

## Supply Chain Solutions

Solutions for the integration of inventory data and optimization of business processes







"Can I collect my data remotely and use it in my ERP?"

"Will I have complete inventory visibility 24 hours a day, 7 days a week, anywhere in the world? Even on my mobile device?"

**"Sure."**

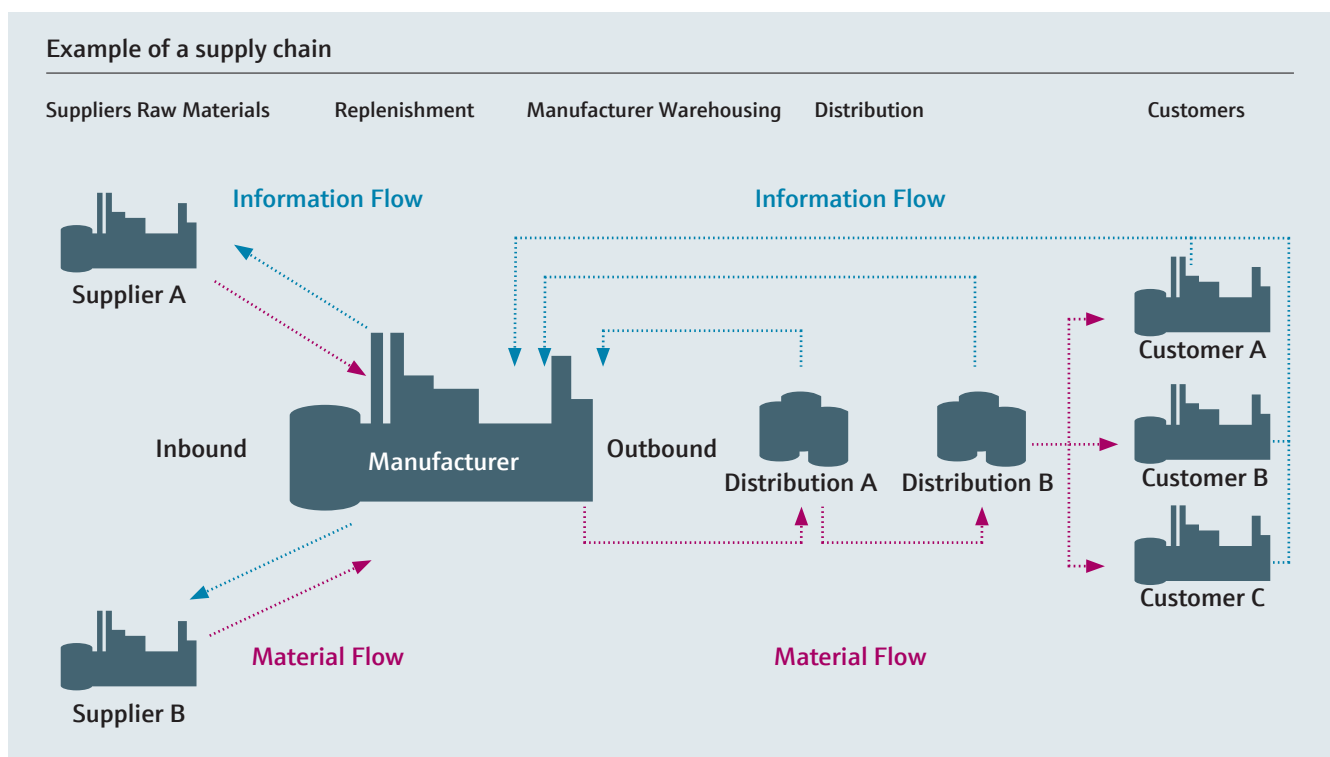
# Evolution to a cross-company collaboration model

Industry 4.0 and the Internet of Things will revolutionize future value added chains.

The business world is at the threshold of the fourth industrial revolution. Linking the real and virtual world facilitates better monitoring and faster decision-making processes. This makes it possible to control and optimize companies and entire value added networks almost in real time. In order to use these new possibilities, the whole supply chain needs to be integrated. Endress+Hauser can support you with your business process analysis and offer a

comprehensive service to identify individual software and the respective instrumentation in this process.

