metsoDNA CR

A complete automation platform for better process results

metso
Expect results

metsoDNA CR

Community for Results

metsoDNA CR is a new generation automation and information platform. It covers all controls for process, machine, quality, and drives, as well as mechanical condition monitoring in a single platform. metsoDNA CR can be extended from the micro system – including the world's smallest fully functional user interface – to mill and plant-wide systems supporting global organizations.
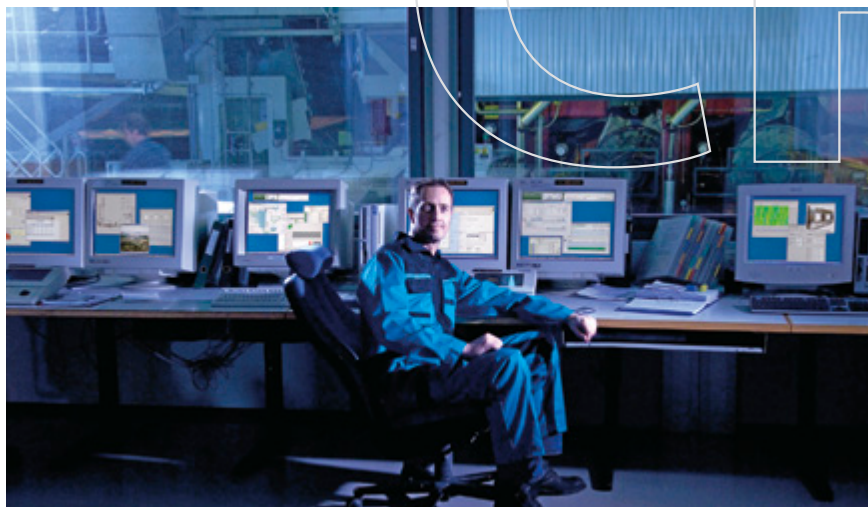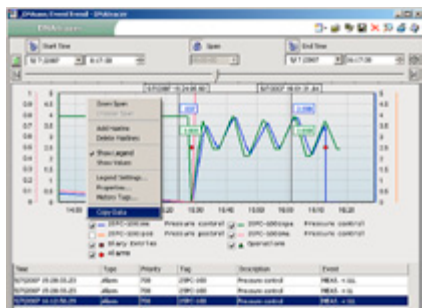
A true Community for Results

Production work at today's pulp, paper, energy and process industries requires constant and intensive utilization of information. Production professionals, such as operators, production managers, maintenance and development engineers work hard to keep up with their performance goals. The best results are achieved when professionals work together towards the same goal.

metsoDNA CR links the whole organization into one powerful Community for Results.

metsoDNA CR provides tools that enable sharing information and knowledge thus allowing plant-wide communication and discussion. You get all of this regardless of time or place, from the control room night shift to the daily operations at headquarters. An organization that can share the same knowledge and exchange the same experiences will be able to strive for the same goals as a true Community for Results.
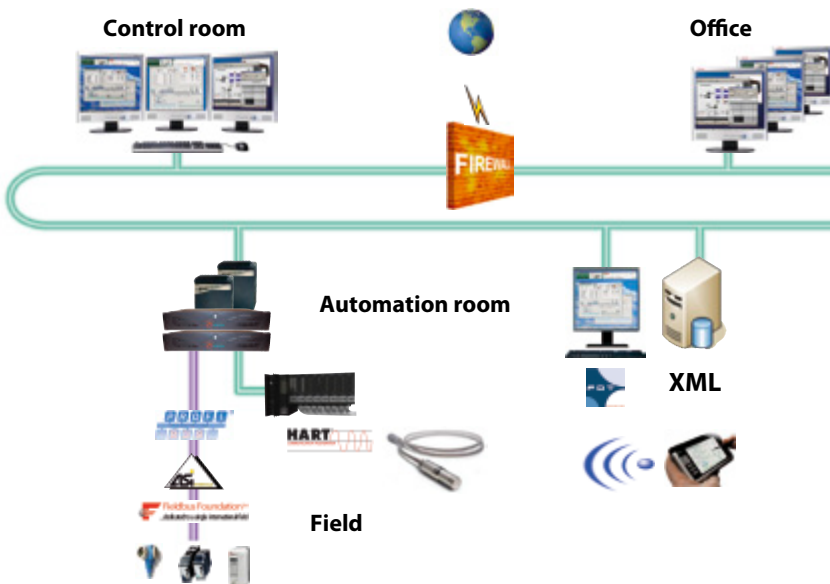
Results with a capital R

When an organization works as a community to achieve their results together, all the people have access to the same facts and they can make the right decisions. This leads to better production efficiency, improved disturbance management and effective cooperation over organizational borders. Operations like production and maintenance can be seamlessly integrated.
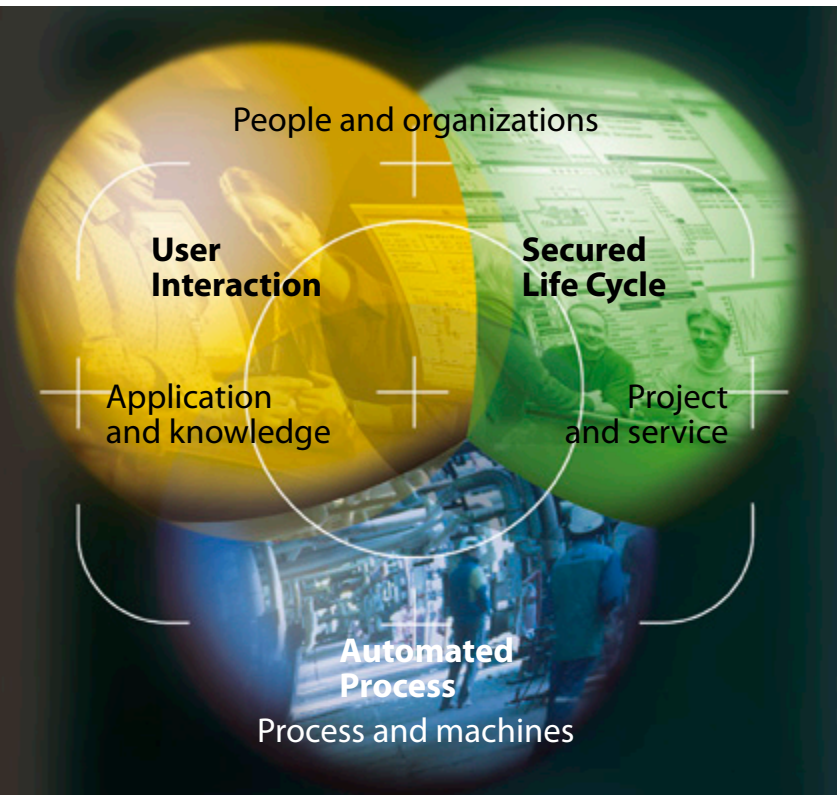
Easy access to information helps plants to achieve their goals for: optimum quality, performance, environment and cost – the Results with a capital R.

Did you know…?

Community refers to a group of people with the same goal.

A single platform *for all tasks*

People and organizations

User Interaction

Secured Life Cycle

Application and knowledge

Project and service

Automated Process

Process and machines

Community for Results

metsoDNA CR's platform architecture links automation and information activities together. Deeply rooted in customer needs, this platform offers an answer to production challenges at today's plants and mills.

Advanced User Interaction tools serve the needs of people and organizations. Role-based and task-oriented interfaces allow users to concentrate on critical production information.

With Life Cycle tools, you can build and maintain Automated Process solutions, controls and optimization applications in response to your plant requirements. As a result, your processes will be precisely controlled for the best performance the way you want.

All of this is based on skills and knowledge of Metso experts. Expertise gained through decade's of experience automating various production processes.

Within the metsoDNA CR platform, these elements compose a new asset in reaching better results – the Community for Results.

Change has become a rule in the pulp, paper-making, process and energy industries. This involves continuous development in plants and mills – and the organizations running them.

metsoDNA CR develops together with your organization's needs.

Truly scalable, this automation and information platform grows from a single controller to a mill and corporate wide system. It has been designed to support the many aspects of user interaction, reliability of automated processes and the secured life cycle operation of the entire automation and information network.

Did you know…?

We have automated 400,000 MW of power production and we control altogether 150 million tons of paper and board making every year.
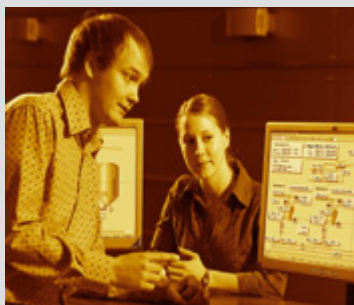
User Interaction activity seamlessly combines the tools needed by the production organization for results-oriented work, including tools for operation, reporting, analysis and community.

Automated Process activity offers efficient solutions for all process targets with high availability. It supports all controls, various field interfaces, and information services.

Secured Life Cycle activity provides tools to engineer and maintain the entire metsoDNA CR platform. It contains industrial grade security solutions, as well as upgrade and migration paths for existing systems.

User Interaction activity gathers together intuitive tools for users and communities and gives everyone from the control room to corporate management access to the same facts and information. It provides a realistic window to process events allowing users to see and interact with the production process.

