 3,8	WZ 3,1
00000B20M	18.03.2016	INT001	MAG1	Isolierung - Bezeichnung		WZ 3,8
00000B2CC	13.02.2020	INT001		Gefahren Kabel		Gefahren
00000B2QC	14.06.2017	INT001	MAG1	Isolierung - Bezeichnung		Gefahren

A-Protokoll anzeigen Ende

## 12.5. Defect REcording and Evaluation System module (DRES)

DRES is an additional module designed for a convenient recording and evaluating of defects that are detected during and after the production process. DRES records defects systematically and analyses potential defect causes, defect types and defect consequences. Then, as soon as a defect cause is recognized, selective corrective measures can be immediately proposed such as the segregation of the deficient product. After correction of the defect, the product can be released for further processing.

DRES can be integrated into the normal test procedure thus allowing for the complete traceability including blocking and releasing of faulty products.



FFBS - Error Recording and Evaluation System

TestSampleIDNo: \_\_\_\_\_ FM-No: 000110 F4 = Previous Sample F5 = Other Sample

Material No: 99999999 Des: Dummy Sankander

AVO: 0123 Des: Testorder BSR

FA No: 01012345 Trail No: \_\_\_\_\_

FL-No+Flex	Order Quantity	Actual Quantity	Complained Quantity	Unit Quantity
012345	10	10	1	m

Error Description: assembly wrong Priority: High

Test for error description

Error occurred: 100109 in Early Shift Shift on Machine AD01: Stranding

CIQ 3.0 ERROR MESSAGE FM No.: 000028

Material test Processing complaints (Bearbeitung Reklamation)

Material No	AVO	AVO Description	Priority
99999999	0123	Testorder BSR	High

Material No: 99999999 AVO: 0123 AVO Description: Testorder BSR Priority: High

FA No: 01012345 FL No: 012345 Trvme No: \_\_\_\_\_ IDNR: 000007M2SL PBIChR: \_\_\_\_\_

Order Quant	Actual Quant	Compl. Quant	Complained Tot	Order Qu. Order	By How Delivere	Quantity Unit
10	10	1				m

Error Description: assembly wrong

Incursion of Error on: 10.01.2009 Shift: Early Shift at Machine: AD01: Stranding

Test error reason

Type of Cause

Suggestion

Decision / Repair Procedure

Assessment

Evaluation to "FFBS", PS "FFBS", samples

Quick search: 000006

Search Value (F...)	FM-No	Status	Mat-No	AVO	FA-No	F...	Error Description	New created	C-Date	M-Name	M-Date
000006	000006	Preliminary de...	99999999	5000	50001233	001	Selection number "001"	CIQ308	16.03.2008 12:07:00	DEMOE	27.10.2014 09:21:00
2	000008	Decided	99999999	5000	50001231	vs01	assembly wrong	CIQ308EN	16.03.2008 12:25:00	DEMOE	27.10.2014 09:21:00
3	000015	Preliminary de...	99999999	5000	50001122	vs03	permutation	CIQ308EN	16.03.2008 16:36:00	DEMOE	27.10.2014 09:21:00
4	000017	New created	99999999	5000	50001233	vs00	no visible errors	CIQ308	26.03.2008 21:11:00	DEMOE	27.10.2014 09:21:00
5	000018	New created	99999999	5000	50001231	vs00	no visible errors	CIQ308EN	26.03.2008 21:14:00	DEMOE	27.10.2014 09:21:00
6	000019	New created	99999999	5000	50001122	vs03	permutation				
7	000026	New created	99999999	5000	50001233	vs01	assembly wrong				
8	000027	New created	99999999	5000	50001233	vs01	assembly wrong				
9	000028	Preliminary de...	99999999	0123	01012345	vs01	assembly wrong				
10	000029	Decided	99999999	1234	12345666	vs02	number of elements wrong				
11	000032	New created	99999999	5000	50001233	vs00	no visible errors				
12	000033	New created	99999999	1234	12345666	vs02	number of elements wrong				
13	000034	New created	99999999	0123	01012345	vs01	assembly wrong				
14	000035	New created	99999999	0123	01012345	vs01	assembly wrong				
15	000036	New created	99999999	0123	01012345	vs01	assembly wrong				
16	000044	New created	99999999	5000	50001122	vs03	permutation				
17	000051	New created	99999999	5000	50001233	vs00	no visible errors				
18	000052	New created	99999999	5000	50001233	vs00	no visible errors				
19	000054	New created	99999999	5000	50001233	vs00	no visible errors				
20	000055	New created	99999999	5000	50001233	vs00	no visible errors				
21	000056	Preliminary de...	99999999	5000	50001233	vs00	no visible errors				
22	000057	New created	99999999	5000	50001233	vs00	no visible errors				
23	000058	New created	99999999	5000	50001233	vs00	no visible errors				
24	000059	New created	99999999	5000	50001233	vs00	no visible errors				
25	000060	New created	99999999	5000	50001233	vs00	no visible errors				
26	000061	New created	99999999	5000	50001233	vs00	no visible errors				
27	000062	New created	99999999	5000	50001233	vs00	no visible errors				
28	000063	New created	99999999	5000	50001122	vs03	permutation				
29	000065	New created	99999999	5000	50001122	vs03	permutation				
30	000066	New created	99999999	5000	50001122	vs03	permutation				
31	000068	New created	99999999	5000	50001122	vs03	permutation				