At the end of such integration processes, transparency, flexibility and integrated business processes beyond company limits are guaranteed. This creates a win-win situation for all companies involved.



## Materials management/purchasing

### On-hand Stock Monitoring (Inhouse)

- Monitor stock performance
- Improve replenishment
- Reduce stock levels

### Supplier Managed Inventory (SMI)

- Outsource replenishment
- Consignment stock, pay on consumption

## Marketing and sales

### Vendor Managed Inventory (VMI)

- Provide value-added service
- Tighten customer relationship
- Improve sales planning

# Inventory is in the eye of the beholder

Managing the inventory and the supply chain is one of the biggest challenges for companies these days. And it even can be a crucial competitive advantage.

The competitiveness of a company can be significantly influenced by the choice of the appropriate inventory management strategies. When excess stock is kept, deliveries can be processed at any time, however, inefficient processes are covered up and costs become increasingly difficult to control.

Keeping your inventory low reduces costs, but can affect your delivery performance. While companies strive for the right balance of inventory stocks, they are confronted with changing customer requirements, uncertainties of demand and supply as well as ever increasing market demands. In order to ensure competitiveness, processes must be continually optimized and supported by up-to-date information. It is only on the basis of up-to-date and transparent inventory data and information along the value

creation chain that the planning and replenishment processes can measure up to the demands of the market. The unknowns that logistics personnel face with warehousing and delivery schedules are usually compensated by keeping a higher safety stock. The objective, however, should be to reduce inventory by applying a time-conscious and integrated inventory management process, which makes the forecast of demands more accurate and maximize the degree of service.

To optimize these business processes the integration of real time data and the publishing of this information and knowledge is the key to success in collaboration of different functions.

## Different views on the inventories within a company



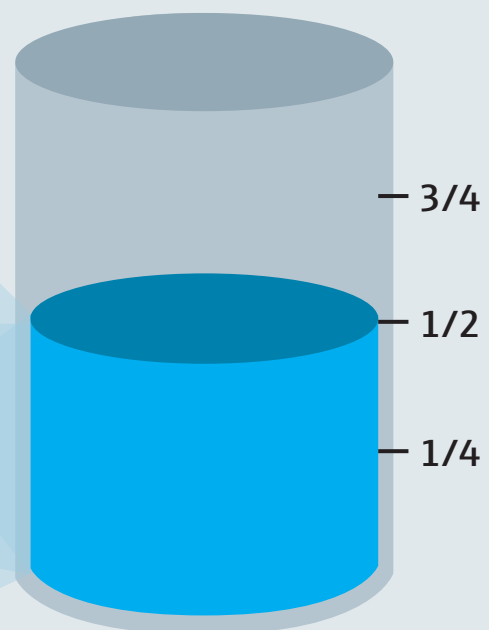
**Chief Financial Officer**  
"Minimized fixed capital"



**Operations manager**  
"Full availability of raw materials"



**Sales manager**  
"Transparency of available products"



## Faster and more efficient decisions

Fast and efficient reaction to supply chain volatilities is just one result of the optimization of the company's supply and value chain.

It is often a long way for data from tanks or silos to where the information is needed in the ERP system. However to have real-time information provides a true competitive edge. We are truly in our element, when speaking of inventory management and supply chain solutions, especially when it comes to measuring and transporting data from tanks to inventory systems and creating real information out of it. And this applies even more, when it comes to the integration of this information into your business systems and making it really valuable for the optimization of your inventory processes and decision making. Endress+Hauser is your partner for the complete planning, commissioning and service of measuring instruments, inventory systems and the integration of the information into your ERP.

### How can your solutions help me to increase the customer satisfaction level of my business?

Our solutions can help to improve not only the efficiency and productivity of your plant, but also by that improving

your delivery performance and avoiding product run-outs or emergency deliveries. This leads to less claims and complaints and by that increases the customer satisfaction and the customer loyalty even in markets with strong competition.