Automated Process activity contains everything that runs automatically by itself. It covers all controls, various field interfaces and buses and optimizations. It supports both distributed and centralized solutions and connections to third party systems. A high safety level is achieved by integrated Safety Instrumented Systems. Comprehensive information services contain history data collection to consistent databases.

Secured Life Cycle activity ensures that your automation investment is also safe in the future. It provides methods and tools for engineering and maintaining your metsoDNA CR platform. In addition, the

integrated asset management tools allow for condition monitoring of field devices, automation system and process equipment.

When put together, these pieces will turn your plant-wide production organization into a life cycle Community for Results.

My needs are clear!

"I aim at targeted quality and production with the right cost and minimum environmental impact. I therefore need an automation and information solution that is easy to engineer, maintain and expand. Surprises are not allowed – I want to sleep at night. I also need to make my team more efficient and continuous innovation is another must. To make it all happen, I need the right platform and the right partners to build a Community for Results".

Powerful *architecture*

metsoDNA CR offers an architecture for intuitive role-based User Interaction, high availability Automated Process solutions and Secured Life Cycle management.

One platform
- For all type of controls and user requirements

High availability
- Due to industrial components
- Redundancy on all levels
- Industrial grade security

Easy maintenance
- Extensive diagnostics
- Straightforward spare part concept

True scalability
- From smallest to largest solutions
- One set of modular components
- Easy to expand

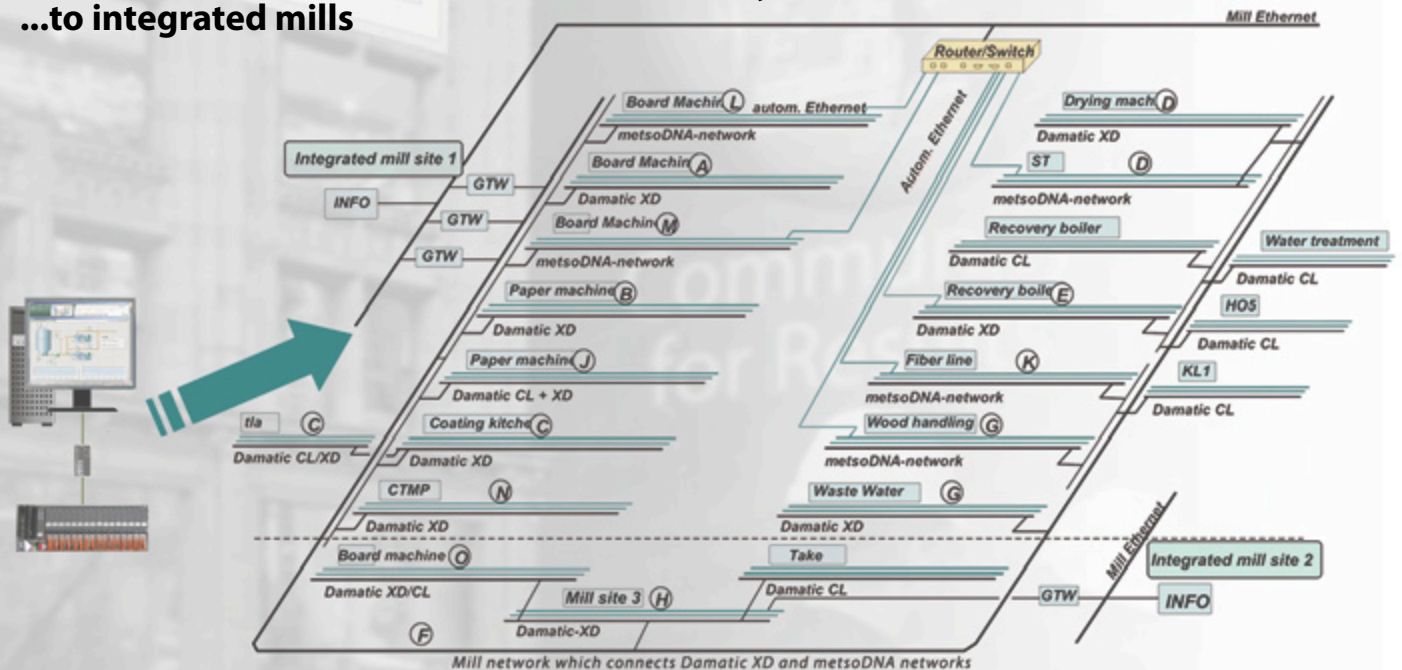### Open standard communication
- System and business integration plus field buses

Efficient engineering
- Through uniform engineering tools and reuse of applications

Scales from a few embedded I/O and a mini system...
...to integrated mills

Mill Ethernet

Router/Switch

Integrated mill site 1

INFO

GTW

GTW

GTW

Board Machine (L)   autom. Ethernet
metsoDNA-network
Board Machine (A)
Damatic XD
Board Machine (M)
metsoDNA-network
Paper machine (B)
Damatic XD
Paper machine (J)
Damatic CL + XD
Coating kitche (C)
Damatic XD
CTMP (N)
Damatic XD
Board machine (C)
Damatic XD/CL
Mill site 3 (H)
Damatic-XD

tla (C)
Damatic CL/XD

Drying mach (D)
Damatic XD
ST   D
metsoDNA-network
Recovery boiler
Damatic CL
Recovery boile (E)
Damatic XD
Fiber line (K)
metsoDNA-network
Wood handling (G)
metsoDNA-network
Waste Water (G)
Damatic XD
Take
Damatic CL

Autom. Ethernet

Water treatment
Damatic CL
HOS
Damatic CL
KL1
Damatic CL

Integrated mill site 2
GTW   INFO

Mill Ethernet

Mill network which connects Damatic XD and metsoDNA networks

One platform for operation and maintenance interaction

• Linux or Windows environments

• Enterprise integration
• Connection to the partner systems
• Safe remote user interface and data connections using VPN

• Web based reporting and analyzing

Control room
Operation, Maintenance, Reporting

Remote Connections

FIREWALL

Reporting, Analyzing

Office

Star or ring topology redundant Ethernet network

Automation room

Controls, Optimization, Connectivity

Centralized

Distributed

Engineering & Maintenance, Asset Management, Information Services

XML

Safety instrumented system

Field

• Updating layered security with hardening, anti-virus and DMZ solutions

• Information through Web Service interfaces

• Concurrent multi-client engineering

• Wireless solutions for operation and maintenance

One platform for all control applications

• Integrates major field buses and field asset management

Redundancy for:

• Ethernet networks

• Process control and gateway nodes

• Alarm server and historian

• User interaction nodes

• I/O buses

• PROFIBUS DP and FF HSE

• Power supply (battery backup)

• Fault tolerant and buffered history data collection

• Hard disks

• Redundant I/Os

Backup:

• Centralized backup

• Optional local backup on flash memory

• Archiving of backups for engineering server

• Backup of engineering and info server hard disk data on backup media

User Interaction

The ever tightening production and quality goals together with the continually expanding process control areas require effective use of information, as well as quick action in process situations. The metsoDNA CR user interface, DNAuse, brings all vital information to the user's fingertips.

DNAuse designed for production professionals

When the user interface is designed to serve the various process operation tasks, the user can concentrate on the task at hand – instead of studying the details of the user interface itself. Having tools that help with the daily tasks will also increase the willingness to utilize the right information and solve problems efficiently.

DNAuse adapts quickly and easily to the various user tasks in your plant-wide organization. You will have your task-based pictures easily at hand with just one button. The drag and drop function and online history collection configuration provide you with the freedom to focus on the chosen process variable.

metsoDNA CR User Interaction applications offer users efficient tools for operation, reporting and analysis. Community tools enable continuous discussion and collaboration and help you keep your Community for Results effective. The User Interaction activity is scalable from field to office and from small hand-held terminals to large screens on the wall.

The role of the user interface is expanded from basic operations to information and knowledge management. To manage today's huge amount of information, the user environment needs high usability. Role-based pictures provide users with targeted information that supports production, maintenance and other important plant tasks. High usability turns into better results.

Did you know…?

The high usability of metsoDNA CR tools is based on our extensive research and experience in process control. Systematic methods are applied in development. We have accomplished hundreds of field studies and acquired feedback from thousands of deliveries over 20 years.