DRES - Evaluation

State

new create

active

preliminary decided

decided

assessed

History

with history

FM numbers (range) 000027-000044 ignore: (empty) exact value: 123 to number: 123 from number: 123- range: 123-456

acquired time period (yyyymmdd) 2009128

changed time period (yyyymmdd)

Sorting

FM number

error no + material no

search selection gnd help

## 12.6. The Monitoring of slow reacting processes or equipment (DMS -Distributed Monitoring System)

The DMS module, serves for acquisition, display and storage of measured values made in several locations (e.g., various lab heating cabinets and climate chambers). It periodically gathers measurement data, after reaching a predefined amount of time, from each test stations via the local area network. The values are transferred for visualization to CIQ 3.0 in order to monitor measured data for each individual channel. The projection contains a clear representation of the most important data of all configured devices. Among them, status, busy times, target specifications, current values and defects can be tracked.

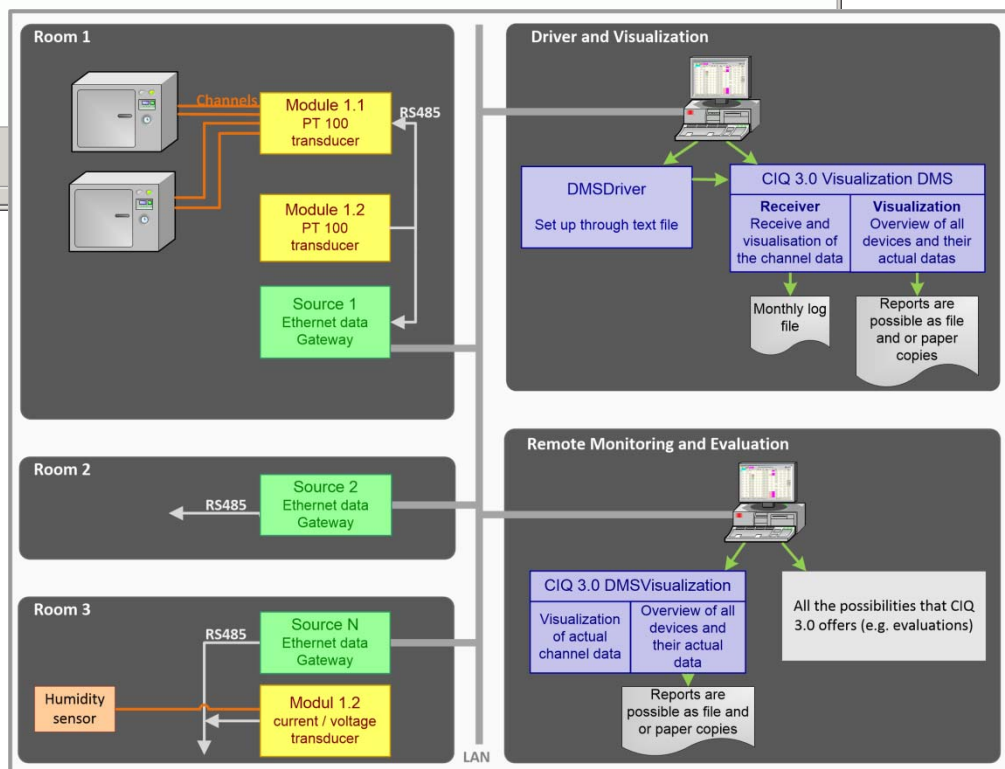
The time line of the measurements may be represented in charts and reports. Due to the concept of separating the device-specific driver on one side and the visualization on the other hand, DMS reaches a high degree of flexibility concerning connected devices and the type of tracked values.