### How can Endress+Hauser support me in optimizing the operational efficiency of my plant?

Our solutions provide full inventory visibility and transparency of your liquids and bulk solids stored within your plant or manufacturing sites, be it raw materials for production, semi-finished goods for refining or finished goods awaiting distribution. This allows you to manage your materials, analyze the performance of your stock management and effectively exchange information within your organization. The information contributes to the quality of the decisions and to employees performing their tasks more efficiently independent of location and time. This leads to more accurate forecasting and production planning as well as reduced inventories.



“Endress+Hauser supply chain solutions enable reliable and more optimized planning and execution across the extended enterprise.”

#### Can I increase the safety in our plant with Endress+Hauser solutions?

Our solutions keep employees safe in control rooms or office environments, on the ground and off tanks while improving inventory visibility. And we also limit your environmental impact by preventing overfills and avoiding unnecessary deliveries. When it comes to overfill prevention and safety relevant instrumentation, you can only find the best fit for your application if you have a variety of choices and are familiar with the instrumentation. This requires a lot of detailed know-how. Our experienced sales professionals and engineers help you to make the right choice from our extensive portfolio and wide range of materials.

#### Can I rely on you as a solution provider for inventory monitoring and supply chain solutions?

Due to our worldwide presence, we are able to concentrate global know-how to find the best individual solution for each customer. We can offer a wide range of process instrumentation and can always use the best fit sensor for your applications. As an independent, family-owned company with financially and economically sound foundation, Endress+Hauser serves its customers as a long-term partner.

#### Can you guarantee the performance of your solutions long term?

Endress+Hauser has a global network of service centers, employing highly skilled and experienced service technicians. Our innovative products and services give our customers a competitive edge in their markets. Thanks to our W@M – Life Cycle Management and its various tools, you have easy access to all your documents and calibration certificates allowing you to maintain your assets efficiently throughout their life cycle. As a single-source provider, we offer professional and transparent collaboration that will ultimately save you time and money.



#### Benefits at a glance:

- Increased operational efficiency
- High operational safety level
- Increased customer satisfaction



More information on our website:  
[www.tank-gauging.endress.com](http://www.tank-gauging.endress.com)

# Business process consultancy

The Endress+Hauser solutions can support you to optimize your value chain and to make it really smarter.

We are your partner for all steps of the project life cycle – from a supply chain audit up to the service and updates for the complete system. Project management at Endress+Hauser focuses on individual customer needs and contributes to ensure that your project is completed with a minimum risk, on time and on budget. As your partner, we cover all aspects of the project – from design, engineering and commissioning through to information management. Our dedicated project managers are integrated into the customer's project management team and participate throughout the whole process from the project start-up meeting to the project handover meeting according to internal documented processes or to customer processes and organization. The bottom line for you is time and cost savings with the added benefits of improved transparency and security. With Endress+Hauser, all your needs are covered with just one competent partner.

Our engineering expertise ensures that we design the optimal automation solution for your requirements. With state-of-the-art engineering tools, we execute the individual planning and design of the application and offer a flexible choice of appropriate system components. Our recommendations are based on techniques and solutions that have successfully proven themselves in numerous automation projects. We permanently strive to find efficient and sustainable solutions to meet the most diverse requirements.