The smallest control room ever.

intuitive tools for users and communities

Intuitive tools for every role and task
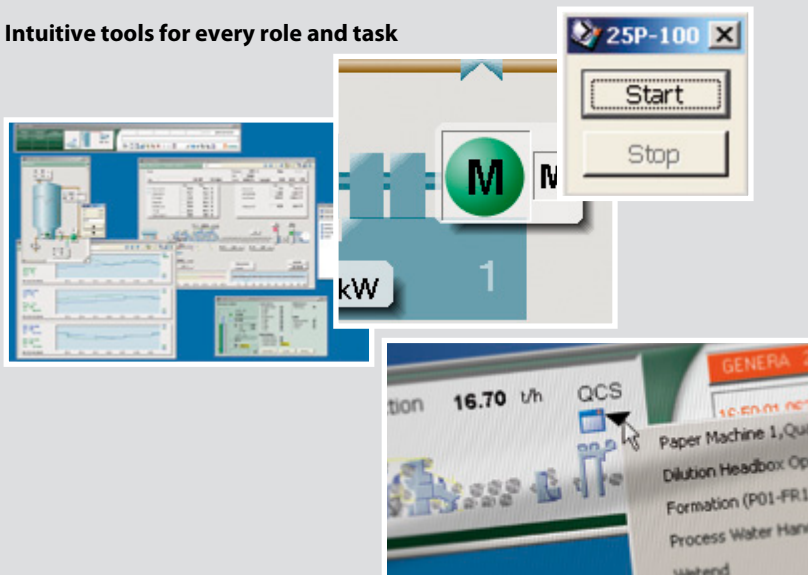
Operation tools – make your work more productive than ever

Intuitive and straightforward DNAuse enables quick problem solving and good decision making. Functions, such as graphical navigation, point and click, and drag and drop are specially designed with production professionals in mind. Selecting relevant information can be done easily by arranging, resizing and panning of desktop windows, as well as by storing the chosen picture or entire desktop layout.
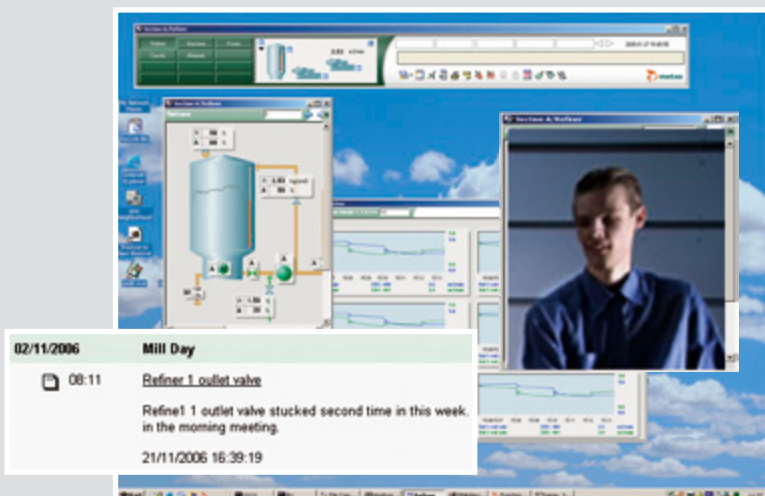
One Click

Deeper Analysis

Reporting tools – integration builds situation awareness

DNAtracer integrates process data and alarm functions enabling quick alarm analyses directly from a trend – with one click. You don't have to search for relations between data and events because they are made clearly visible. More data can be added simply by dragging and dropping. The data from various sources can be combined by DNAreport, which integrates events, operations, log book entries and process data into a single trend or report. DNAreport further allows for line-based parametrizing of reports.

A web-based portal, metsoDNA CR My Community, ensures that all information is continually available wherever needed.

Community tools – enabling enterprise-wide collaboration

Discussion tools integrated into process operations allow teams and organizations to share the same facts and visions. The production organization's logbook, DNAdiary, ensures that the same facts and opinions are distributed to everyone. It offers a discussion forum of production events within and between organizations. Operators can search for similar situations and process events, and make decisions based on the latest facts and opinions.

User Interaction

Quickly to the roots of the problem

Production people have to be able to react to various process incidents. For them, it is crucial to know what has really happened and what the reasons behind it are.

DNAuse facilitates efficient alarm operations with 1 ms resolution showing the sequence of events that leads quickly to the roots of the disturbance. In addition to that, there is an alarm list that shows not only the activation time, but also the time of acknowledgement and inactivation. For advanced analysis, you can utilize DNAreport alarms and events solutions.

Event Browser is a unique way to handle alarms and events. Besides alarm and event information, it is able to show additional data in the event row. For example, it can display the live value of the alarming measurement that shows how the situation is developing and the alarm limits from the time of the alarm. Efficient alarm analysis is ensured with search, sort and filter capabilities for all events. All alarms and events can be also stored into history database, so Event Browser can be used in the history mode for later troubleshooting.

In DNAuse, every single process picture can be turned into the history mode "time machine". This replay feature allows users to review interesting past process situations or disturbances, which helps improve process operations. As such, it offers an excellent analysis tool to prevent future production problems. This function is available as a basic feature without any additional configuration.

History mode indication   **Start History mode**

analysis and problem solving

DNAhelp

DNAhelp describes how the control is working. With clearly written text, it ensures that all users can gain the same understanding of the control functionalities. Seamlessly integrated into the operator interface, the help function is available also in the office. DNAhelp displays live interlocks, for instance, for motors. It thus aids in identifying production problems and speeds disturbance solving. It shows the first interlock that has caused the problem and allows operators to add comments online. The same DNAhelp is used for machine, process and drive control applications.
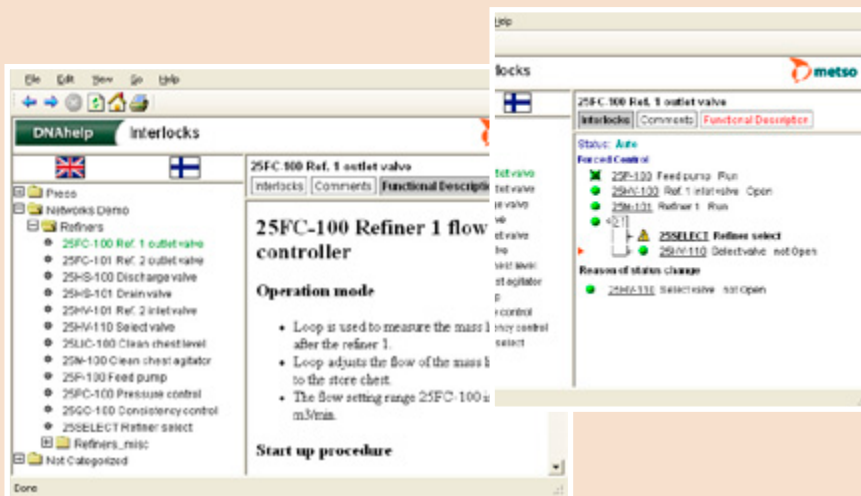
DNAuseEditor

DNAuseEditor is a wysiwyg (what you see is what you get) picture design tool. With this tool you easily create impressive process pictures using an extensive library of three dimensional devices, tanks, pipelines and other process components. The editor is compatible with your existing Damatic XD, Damatic XD*i* and metsoDNA pictures.

Operator tools
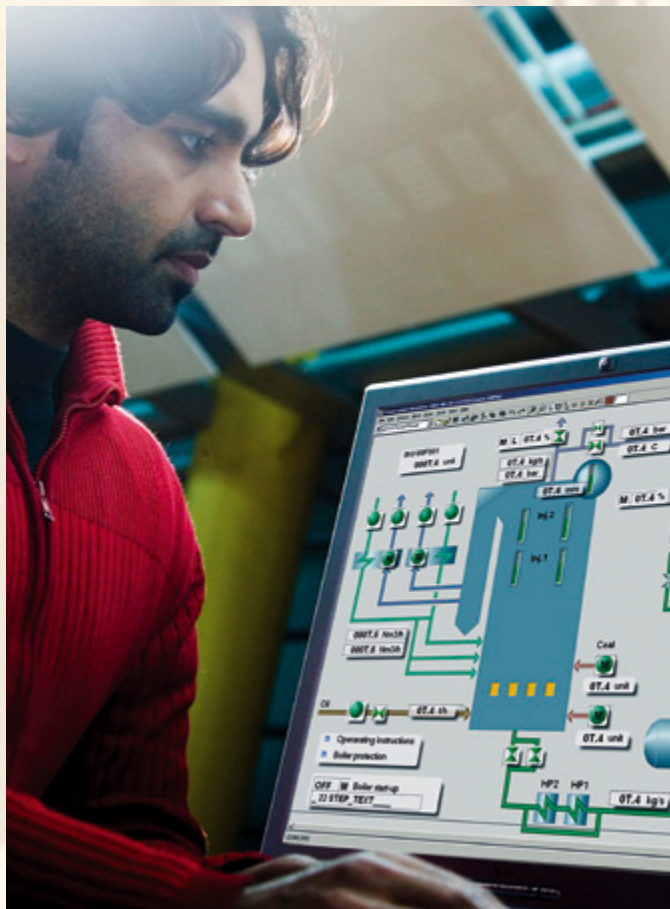
Products

DNAuse	Operator interface for control room
DNAview	Process control interface for remote usage
DNAals	Alarm and event server
DNAhelp	Real time interlocks and functional descriptions for machine, process, drive, and quality control applications

Performance

Max. number of pictures	No practical limit
Max. number of objects per pictures	No practical limit
Picture update time	Typ. 1 s
Max. # picture windows per operator interface	No practical limit
Max. # loop windows per operator interface	No practical limit
Motor start operation -> response at binary output	Typ. 1 s
Alarm resolution and accuracy	1 ms

Hardware

ACN PO, ACN AS,
Windows workstation

# User Interaction

metsoDNA CR – My Community

Getting data from the process is not enough, but it also has to be distributed, shared and further processed in the community. metsoDNA CR My Community web portal ensures seamless interaction between people and processes and – what is more – also between people and communities. It contains all reporting, analyzing and community tools individually set up for each user. No separate user management is needed. A web browser is all you need to join the metsoDNA CR My Community.

My Community solutions are based on DNAreport. They all have similar basic logic including: timeline, parameter modification, saving of modified reports and exporting to PDF or Excel.

DNAreportDesigner for report development in metsoDNA CR

DNAreportDesigner is a graphical tool that enables users to create web reports without programming skills or knowledge of different databases. Intuitive drag and drop functionality seamlessly connects different data from Information Services with graphs, texts or numerical values in the report. As it is dynamic, the reports allow end users to change the report parameter runtime in My Community Portal, and then save the modified report and its changed parameters without using DNAreportDesigner.