Belegung abgelaufen!

**DMS - Distributed Monitoring System**

**CIQ 3.0**

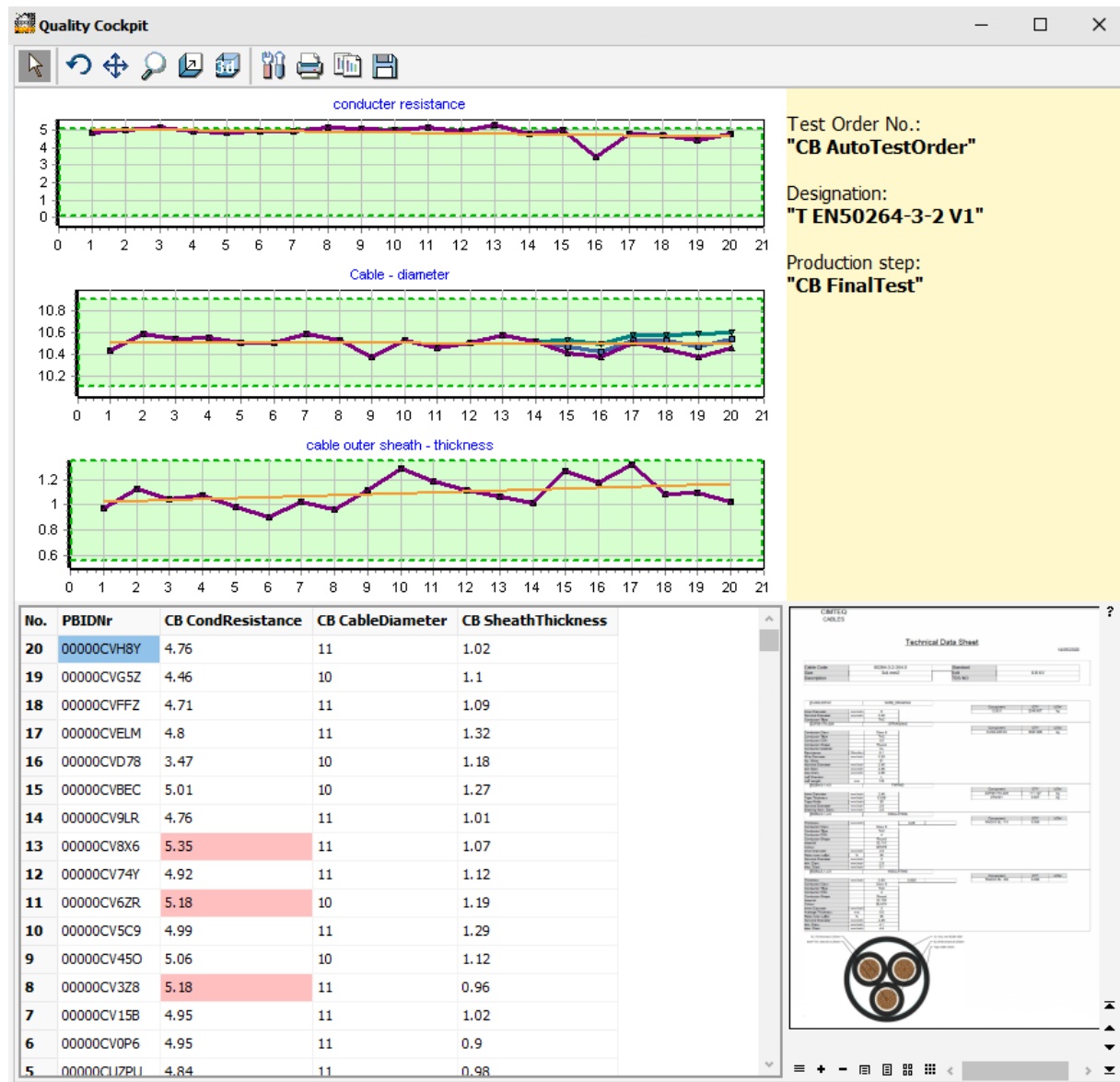
Nr.	Gerätenummer	Status	Start Belegung	Ende Belegung	Soll Temp.	Toleranz Temp. Minus	Toleranz Temp. Plus	Letzter Zyklus	Letzte Messung Temperatur	Temperatur	Summenfehler	Letzte Messung Feuchte	Feuchte	Bediener	Bemerkung	Start aktuelle Messprobe
1	20080829 132221 5	Nicht belegt						01.09.2008 12:18:22:765	01.09.2008 12:18:22:718	18,79	IO					29.08.2008 13:43:00
2	Raum 01	Kontinuierlich						01.09.2008 12:18:22:765	01.09.2008 12:18:22:718	18,79	IO					01.09.2008 12:17:25
3	Schrank 01	Kontinuierlich	29.08.2008 13:23:00		20,00	3,00	3,00	01.09.2008 12:18:22:765	01.09.2008 12:18:22:718	18,79	IO	01.09.2008 12:18:22:718	27,85			29.08.2008 14:19:00
4	Schrank 02	Belegt	29.08.2008 13:24:00	30.08.2008 13:24:00	20,00			01.09.2008 12:18:22:765	01.09.2008 12:18:22:718	18,79	IO	01.09.2008 12:18:22:718	27,85	Schad	KA01/KA02	29.08.2008 14:20:00
5	Schrank Feuchte	Belegt	29.08.2008 13:25:00	31.08.2008 13:25:00				01.09.2008 12:18:22:765			IO	01.09.2008 12:18:22:718	27,85	Schuld	nur Feuchte	29.08.2008 13:43:00