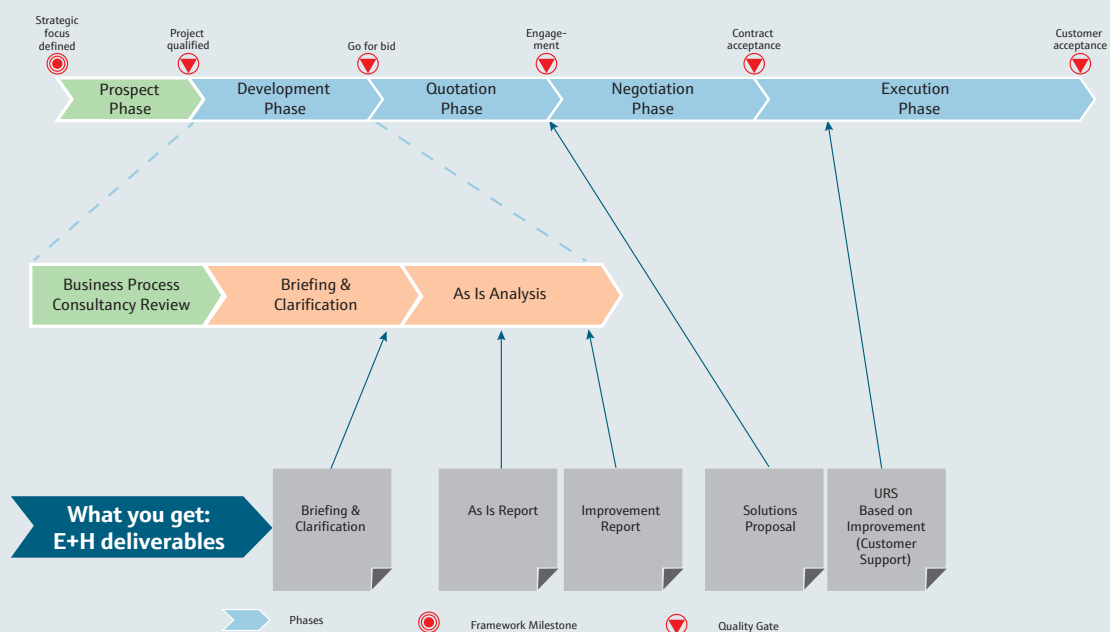


## Business support services

- Business process audits
- IT consultancy
- User requirement support
- KPI evaluation/implementation

## Supply chain consultation

Standard for organization and management of customer projects



# Endress+Hauser offers complete solutions for supply chain management

Endress+Hauser offers a solution to collect inventory data and transform into information for the improvements of supply chain management.



## Collaboration

The SupplyCare online inventory management platform supports users in collaborative demand planning, event-driven replenishment planning and scheduling as well as the reconciliation (in/out) and consolidation (totaling) of geographically distributed inventories. The collaboration platform allows all stakeholders to have transparent information for fast and effective decision making. You can involve partners from all entities and even from different companies to make your supply chain smarter.

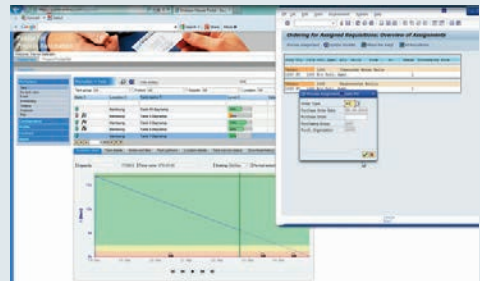


Collaboration across the world



## Integration

Our flexible and open middleware and profound IT system know-how enable the integration of any data source (field, internet, DB, ...) into leading business systems like SAP, JD Edwards, Oracle, databases or existing systems. Our well-trained software integration specialists gained a lot of experience with the integration of the inventory data into ERP systems and the automation of business processes.

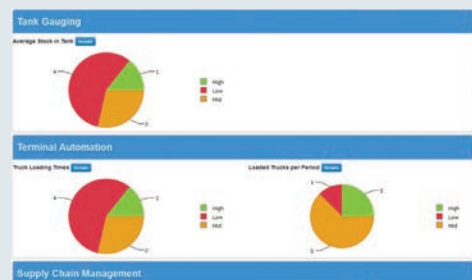


Integration planning with ERP



## Optimization

If you need to have very specific KPIs (Key Performance Indicators) at a glance, we even offer your own engineered KPI Dashboard, including all information you need to run your business in the most efficient and successful way. With this customized tool, you have the chance to measure, analyze and improve your business processes and by that reduce the time to action and costs.



KPI Dashboard

# Our offering

To manage correctly you have to measure correctly.

From monitoring of tanks and silos up to highly accurate Tank Gauging and the management of terminals, we offer, apart from all relevant measuring and system technologies, also appropriate software to monitor and optimize your inventories and supply chain.