The reports are saved in an open xml format. The saved reports are moved automatically to My Community Portal and they are immediately accessible by all users according to their user access rights.
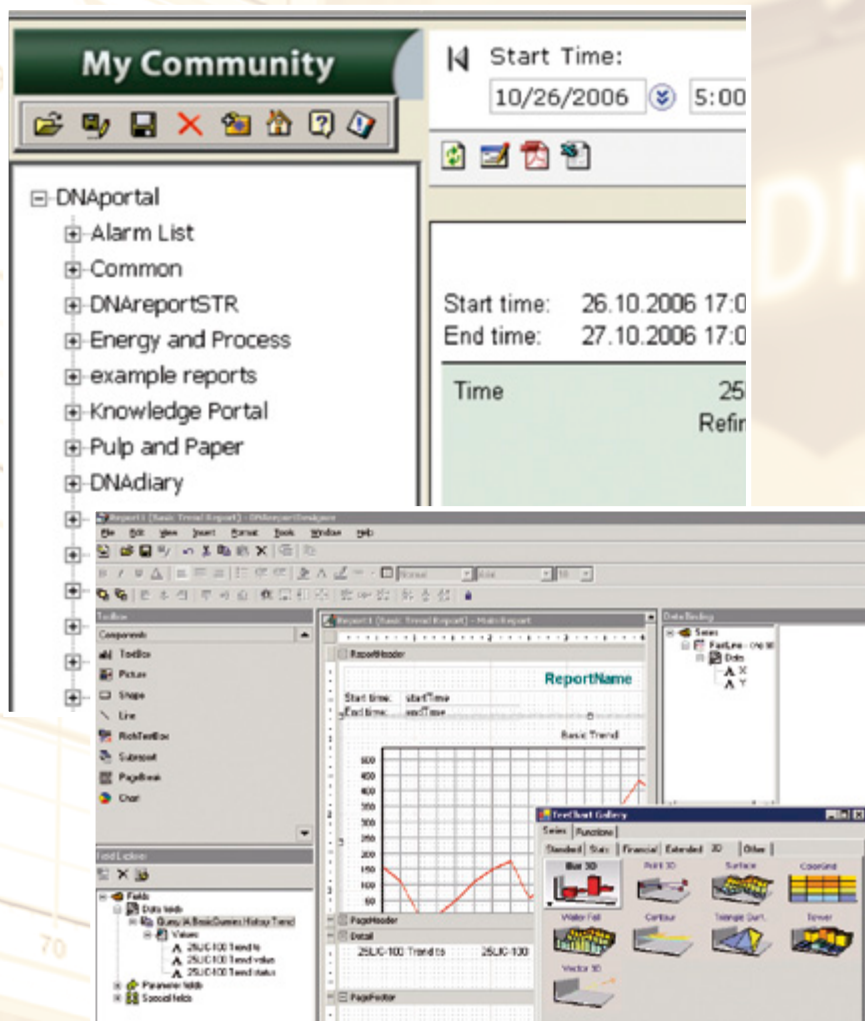
Reporting and analyzing tools

Products

|	
DNAreport	Reporting environment with development tools
• DNAreport STR	Summary, Total and Runtime Solution
• DNAreport PAM	Plant Asset Management
• DNAreport AE	Alarms & Events Analyzing
• DNAreport AAE	Advanced Alarms & Events Analyzing
• DNAreport SOE	Sequence of Events Analyzing
DNAtracer	Analyzing tool for trends and events
DNAentry	Manual data entry
DNAdiary	Production organizations logbook

Performance

Concurrent users	No practical limits

Hardware

DNAuse environment or office PCs

# *sharing the same experiences*
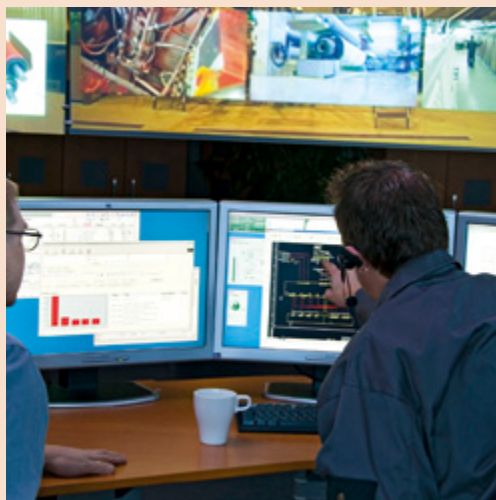
"Earlier when I went to the control room, I first asked what has happened. Now with metsoDNA, I already know the facts and we can start from another level."

…Says a pulp mill production manager who has used DNAdiary for discussions and process events and DNAreport for trending and reporting at several departments of the mill.

DNAreport case: Start-Up Analysis

The DNAreport application provides the plant's operation and maintenance personnel a tool for start-up monitoring and analyzing. It automatically records the start-up time enabling deeper analysis later on. A long-term history data storage comparison of start-ups over a wider time range. The Start-Up Analysis application can be applied to any process component or unit in the plant. As an open solution, it can be customized in response to the specific requirements of each plant.
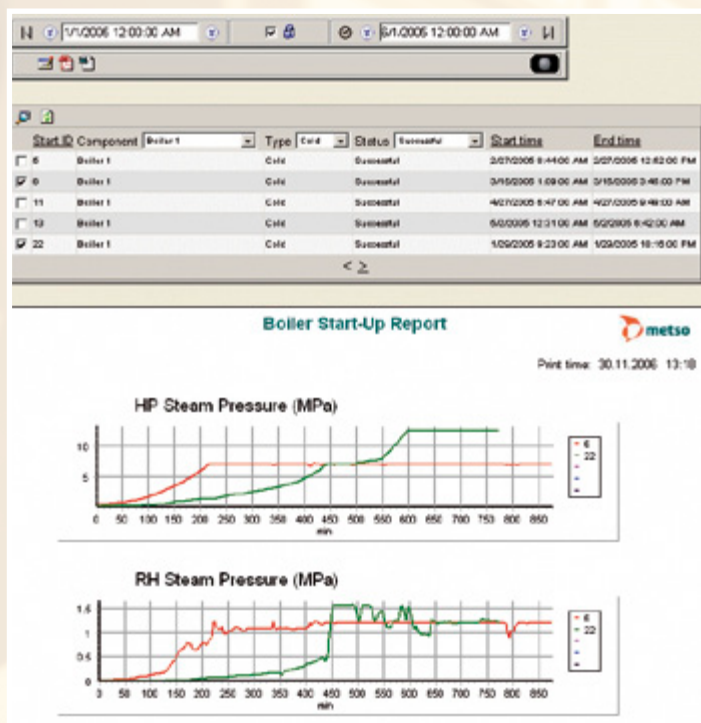
DNAreport case: Pulp drying machine OEE

Seeking better production efficiency requires tools to see what really has happened. With DNAreport, performance reporting is easy.

The idea behind this reporting solution is to give mill people an overall picture of the pulp drying process performance: availability, efficiency and quality. OEE (Overall Equipment Effectiveness) is calculated for each machine section and for the overall process. Key figures are presented as summary reports and detailed analysis reports.

With DNAreport it is easy to combine data from different data sources in one single report. The versatile calculation environment enables efficient calculation of the key figures.

Automated reporting saves time and makes the performance data usable and reliable. Saving the data history enables long-term reporting and follow-up of trends. It helps develop optimal methods for the mill operations.

Automated Process

metsoDNA CR Automated Process activity offers one seamless platform for even the most demanding control and information management tasks.

Combining all applications into uniform control hardware and software means clear benefits for operation and maintenance.

Maintenance is realized with one set of engineering tools and methods. There is no need for additional training and one set of spare parts is enough for all control types. Having one and the same interface for all controls also enables uniform operation and saves users from learning several systems.

All your needs: from basic to advanced

metsoDNA CR provides its users with integrated analog and logic controls. Basic controls include reliable measurements, alarm detections, PID, motor and valve controls, group starts, sequences and so on. Fast control cycles can be utilized when needed, for instance, for paper machine drive controls.

When the basic controls are not enough, plants can aim at better results by using advanced controls on the same ACN platform. These controls can be implemented with sophisticated tools and technologies, such as fuzzy logic, neural networks, Java programming and multivariable controls. They have been specially designed to help mills strive for continuous performance improvement and optimization.

Vibration monitoring is natural part of metsoDNA CR

metsoDNA CR is the only platform which can do all types of controls and asset management functions within one platform. It means that controllers, I/O infrastructure, operation and analysis tools, and engineering tools are the same used in process controls, optimizations, vibration monitoring applications and field device asset management solutions.

If you want to monitor vibrations DNAmachineAssessor is your tool. With the tool you can monitor vibrations of e.g. a rotating machine, such as motor, pump or gearbox, you can just add additional I/Os to the existing metsoDNA CR. For a larger condition monitoring application, a dedicated process controller may be needed. User can easily compare any process control data to the vibration monitoring data, e.g. in a trend curve to make analysis of the process behavior. For deeper analysis purposes, Synchronized Time Average (STA) curves or frequency analysis pictures are available. This unique approach to combine mechanical condition monitoring and process controls in one system gives the user clear benefits in analysis, operation and maintenance.