## 12.7. The CIQ Quality Cockpit

The CIQ 3.0 Quality Cockpit was development enabling to provide a clear overview of the global production situation. It can be fully customized and extended according to the user need. For example, following information could be displayed:

- Graphical representation of test values and trends
- Setup specifications for the production of the current order
- Test results of the various samples or of each produced item
- Test situation after each production step such as: after insulation, twinning, stranding, jacketing, packaging,....
- ....

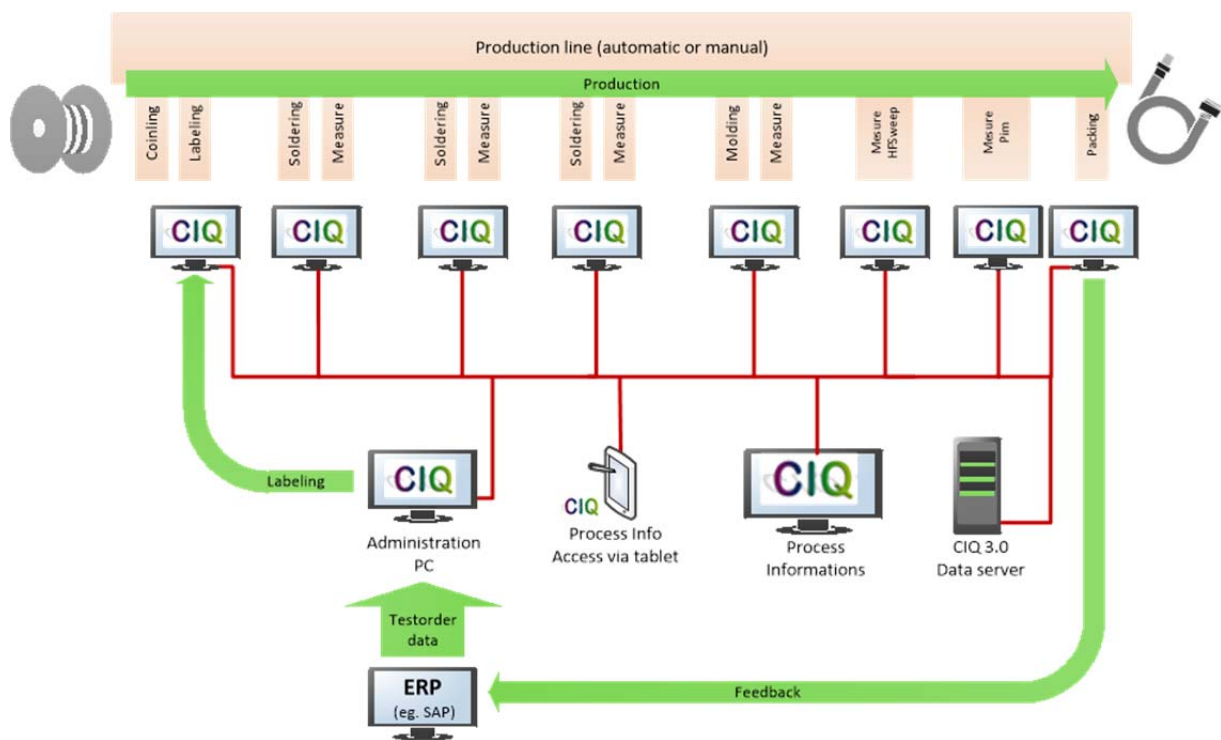


### 13. Example of user specific customizations/developments

CIQ 3.0 can be fully customized to user needs. Even with its specific design for the cable industry it remains a Quality Data management system and can also be adjusted and used for other purposes than only products based on length management.

For example a specific application was developed for monitoring manual or automated components assembly lines, for eg. for manufacturing connectors. Whereas SoftDLC is aimed to continuous production flows, this module was targeted for supervising the production of individual parts.

In this example a workpiece carrier is transported from one production step to the next one. At each manufacturing step, one or several operations are carried out. This consumes materials and/or requires tests/measurements. The part can also receive a label with a serial number and in some cases additional stickers. Only faultless components are packed at the end of the process. Rejected products are stored separately. After detecting an error in a production step, no further work or tests are carried out but the affected workpiece carrier is only transported further ("empty transport").



Parallel to the progress of the workpiece carrier through the production stations, a communication between the manufacturing plant and the CIQ 3.0 module is taking place. The actual values and operational information (e.g., workpiece carrier number) are managed by CIQ.

This module handles the deployment of:

- Product information
- The collection and management of traceability data
- Label printing
- Performing and evaluating performance measurements
- The acquisition of the any other relevant measurement and process values
- Storage and management of data
- Long-term archiving
- The transfer of data extracts to other computer systems (for example SAP, SQL database)
- The post-processing of faulty detected or repaired parts
- And the evaluation of data (e.g., protocols and control charts)

## 14. Mask Editor “WSForm” script language

The operating interface of CIQ 3.0 can be customized to specific requirements and adjusted at any time through the WSForm Editor (**WEKAScript Form Editor**). The user himself may configure the Graphical User Interface to meet any specific requirements of the processes. The Editor helps the user to solve the following tasks:

- Edit any desired form and insert all required components
- Actively trigger events
- Define the layout of the process data display

It makes available components for the design of control buttons, labels, input windows, displays, graphics and lists.