## Knowledge

Inventory business optimization (Supply Chain Solutions - more details in the brochure CP01075S)



Integration planning with ERP



Integration planning with ERP



Replenishment planning

Integration

Collaboration

## Information exchange

## Information

Inventory systems



Terminal management



Inventory monitoring



Web based Inventory

## Data

Inventory measurement and data transport (field instrumentation and components)

Tank Gauging devices (custody transfer)



Free space radar  
Micropilot S  
FMR540



Stilling well radar  
Micropilot S  
FMR532



Servo  
Proservo  
NMS5



Tank Side  
Monitor  
NRF590



Average temperature  
Prothermo  
NMT539

Data interfaces



Wireless  
HART  
Fieldgate  
SWG70



Gauge  
Link  
NXA20

Inventory devices



Guided radar  
Levelflex  
FMP5x



Free space radar  
Micropilot  
FMR5x



Ultrasonic  
Prosonic  
FMUx



Hydrostatic pressure  
Deltapilot  
FMBx



Differential pressure  
Deltabar  
PMDx



Collaboration across the world



Loading optimization



KPI Dashboard

## Optimization

## Information exchange

Customized  
SCADAInventory  
managementInventory  
management

## Truck loading and off-loading

Tankvision  
Tank Scanner  
NXA820Fieldgate  
FXA520  
FXA320Tankvision  
Multi Scan  
NXA83Mass flowmeter  
Promass  
84xBatch controllers  
Vega T & II  
329x & 429xAdditional  
components

## Overfill prevention devices (SIL)

Guided radar  
Levelflex  
FMP5xFree space radar  
Micropilot  
FMR5xVibronic liquids  
Liquiphant  
FTLxVibronic solids  
Soliphant  
FTMxCapacitance  
Solicap / Liquicap  
FMIx / FTIx

## Cut costs by 1/4...

When optimizing inventory to a lower level, real cost savings up to 25% of the capital committed to the reduced inventory can be expected.

Typically in manufacturing firms, inventory management is often not integrated into the process control systems. The stock values are at best measured and displayed. As a result, the treatment of the inventory data is largely manual and besides time and labor consuming a source for faulty interpretations. The table below gives a typical overview of a company with a number of silos storing raw materials, half-finished products and finished goods.

Savings manpower		
Function	Possible savings	Reason
Operator	2h / day	Level reading and reporting of the displays in the field
Supervisor	2h / day	analyses of the data coming from the different systems like SAP, Excel, etc...
	4h / week	raw material order management and keeping up to date the inventory levels in the different systems.
	8h / month	allocation of the used materials for each production batch
Production manager	4h / week	manage and analyze the data of the different systems like SAP, Excel etc.
Supply chain manager	4h / week	analyze the data of the different systems
		calculate usages, deviations, KPIs and other operation critical information
		collaborate the results of the calculations to the other stake holders
<b>Amount:</b>	<b>136h / month</b>	<b>Almost 1 FTE (full-time equivalent) savings per month</b>

The total capital committed to inventory, can be divided in 4 classes: Working capital, storage cost, risk costs and handling costs. Related cost savings to reduced inventory capital commitment:

- Structural decrease of working capital: Lowering inventory means freeing up working capital to be used on long term for amortization of loans or to conduct other investments
- Storage costs: Warehousing, silos and other storage assets, in general it is accepted to count it as 5% of the value of the stored goods.
- Risk costs: Depreciation of value in time (fresh products) assurance costs, in general this is also rated at 5 % of the value of the stored goods.
- Handling costs, are not only the annual ordering cost, it is the sum of all handling and labor intensive activities necessary to manage a company's inventory.