Automated Process activity contains everything you need for process, machine, drive and quality controls and optimization as well as mechanical condition monitoring. The efficient ACN control node product family ensures a dependable platform for all your controls and external connections.

These control nodes support the modern ACN I/Os and main industry field buses, such as PROFIBUS, FF and AS-i. Standard links like OPC, Ethernet and serial links ensure excellent connectivity to third party systems.

By utilizing our consistent and comprehensive information services, you create a uniform solution for data storage and calculation. You can integrate this solution even into enterprise level applications, such as the mill's ERP, CMMS and LIMS systems.

Safety instrumented system components can be integrated into metsoDNA CR.

One platform for all needs

integrated safety instrumented system

Machine condition monitoring

Field device asset management

Drive controls

Quality controls and process optimizations

Machine controls

Process controls

for versatile high availability

metsoDNA CR energy industry auto-mation covers solutions for conventional power cogeneration, combined cycle, as well as energy from waste plants.

The advanced pulp industry solutions, based on fuzzy logic and multivariable controls, are used in many state-of-the-art pulp mills.

The world's fastest paper machines run with Metso automation technology that facilitates a complete set of process, machine, drive, quality and profiling controls based on the metsoDNA CR platform.

metsoDNA CR is used for all kinds of industry solutions, such as large oil refineries, marine automation and in the food industry.

ACN application and control nodes

The ACN process control node product range features a reliable platform for basic and advanced controls, fast logic, and versatile calculations. Together with ACN I/O and field bus solutions, it offers real user benefits, including down to 20 ms control cycles, as well as scalability even to the smallest systems. The same ACN platform is used for connecting third party systems.

Reliability is secured by using industrial components, an advanced spare part concept, redundancy and a stable network structure.

ACN controller node family:

ACN SR1 small rail mounted controller
• Embedded field installations
• ACN I/O

ACN C20 and C65 compact controllers
• Field and centralized installations
• All field buses
• ACN I/O

ACN RT high capacity rack mounted controller
• Centralized installations
• All field buses
• ACN I/O
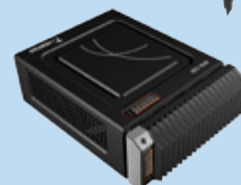
Did you know…?

ACN control nodes are application compatible with each other. Older Damatic XD, Damatic XD*i* and metsoDNA applications are compatible with the latest metsoDNA CR.

Integrated Safety Instrumented System

Safety Instrumented Systems (SIS) are used in the process and power industries to prevent or minimize the consequences of dangerous process situations. metsoDNA CR offers a TÜV certified integrated safety solution. It also satisfies the NFPA 85-2004 specification for burner management safety systems.

• A uniform user interface with integrated cessing
• Fast Ethernet interface between SIS units and control node
• Full scope of redundancy
• Diagnostics covering safety related I/O's and communication
• Safety application with IEC 601131-3 configurator
• Integration to process controls
• Safety integrity levels (SIL) 1-3

The Safety Instrumented System interface can be connected to the ACN control node. All the I/O and diagnostic data from the SIS is transferred to the ACN control node. The interface is configured by using the function block engineering CAD.

Automated Process

ACN I/O

The ACN I/O is an I/O family that enables the use of the same I/O in both centralized and distributed solutions.

There are two series of the ACN I/O units: M80 and M120. M80 series includes units for a low current/voltage analog/digital applications. M120 series units are used when high voltage isolation between the channels is needed or when digital interface is needed for 120...240 V DC/AC line voltages without external relays.

ACN I/O is connected to ACN via Ethernet and it offers easily accessible field connections as well as a wide range of cross connection and field wiring possibilities.

You will gain:
- Control speed down to 20 ms
- Extensive diagnostics
- High accuracy of AI (16 bits) and AO (14 bits)
- 1 ms sequence of events
- Hot swapping of I/O modules
- HART
- G3 environmental specification
- High packing density
- 1500/2200 VAC isolation (M120)
- 120/240 VAC I/O without intermediate relays (M120 DI/DO)
- Redundant I/Os (M120)

ACN I/O M80 units

M80 analog units

AI8C	8 ch 0/4 ... 20 mA Analog Input
AI8CN	8 ch 0/4 ... 20 mA Analog Input, used with active field equipments
AI8V	8 ch 0/2 ... 10 V Analog Input
AI8H	8 ch 0/4 ... 20 mA HART Analog Input
AI2B	2 ch -40 ... +40 mV Analog Input
AO4C	4 ch 0/4 ... 20 mA Analog Output
AO4V	4 ch 0/2 ... 10 V Analog Output
AO4DV	4 ch -10 ... +10 V Analog Output
AO4H	4 ch 0/4 ... 20 mA HART Analog Output

M80 digital units

DI8P, DI8N, DI16P	8/16 ch Digital Input, self-powered short-circuit protected, opto-isolated, PNP/NPN input (24 VDC)
DI8U	8 ch Digital Input, totally floating, opto-isolated, IEC 61131-2 decision levels for 24 DC/AC inputs
DI8M	8 ch Digital Input, with circuit monitoring
DO8P, DO8N, DO16P	8/16 ch Digital Output, self-powered relay output 200mA/24 VDC
DO8RO, DO8RC	8 ch Digital Output, totally floating change over contact, 1.0 A/50 VAC or 1.0 A/75 VDC
DO8SO	8 ch Digital Output, totally floating solid-state contact with supply/ channel, 0.5 A/40V

Other M80 units

FI4V, FI4S5, FI4S24	4 ch Frequency Input or 2 ch SSI Input 0 ... 400 kHz, 5 V or 24V
TI4W3, TI4W4	4 ch Temperature Input for Pt100 sensor 3-wire or 4-wire connection
HC8	8 ch HART Communication Unit, no analog current signal measurement

M120 analog units

AII8C/ AII8CN	8 ch 0/4 ... 20 mA Analog Input, 1500 VAC isolation
AII8V	8 ch 0/1 ... 5 VDC Analog Input, 1500 VAC isolation
AII4H	4 ch 0/4 ... 20 mA HART Analog Input, ch to ch isolation: 1500 VAC
AOI4C	4 ch 0/4 ... 20 mA Analog Output, 1500 VAC isolation
TCI8	8 ch temperature Input, 1500 VAC isolation
TII4W3/ TII4W4	4 ch RTD 3-wire/4-wire Temperature Input, 1500 VAC isolation
AIF8V	8 ch 0 ... 24 VDC Analog Input, for acceleration sensors, 1500 VAC isolation
AIF8T	8 ch trigger Analog Input, rotation speed signals from the synchronization sensors (for example, RTS-226), 1500 VAC isolation

M120 digital units

|	
DII8P24	8 ch 24 VDC Digital Input, 1500 VAC isolation, common ground
DII8P48	8 ch, 48 VDC Digital Input, 1500 VAC isolation, common ground
DII4U120, DII8U120	4/8 ch 120 VAC Digital Input, 2200 VAC isolation
DII4U240, DII8U240	4/8 ch 240 VAC Digital Input, 2200 VAC isolation
DII4U125	4 ch 125 VDC Digital Input, 2200 VAC isolation
DOI4RO, DOI8RO	4/8 ch Relay Digital Output, 2200 VAC isolation
FII4	4 ch 24 VDC PI, 1500 VAC isolation

IPS	I/O Power Supply Power supply for I/O group max. 16 I/O units / IPS
IBC	I/O Bus Controller Connects I/O group to ACN max. 16 I/O units / IBC controller

A wide range of field bus solutions

Field buses have gained ground in controlling intelligent field devices, motors and frequency converters. They can offer improved diagnostics, flexible design and easy commissioning. For instance, improved device diagnostics are integrated seamlessly in the operator's user interface, or they are available in any web-based user interface.

The ACN family also features a full spectrum of field bus solutions: in addition to ACN I/O, the most common field bus solutions are PROFIBUS DP and PA, Foundation Fieldbus and AS-Interface.
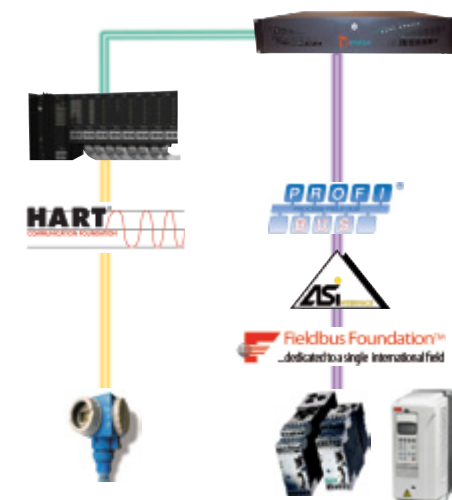
Migrating third party systems to the new metsoDNA CR can be easily accomplished using the same ACN I/O technologies. Migration can also take place partially, leaving the desired part, for instance cabling or cross connection of the existing system, to be a part of the new solution.

for distributed and centralized solutions

State-of-the-art connectivity

metsoDNA CR is an open network, and can contain many versatile interfaces compatible with process computers, PLCs and other external systems. These interfaces provide excellent connectivity to third party systems through standard links, such as OPC, Ethernet and serial links. In addition, they are available for different hardware platforms supporting a wide variety of external interface protocols. Full connectivity to Damatic, Damatic XD and Damatic XD*i* systems is a natural asset.