Among others, following tasks can be realized by using available WEKA Script functions:

- Display, store, delete, modify or reject measured values
- Input data such as order no., sample no., recipe or text of any kind
- Display values and respond to various events generated outside of the CIQ environment
- Graphical display of data such as curves, trends or histograms

The screenshot displays the WEKAScript Form Editor interface. The main window contains a script editor with the following code:

```

else
  FANr:= '';
  Result:=False;
end if;

if Result then
  if Exist(AW.Aufträge [FANr]);
    then
      FANrGeprüft:=FANr;
      FANrBesGeprüft :=AW.Aufträge [FANr].Bezeichnung;
    else Result:=False;
    end if;
  if(AW.C.Testmeldung('FANr: gueltig? FANr:'+FANr);
  and FANrGueltig);
  //
  // AVO überprüfen anhand erlaubter AVOListe --- notwendig??
  function AVOGueltig (AVO :String) :boolean;
  begin
    Result:=False;
    var AnsAVO : Integer := SetExtractCount(ErlaubteAVO, '', 0);
    for i : Integer := 1 to AnsAVO do
      Result:=SetExtractWord(ErlaubteAVO, '', #0, i);
      if Result then
        AVO:=i+'-AVO';
        break;
      end if;
    end for;

    if Result then
      if Exist(AW.Aufträge [FANrGeprüft].Arbeitsgänge [AVO]);
        then
          AVOGeprüft:=AVO;
          AVOBesGeprüft :=AW.Aufträge [FANrGeprüft].Arbeitsgänge [AVO].Prüfplan.
          Bezeichnung;
        else Result:=False;
        end if;
      end if;
    end if;
  end if;
end if;

```

The Object Inspector panel shows the following properties for 'WSPageControlHaupt: TWSPageControl':

About	
ActivateSound	
ActivePage	ETabSheetMessung
ActiveTabColor	Silver
ActiveTabFont	(TFont)
Align	alClient
AlignWithMargins	
AlphaForImages	
anchors	[akLeft,akTop,akRight,akBottom]
BitmapActiveTab	(None)
BitmapCloseButton	(None)
BitmapTab	(None)
Caption	
CaptionID	0
CenterTabCaption	
CloseButtonMode	cbmNone
Color	Window
Constraints	(TSizeConstraints)
Cursor	crDefault
CustomHint	
DefaultPage	
DockOrientation	doNoOrient
DockSite	
DragCursor	crDrag
DraggablePages	
DragKind	dkDrag
DragMode	dmManual
DrawFocusRect	
Enabled	<input checked="" type="checkbox"/>
Flat	
FlatTabBorderCok	BtrShadow
Font	(TFont)
Height	556
HelpContext	
HelpKeyword	
HelpType	htContext
Hint	
HintID	0
HotTrack	
HotTrackFont	(TFont)
ImageForm	
Images	
InactiveTabColor	BtrFace
Left	0
Margins	(TMargins)
MinTabHeight	40
MinTabWidth	40
Multiline	
Name	WSPageControlHaupt
ParentColor	<input checked="" type="checkbox"/>

The Object TreeView shows the following structure:

- FormDAImportStartbild
  - WSPageControlHaupt
    - ETabSheetMessung
    - ETabSheetTabelle
      - WSPanel3
        - WSPanelTabelle
        - WSPanelFuß
        - WSPanelKopf

The preview window shows a form titled 'FormDAImportStartbild' with the following fields and buttons:

- Auftragsnr: 222222222222 Fehlermeldung Prüfauftrag Arbeitsgang
- Prüfer: WSLabelMeldungPruefer
- Bemerkung zur Messung: [Text area]
- Reißdehnung: [Form fields for 'vor Alterung' and 'nach Alterung']
- Festigkeit: [Form fields for 'vor Alterung' and 'nach Alterung']
- Lichtbeständigkeit: [Form field]
- Bedruckung: [Form field]
- Flammtest: [Form field]
- Bemerkung zur Probe: [Text area]
- Buttons: 'aus Datei lesen', 'Prüfung kontrollieren und abschließen', 'help'