### Cost saving due to improved inventory management

Assumptions 'Company A' - Balance sheet and statement of income in Thousands:

■ Annual net profit:	3,167 k€
■ Equity capital:	17,523 k€
■ Return on equity capital:	18.08 %
■ Inventory, capital commitment:	5,430 k€

Calculation:

5% reduction of the inventory:  $5,430 \text{ k€} \times 5\% = 271.5 \text{ k€}$

Cost savings summary:	Working capital:	$271.5 \text{ k€} \times 5\% = 13.58 \text{ k€}$
	Storage costs:	$271.5 \text{ k€} \times 5\% = 13.58 \text{ k€}$
	Risk costs:	$271.5 \text{ k€} \times 5\% = 13.58 \text{ k€}$
	Handling costs:	$271.5 \text{ k€} \times 10\% = 27.15 \text{ k€}$

**When 'Company A' reduces its inventory by 5 %, this represents 271.5 k€ capital commitment; the real cost savings can be as much as 67.8 k€ per year.**

# Optimizing order and delivery logistics

Online inventory data of tanks for materials management and logistics.

## The customer:

The worldwide largest chemical distributor, Brenntag, exclusively distributes AdBlue® under the brand name of Air1® for the largest manufacturer of urea in the European Union, the Norwegian company Yara. Apart from Air1®, Brenntag also offers its customers the right storage tank and distribution solution.

## The solution:

To guarantee optimum order and delivery logistics, Brenntag trusts the supply chain solutions of Endress+Hauser. These consist of the level instrumentation for the AdBlue® tanks, the remote data transfer of the level data as well as the visual display software and data integration into the Brenntag ERP system (SAP) centered at the headquarters in Mühlheim/Ruhr.

Yara and Brenntag decided on the Endress+Hauser offer because of the innovative complete solution. The wide product portfolio does not only facilitate the use of the ideal instrumentation but also the entire vertical integration from measuring and remote data transfer through to the integration into the ERP system of the customer.

Unbeatable arguments are the synergy of product, system and application know-how also in an SAP environment as well as a worldwide presale and aftersale support.

The supply chain solutions of Endress+Hauser enable Brenntag as a distributor to control the actual inventories at different sites online at any time and to guarantee the on-time delivery of AdBlue®. On basis of realtime inventory data and better forecasts, the maximum service level is achieved with a minimum inventory.



## Advantages

- Continuous material availability
- Less shortage
- Higher reliability benefits end customers
- Reduced transactions
- Simplified purchasing (i.e. no purchase orders)
- Bottom line; improved service level with less process costs



## The products installed

- SupplyCare
- Liquicap T
- Fieldgates FXA320 (GSM)
- RIA250



# In good hands

Single point of contact for all your needs



You know what they say: Only trust those who know the rules and know how to run their business. Operators, contractors and engineers need answers to their specific requirements. Make sure you get the answer that is perfect for your process – by choosing a partner with 60 years of experience and unbiased expertise. We hope that the last few pages have proven to you that we know what we are doing and that they have answered all of your questions. Our main goal is to support you and help you to solve your issues in your process.

Delivering complete supply chain solutions is not a day-to-day business for you. The Endress+Hauser network of service engineers spans the globe ensuring that wherever you are based, you can benefit from our technical expertise and support. We constantly work with our customers to ensure that we competently support you in all situations. Be it trouble shooting, technical support, emergency spares, maintenance, calibration, training or straightforward advice – we pride ourselves on understanding what you require of us and have evolved our organization in such a way that it is aligned to help you achieve your operating objectives.

Clearly defined responsibilities from the beginning to the end enhance a flawless startup-turnkey project – documentation included. And our support does not leave you after signing the site acceptance test. To us, customer relations are a long-term commitment and last throughout the life-cycle of the plant. In addition, you can rely on the experience of Endress+Hauser gained in many projects that we delivered in time and in outstanding quality.

We have established service structures and useful tools like our W@M – Life Cycle Management, which enable us to support you during the entire lifetime of the supply chain solution and help you to service, maintain and optimize your installed base cost-efficiently.

As a renowned and reliable partner for your industry, we live the Endress+Hauser credo of learning from our customers we serve and strive for exemplary quality in our products and services. This results in smooth project execution and trouble-free business processes in your company.



## Service offers

- Business process audits
- As is analysis
- Installed base analysis



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