XML

As a result, you get:

- *Uniform configuration to all I/O and field bus solutions*
- *Easy device parameterization and troubleshooting*
- *Online diagnostic windows*
- *I/O and bus solutions with one process controller*

Uniform Information Services

Information Services combine process interfaces, calculations and databases into one uniform solution. Databases store all measurements, set points, controller outputs, device statuses, quality data, profiles, alarms, operations and so on into history databases.

DNAdata provides a Web Service interface for all User Interaction tools to report and analyze the stored data. Since the Information Services are based on Service-Oriented Architecture, all client tools can utilize all the stored information. This means that analyzing capabilities are not restricted as they were previously in the traditional Client-Server Architecture. The very same DNAdata Web Service interface can be used by external applications via the DNAdata Enterprise solution without any specific client side tool or driver.

DNAsiteHub – Enterprise Application Integration solution – adds reliable messaging functionality to the Information Services. Using DNAdata as a data source, DNAsiteHub makes it possible to seamlessly integrate metsoDNA CR with an Enterprise System, such as the Enterprise Resource Planning and Computerized Maintenance Management Systems. DNAsapAdapter is an integration solution that directly exchanges information between the metsoDNA CR and SAP. You can transfer maintenance related entries from DNAdiary directly to SAP as fault notifications for further processing.
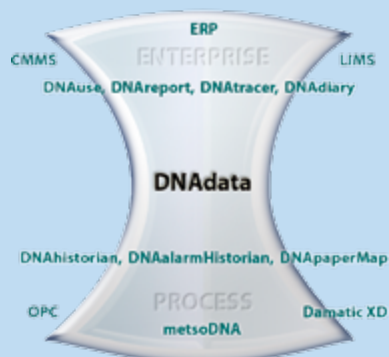
Controls

Products

Process Controller and Gateway

- Including Fuzzy logic, Embedded Java language, Multipredictive Process Controls (MPC) possibilities

Field bus license for PROFIBUS or Foundation Fieldbus

Performance

Control cycle	0.02 ... 60 s
Communication between process controllers	0.01 ... 25 s
Max I/O amount	depends on hardware, see data sheet.

Hardware

ACN RT, ACN C20, ACN SR1

Connectivity

Products

OPC DA Server
OPC DA Client
OPC A&E Client
Modbus/TCP
Several tested serial and Ethernet protocols

Information Services

Products

DNAhistorian	Continuous process historian
DNAalarmHistorian	Alarms and events historian
IQpaperMap	Profile and quality historian
DNAsiteHub	Message broker solution for enterprise integration
DNAsapAdapter	SAP interface for metsoDNA CR

Performance

Number of tags	50 000
Data collection cycle	Every control cycle ... 60 s
Length of history	No practical limit

Hardware

ACN PO, ACN AS
Windows Server

Secured Life Cycle

metsoDNA CR Secured Life Cycle activity contains tools to engineer and maintain plant automation. A state-of-the-art engineering and maintenance tool enables scalable multi-user environment for concurrent engineering. This single tool allows for life cycle management of all control applications, field buses, field devices and network document management. In addition, advanced diagnostic tools offer easy maintenance support for both applications and hardware components.

metsoDNA CR plant asset management provides tools for proactive maintenance and condition monitoring of all plant assets: from field devices, control loops and automation to pumps, pipe lines and process equipment. These tools help you prevent instability or cumulative performance degradation. As a result, your plant achieves a better life cycle performance.

metsoDNA CR industrial grade security is designed for critical real-time production environment. The layered security approach provides safety against all threats.

metsoDNA CR offers an easy way to secure your automation investment. Upgrade paths for existing systems and compatibility are the key elements for creating a strong basis for the life cycle management. The metsoDNA CR Software Life Cycle Concept ensures cost-efficient means for utilizing the newest platform features.

The ability to adapt to future needs is a decisive factor in an automation investment. metsoDNA CR's Life Cycle activity contains advanced engineering, maintenance and asset management applications that ensure your entirely future-proof automation and information solution.

DNAexplorer – powerful engineering and maintenance tool

Engineering and maintenance play a central role in providing maximized life cycle performance for the plant systems.

The heart of the metsoDNA CR engineering and maintenance is the DNAexplorer, which offers one easy-to-use configuration and maintenance tool for all control applications, field buses and field devices, as well as for network document management. It is efficient both in large scale project execution and in one loop maintenance tasks. It provides your plant operators and maintenance engineers with a scalable multi-user environment extendable from small to large systems. DNAexplorer also enables remote engineering.
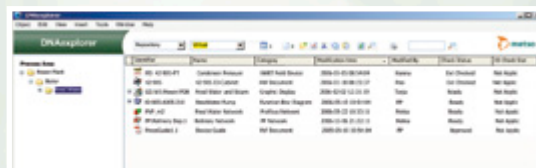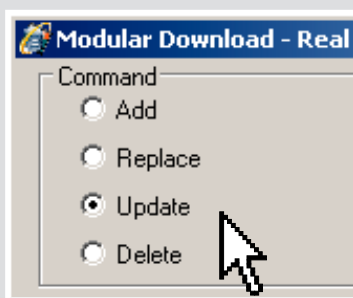

Did you know…?

metsoDNA CR offers one and the same tool for I/O and various field bus solutions. Configuration of intelligent field bus solutions is as easy as that of the traditional I/O solutions.

for the future and past

The concurrent multiuser engineering environment allows for scalability to tens of users.

Load application to metsoDNA without process interference
Loading a modified loop into the process controller does not interfere with the process itself. The controllers continue from their previous states, for instance, they hold the M/A status and outputs or keep the motors running.


Training simulator
A comprehensive training simulator enables operators to experience critical equipment malfunctions and teaches operators to successfully react.

Optimize maintenance costs with DNAfieldAssessor

Intelligent field devices are becoming increasingly common. DNAfieldAssessor – an integral part of the DNAexplorer – provides configuration and maintenance capability for field equipment. It allows for efficient commissioning of the field devices and control applications at the same time. DNAfieldAssessor ensures quick access to relevant information, and helps find the right solutions rapidly in disturbance situations. It supports proactive field asset management and enables field device performance monitoring, as well as planning of future maintenance work. Configuration and maintenance information is available for both process operators and maintenance people in the office.

Advanced diagnostics: see problems before they cause bigger problems

In metsoDNA CR, every system component – both software and hardware – is diagnosed. These diagnostics will be shown in the operator interface. For instance, a clear picture of the I/O-cabinet with alarming points will be viewed to offer an excellent status overview. DNAactivityManagement enables proactive maintenance of the metsoDNA CR system and application.

metsoDNA CR can alert operation and maintenance people not only to the system alarms, but also to the possible field
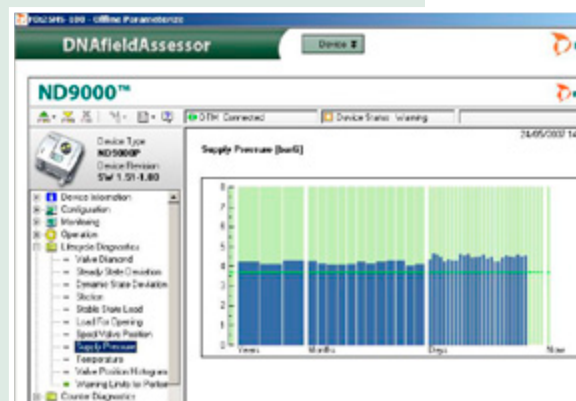
device problems thus helping them avoid damage. Web-based device diagnostic windows and DNAfieldAssessor are available for troubleshooting.

Device Performance Monitoring

Device Performance Monitoring (DPM) complements the functionality of DNAfieldAssessor Condition Monitoring. With knowledge about equipment functions and behavior, this tool makes deeper analysis of the condition monitoring data. It utilizes history data and algorithms to give predictive information about starting device performance problems. DPM indicates the devices whose operation has changed and gives suggestions of most probable reasons for the impaired operation. DPM is intended for predictive maintenance of smart field devices to help to focus and narrow down the task list of maintenance activities.

## FbCAD – an easy-to-use tool for application design

Function block engineering CAD provides your mill's engineers with an illustrative and efficient graphic working environment for designing metsoDNA CR applications.

The function block engineering tool is used for designing function block diagrams for process control loops, sequences, links etc. Function block diagrams are saved in one common database located in the Engineering Server. A function block diagram is at the same time a graphical document of an application, which is loaded in the runtime environment. This ensures that the documentation is always up-to-date.