## 15. Flexibility

A key feature of the CIQ 3.0 system is that it can be easily adapted to the needs of specific production requirements. This flexibility is achieved through a series of tools comprising freely parametrisable software modules:

- Test plans and test orders
- Text in testing instructions
- Reports for documentation purposes
- Product labels and product documents
- Statistical evaluations
- The data storage/archiving system
- Process capability certificates
- Screen masks
- The connection of measuring devices
- The individual adaptation to standards and specifications
- Communication and interfacing with other systems

To prevent unauthorized use, CIQ 3.0–QDM comprises comprehensive features for the administration of user privileges. Each user can be assigned individual access rights.

## 16. Tools

CIQ 3.0 QDM offers a wide range of different tools for most various tasks.

- Info: Provides status information of the system in operation.
- Diagnosis: Diagnosis of the communication (interfaces) with test equipment.
- Editor: File editor, e.g. for work instructions and formulas.
- EV Mask: The EV evaluation for simplified evaluation (see §7.1)..
- WSForm Editor: Screen masks editor.
- WEKAScript-Editor: Editor of WEKAScript modules and expressions (see §14).
- Report generator: Production of exports, reports and labels.
- Special interfaces: For communicating with testing equipment and other systems.
- DUsIS: Distributed user information system.
- Help: Standard help and freely user definable help texts.

## 17. Archiving

CIQ 3.0 QDM includes functionalities for long-term storage of data, test plans and test orders within the system or on external storage media.

Data stored with older versions of CIQ 3.0 QDM can of course also be retrieved and evaluated by later versions. Some minor converting might be necessary.

Renewed data analyses in the event of customer complaints or as part of a product development process are possible at any time without much effort.

Data storage and traceability for legal purpose and certification requirements is insured in order to comply with today's and possible future legal regulations.



## 18. Systems Requirements

For use in a multi-PC environment, CIQ 3.0 is designed for client/server operation via TCP/IP or for direct access to the file server. Client/server operation requires the existence of a data server.

All workstation computers communicate via a single TCP/IP link with the data server. Generally any commercially available desktop PC using supported Windows versions can be used as a workstation computer. Usually, it is not necessary to upgrade existing workstation PCs to the latest state of the art.

## 19. Installation

The original installation and start-up of the system will be performed by AESA. New CIQ 3.0 software versions are offered on a regular basis and can be installed by the user. As the installation process is not complicated, on-site services by AESA are usually not required. All customer-specific configurations will, of course, be preserved.

Configurations incorporating data servers can be implemented in such a way that new software versions are installed exclusively on the server. All workstations within the network will then be automatically be updated when the program is started the next time.

CIQ 3.0 does not require any bulky external libraries, largely preventing version problems caused by the installation of other programs.

## 20. Service and Maintenance Contracts

AESA offers optional service and maintenance contracts. These provide the user with the following benefits:

- Immediate use of the latest and interim program versions
- Supply of test licenses for testing and optimizing functionalities without affecting the “active production process”
- Most current documentation
- The latest help texts
- The latest standard report formats
- Troubleshooting support
- Preferential handling of upgrade requests in CIQ 3.0
- Avoidance of expensive updating fees in case of any software version update required by changes in the Operating System platform or when integrating new devices in the existing system



### SOME CUSTOMERS ACROSS THE PLANET



AESA SA  
Rue de Neuchâtel 24  
CH-2022 Bevaix  
T +41 32 841 5177  
F +41 32 842 4865  
aesa@aesa-cortailod.com

AESA GmbH  
TBG TechnologiePark Bergisch Gladbach  
Friedrich-Ebert-Strasse  
D-51429 Bergisch Gladbach

AESA CN  
1014B Zobon Business Park  
999 Wangqiao Road, Pudong New Area  
CN-200120 Shanghai  
T +86 21 50560188  
aesa@aesa.com.cn

[www.aesa-cortailod.com](http://www.aesa-cortailod.com)



[www.aesa.com.cn](http://www.aesa.com.cn)