Same tool for advanced control design

metsoDNA CR provides function blocks for controls at all levels, including basic process control, advanced quality, drives and optimization controls. Fuzzy, MPC and Java

function blocks are available as standard. You can run the entire plant using the same programming language – a real benefit for the maintenance.
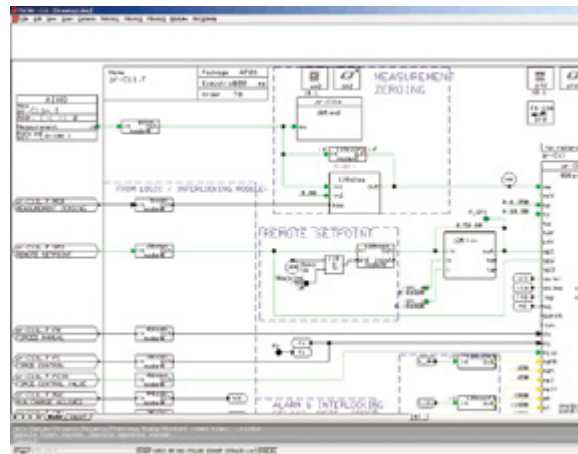
Secured Life Cycle

FunctionTest in virtual and real environment

The FunctionTest testing tool together with the virtual metsoDNA CR environment enables safe testing and accurate simulation of all functions without interfering with the real process. Testing and monitoring in both the virtual and real metsoDNA CR environment is implemented in a highly visualized way. In the function block diagram the user can see numerical values or trends of various test points, change the test signals and simulate I/O and feedback.
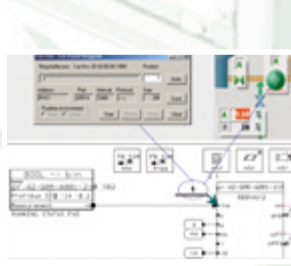
DNAnetworkDesigner designs all components

DNAnetworkDesigner is a tool to design all the layouts of the metsoDNA CR: network, cabinet and control room layouts etc. Using an easy drag and drop method, users can efficiently design and maintain interactive network pictures. Directly from the pictures, they can connect to the corresponding device to perform maintenance and configuration actions.
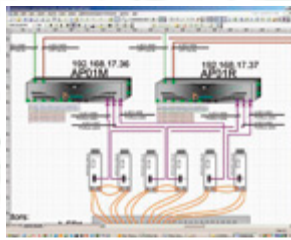
DNAautotune

DNAautotune tunes PID controllers automatically. It is integrated into operator interface, DNAuse, so that the tool is always available when needed. DNAautotune tunes control loops safely. The process is kept under control by the original PID controller at all times during the process tests and the new parameters are accepted by the user before downloading them to the controller. No changes are made to the online controller without confirmation.
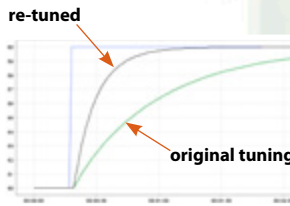
LoopBrowser monitors control performance

Control performance is an important factor in improving production management and end-product quality. With metsoDNA CR LoopBrowser, you can supervise control performance automatically, thus raising your production efficiency to a new level. LoopBrowser monitors and calculates control performance continuously and allows users to see the controller statuses online.

re-tuned

original tuning

Secured Life Cycle

Products

Engineering Server	Engineering database
Engineering toolset including	Application tools
• DNAexplorer	Application browser
• FbCAD	Function block diagram CAD
• SeqCAD	Sequence diagram CAD
• DNAuseEditor	Process picture editor
• Diagnostic@web	Self diagnostic tool
• CdCAD	Control diagram CAD
• LgCAD	Logic diagram CAD
• DNAnetworkDesigner	Network design tool
• Function Test	Control function testing tool
DNAfieldAssessor	Field device configuration and maintenance tool
DNAfieldAssessor CM	DNAfieldAssessor condition monitoring tool
DNAfieldAssessor DPM	Field device device performance monitoring tool
DNAffExplorer	Foundation Fieldbus network design tool and device configurator
Virtual metsoDNA	metsoDNA testing environment
DNAautotune	PID tuning tool
LoopBrowser	Control performance monitoring tool
Antivirus software	Protects windows machines against security threats
DNAactivity-Management	Proactive diagnostic for metsoDNA CR maintenance

Performance

Database size	No practical limit
Concurrent users	Typically max 15

Hardware

ACN PO, ACN AS, Windows Server

BA6604

Auto

Local

OK / Loop operating normally
Tuning OK / ctrl faster than target

Process Condition Monitoring

Process Condition Monitoring is based on an intelligent innovation that enables monitoring based on process measurements. It utilizes measurement data, such as temperatures, flows and pressure differences, stored in the process historian. It eliminates the known effects – the operating point – of the process device, function or sub process, and as an outcome provides a figure indicating changes in real performance.

The solution is adaptive, cost efficient to implement, and easy to understand by process operators and maintenance people. It can analyze data in the background and alert on exceptions. Alarms can be utilized in business processes, such as maintenance planning.
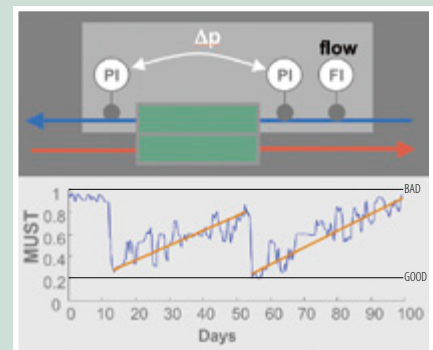
advanced concept – effective tools
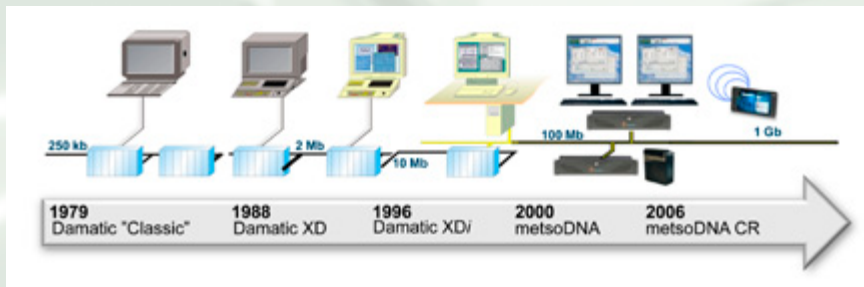
metsoDNA CR continues the unbroken compatibility and upgradeability chain starting from Damatic, Damatic XD, Damatic XDi and metsoDNA.

Secure your operation with Metso's Software Life Cycle Concept

Every mill has its own requirements for their control and information system development in response to their strategic goals. The metsoDNA CR Software Life Cycle Concept has been specially designed to serve the differing development needs of various process and plant types.

metsoDNA's Software Life Cycle Concept consists of an economical step-by-step system upgrade path from previous and current Metso systems to future ones. This extends the life of the plant's control products and helps maximize platform performance during the entire plant life cycle.

When the automation system development is scheduled in accordance with larger production or process changes, then the DNAextendedLife upgrade offers an appropriate and cost-effective solution. It enables updating the standard metsoDNA CR to the closest extended support version with minimum or no hardware changes.

DNAperfectLife is the right upgrade solution when automation is used as a key tool in striving for maximized production efficiency and process performance. This allows the plant to update its metsoDNA CR with a new active version every third year.

It is a cost-effective solution that releases you from large one-shot investments and keeps you continually updated with the latest metsoDNA CR features. Both of these solutions enable economical periodical payments and help you increase both the reliability and maximum uptime now and in the years ahead.

ZPR Rosenthal Upgrade
Upgradeability and Compatibility

Case ZPR Rosenthal Pulp mill, Germany
- A state-of-the-art metsoDNA delivery in 2000
- Capacity and reserves were utilized to its full extent
- Scope increased 53% from the project start

Upgraded metsoDNA in Recovery and Fiber lines 2006
- DNAuse 28 pcs
- DNA IA, BQM, BQS
- Network Switches 27 pcs

The DCS shutdown took only 25 hrs (originally planned for 48 hrs).

The mill started without any problems. The Mill Manager, Production manager and Technical manager are very satisfied.

Did you know…?

With the Customer Advantage Agreement CAA, you can ensure the best possible life cycle performance for all your automation and information applications, including field buses and instrumentation. The agreement can extend from a help desk function to a 100% availability agreement.

Industrial grade security

Security is essential in a real time production environment. Critical production automation demands high standard and high quality solutions. The metsoDNA CR layered security approach ensures that the needed security is met at all levels.

This solution consists of configuration, hardening and patching for all active components. All MS Windows based nodes are protected by antivirus software. The network design follows secure network architecture principles containing a firewall between metsoDNA CR and office networks with optional demilitarized zone. Remote connections can be realized by metsoSCS, Secure Connection Solution with secured access through password protection, user identification and authentication. The solution is life cycle supported: security updates, trainings, communication, audits and services.
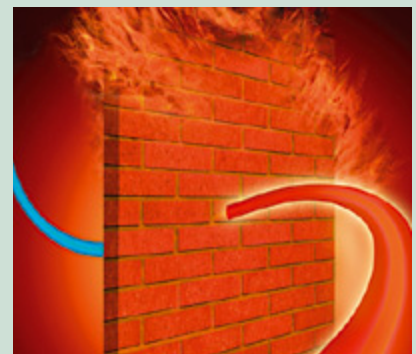
metsoDNA CR

User interaction and server nodes

ACN PO industrial workstation
Intel Core 2 Duo, SSD/hard disk, RAID redundancy option, CD/DVD option, audio card option, redundant network card, keyboard, mouse, Linux or Windows operating system

ACN AS industrial server
Intel Core 2 Quad, hard disk, RAID redundancy option, CD/DVD option, audio card option, redundant network card, keyboard, mouse, Windows operating system

Workstation
Intel Core 2 Duo PC, hard disk, DVD, audio card, redundant network card, keyboard, mouse, Windows operating system

Server
Intel Core 2 PC or multiprocessor Xeon, hard disk, RAID redundancy option, DVD, DAT/DLT option, redundant network card, keyboard, mouse, Windows operating system

Field panel PC
Pentium, hard disk, DVD, network card, industrial keyboard and mouse option, touch screen/pad option, Windows operating system, arm or panel mounting

Laptop
Mobile Pentium, hard disk, DVD, network card, keyboard, mouse, Windows operating system, TFT display

Mobile rugged laptop
Intel Core 2 Duo, hard disk, wireless network card, display touch / pen input screen, TFT display, wireless keyboard with pointing device, Windows operating system, weight 2.3 kg, IP54, -29°C ... +60°C, dimensions 271 x 216 x 48 mm

Mobile Nokia N810 Internet Tablet
Wireless network, high-resolution (800x480) touch screen with 65k colors, 4 hour browsing and 14 days standby, weight 226 g, dimensions 128 x 72 x 14 mm

Monitors and keyboards
• LCD monitors 19"... 89"
• Large screen projector
• Standard ASCII keyboard
• Industrial ASCII keyboard
• Cursor control device

KVM extenders (keyboard, video, mouse)
• VGA/DVI, twisted pair / fiber, up-to 300 m, 1–6 monitors

Printers
• Network B/W laser printer
• Network color laser printer
• Network color inkjet printer

ACN control nodes

ACN RT control node
• Nbr of I/O channels max. 6000, typical 2000
• Control cycle 0.02 ... 60 s, typical 0.4 s
• 1–3 ACN I/O field buses, 1–6 PROFIBUS DP, 1 FF HSE, total max. 7 field buses

ACN C20 compact control node
• Nbr of I/O channels max. 3000, typical 1500
• Control cycle 0.02 ... 60 s, typical 0.4 s
• 1–3 ACN I/O field buses, 1–4 PROFIBUS DP, 1 FF HSE, total max. 5 field buses

ACN SR1 small rail mounted control node
• Nbr of I/O groups max. 2
• Nbr of I/O channels max. 256
• Control cycle 0.02 ... 60 s, typical 0.4 s
• 1 field bus for ACN I/O

System networks

The System Network is built using ACN Switch with redundant ring topology or star topology switched Ethernet. The network devices support Simple Network Monitoring Protocol (SNMP) for network diagnostics.

Mill office network
Office network is separated from the system network with a firewall.

Engineering and information servers network
Engineering and information servers to mill office network can be separated to limited access area (DMZ, demilitarized zone).
• Physical media — Twisted pair / fiber / wireless Ethernet
• Branch length — 100 m / 1000 m / wireless depends on antenna and environment
• Protocol — TCP/IP, UDP/IP
• Data rate — Up to 1 Gbit/s / up to 54 Mbit/s wireless
• Redundancy — Optional

Redundant process network
• Physical media — Twisted pair / fiber Ethernet
• Nodes / network — No practical limit
• Total length — No practical limit
• Protocol — Industrial switched Ethernet
• Data rate — Up to 1 Gbit/s, typically 100 Mbit/s
• Communication interval — Typically 0.1 ... 1 s, fastest 0,01 s

Ethernet network components
• ACN Switch
• Selected commercial HP and Cisco switches
• Ethernet router with firewall

Remote connection components
• VPN tunneling included in Metso Secure Connection Solution

Wireless network components
• Access Point for Office Environment, 120/240 VAC and Ethernet connection
• Access Point IP54 for Field Environment, cabinet with heating and cooling options if cabinet temperature not in -20 °C ... 55 °C
• omnidirectional or directional antenna

Field bus networks

The metsoDNA CR includes ACN I/O fieldbus, PROFIBUS DP/PA, AS -Interface bus and Foundation Fieldbus HSE/H1 solutions.

ACN I/O field bus
• Physical media — Twisted pair / fiber
• Nbr of I/O bus / node — Max. 3
• Nbr of I/O groups / bus — Max. 16
• Nbr of I/O unit / group — Max. 16
• Protocol — Industrial switched Ethernet / HDLC
• Data rate — 100 Mbit/s Ethernet / 3 Mbit/s HDLC
• Redundancy optional

PROFIBUS DP
• Physical media — Twisted pair (RS-485) or fiber
• Data rate speed — 9.6 kbit/s ... 12 Mbit/s
• Devices per bus — Max. 125 slaves
• Redundancy optional

PROFIBUS PA
• Physical media — Twisted pair
• Nbr of I/O units / PA — Max. 30
• Total length — 1900 m
• Spur length — 120 m
• Data rate — 31.25 kbit/s

AS-i – AS-Interface
• Physical media — Twisted pair
• Branch length — 100 m
• Nbr of I/O units/segment — 30
• Power and data via same cable
• Data rate — 156 kbit/s

architecture components

...Field bus networks continues

Foundation fieldbus – HSE, High Speed Ethernet
- Physical media   Twisted pair 100 m / fiber 2 km
- Data rate   100 Mbits/s
- Redundancy optional

Foundation fieldbus – H1
- Physical media   twisted pair 1900 m
- Nbr of I/O units/segment   12
- Power and data via same cable
- Data rate   31.25 kbit/s

FFlink – HSE-H1 linking device for Foundation fieldbus
- Number of H1 Ports   4
- HSE Speed   10/100 Mbit/s
- HSE Media Options   Twisted pair
- Standard-power signaling, separately powered
- Embedded Web Server
- G3 Environmental Approval

Physical measures

	width mm	depth mm	height mm	weight kg
• I/O unit	24	93	86	0,1
• I/O group with 16 I/O units	476	152	129	3,1
• ACN RT	426	379	88	8,7
• ACN C20	210	87	296	4,5
• ACN SR1	40	152	126	0,4
• ACN PO	426	379	88	9,5
• ACN AS	426	379	88	9,8
• Workstation typical	170	470	450	18
• Server typical	230	710	480	33
• 20" LCD monitor typical	185	30	145	10
• Extender KVM 2 display typ.	143	145	29	1,9
• Color laser printer typical	400	450	400	27
• ACN Switch	81	105	135	1,1
• Node cabinet *) **)	900	600	2000	150/200
• M80 ACN I/O cabinet *)	900/1800	400	2000	150/300
• M80 ACN I/O cc cabinet *) ***)	2400	400	2000	400
• M80 ACN I/O motor cabinet *)	1200	400	2000	250
• M120 ACN I/O cabinet 2400 *)	2400	400	2000	400
• Field cabinet 800	800	300	1200	50
• Elect. supply cabin.15kVA	940	400	2000	220

*) weight includes power and cabinet network and cabling
**) weight is given without / with batteries
***) terminal block cross connection cabinet

Power consumption / heat dissipation

	W	Joule
• 16 I/O unit group *)	40	33
• ACN RT	48	48
• ACN C20	24	24
• ACN SR1	5	5
• ACN PO	90	90
• ACN AS	155	155
• Workstation typically	200	200
• Server typical	220	220
• 20" LCD monitor typically	50	50
• Extender KVM	20	20
• Color laser printer typically	180	180
• metsoSwitch	10	10
• Full 8 nodes cabinet typically	600	600
• Full 8 I/O groups cabinet *)	400	330

*) digital=75%, analog 25%, inputs 75%, outputs 25%,
   with digital outputs that don't supply power to the field.

Power supply requirements

General
- 400 VAC three-phase (+6 ... -10%,) 47 ... 63 Hz
- 120/230 VAC (+6 ... -10%,) 47 ... 63 Hz
- 24 VDC (18 ... 32 VDC)

Backup power
- metsoDNA CR is equipped with backup power units to provide power typically 30 minutes for ACN nodes. Optional UPS for PC nodes.

Degree of protection

- Cabinets and equipment   IP20 *)   NEMA 12
- Field cabinet   IP54 *)   NEMA 13
- Field panel for operator   IP65   NEMA 4

*) higher degree of protection optional

Corrosion resistance class

- Standard products   G1
- FFlink, and with optional   G3
  coating ACN I/O and
  control nodes

Electromagnetic compatibility

- Electromagnetic immunity: EN 61000-6-2
- Electromagnetic emission: EN 61000-6-4

Environmental requirements

These conditions are in accordance with the standard classes of IEC 60721-3-3K2. The enhanced deviating values for ACN I/O are presented separately.

- Temperature: +15 ... +30 °C
  - ACN I/O & SR1   0 ... 70 °C
  - ACN RT & C20   0 ... 60 °C
- Max. rate of change   0.5°C / min.
- Relative humidity: 10 ... 75%, no condensation
  - ACN I/O & SR1   5 ... 90%, no condensation
- Absolute humidity: 2 ... 22 g/m^3
  - ACN I/O & SR1   1 ... 25 g/m^3
- Air pressure: 70 ... 106 kPa
- Vibration: IEC 60721-3-3M1
  Amplitude 0.3 mm (2 ... 9 Hz),
  Acceleration 1m/s^2 (9 ... 200Hz),
  - ACN I/O & SR1   IEC 60945
  Amplitude 1.0 mm (2 ... 13 Hz),
  Acceleration 7m/s^2 (13 ... 100Hz),
- Shocks: IEC 60721-3-3M1
  Acceleration 40 m/s^2,
  duration 22 ms, half sine,
  - ACN I/O & SR1   50 m/s^2, duration 11 ms, half sine
- Chemical conditions   IEC 60721-3-3C1
- Chemical conditions (G3)   ÍSA-71.04
- Biological conditions   IEC 60721-3-3B1
- Erosion   IEC 60721-3-3S1

metso

Metso Automation Inc., Lentokentänkatu 11, P.O. Box 237, FI-33101 TAMPERE, Finland, tel. +358 20 483 170 , www.metso.com/automation