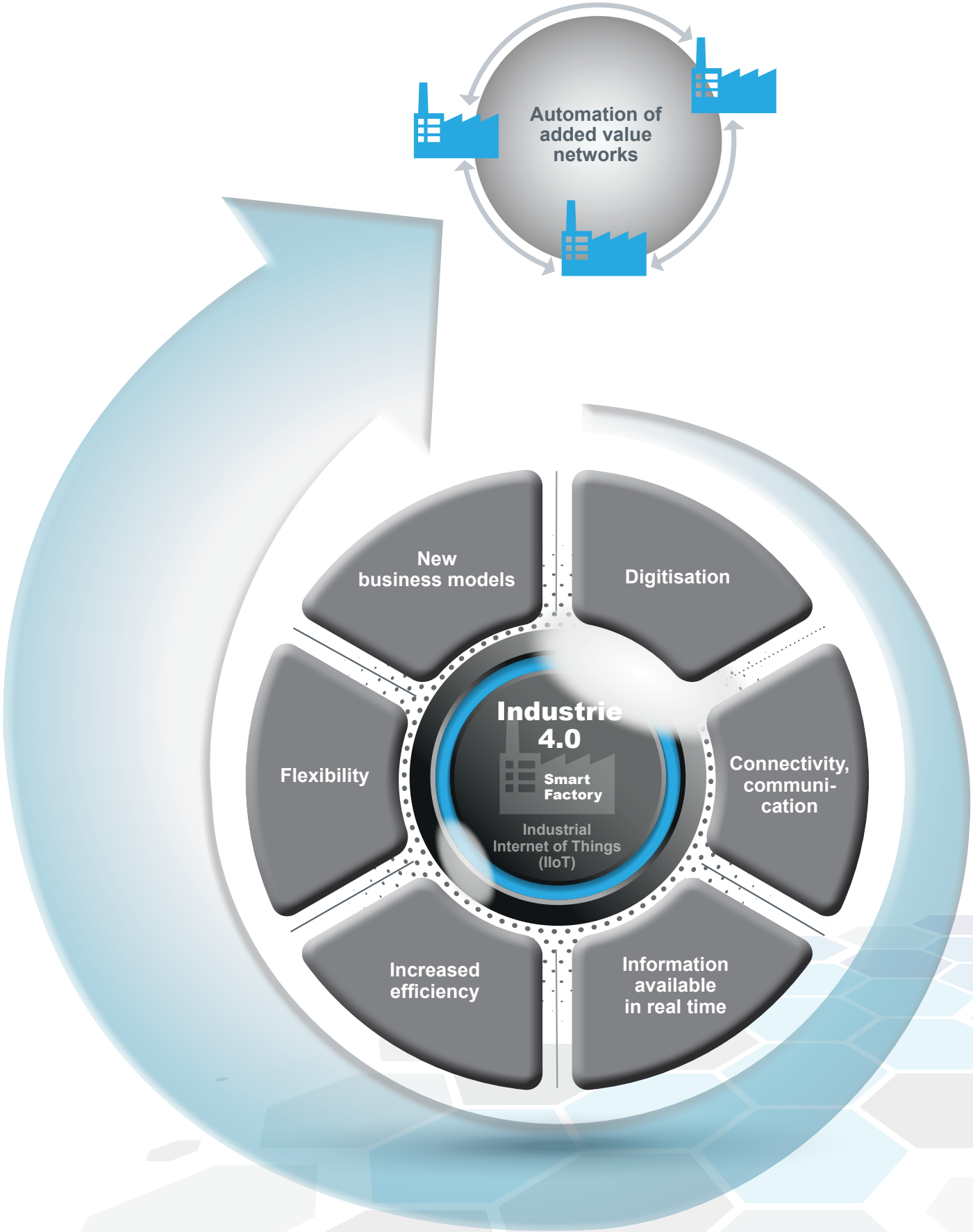
HYDAC INTERNATIONAL

With HYDAC on the way to Industrie 4.0



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With HYDAC on the way to Industrie 4.0

Technology and ever shortening product life cycles, increased **individualisation** of customer wishes, **resources becoming scarce** and **globalisation** are bringing about enormous challenges for the manufacturing industry.

The resulting problems do, however, create a high potential for innovative solutions. For machinery and system builders, there are diverse opportunities to generate competitive advantages. **Connectivity and digitisation** will play a key role here.

On this basis, it will be possible to develop new business models as well as new product and service offers. The changes that industry is aiming for are deemed so extensive that in Germany there is talk of a fourth industrial revolution or, put simply, "Industrie 4.0".

In other parts of the world, corresponding developments are being advanced under terms such as **Smart Factory** or **Industrial Internet of Things (IIoT)**.

What is the best way to describe "Industrie 4.0"?

Many different definitions have been put forward. In brief, "Industrie 4.0" is often defined as **"the merger of cutting-edge information and communication technology with the manufacturing industry**" or as the "**Internet of things and services**" in the industrial sector.

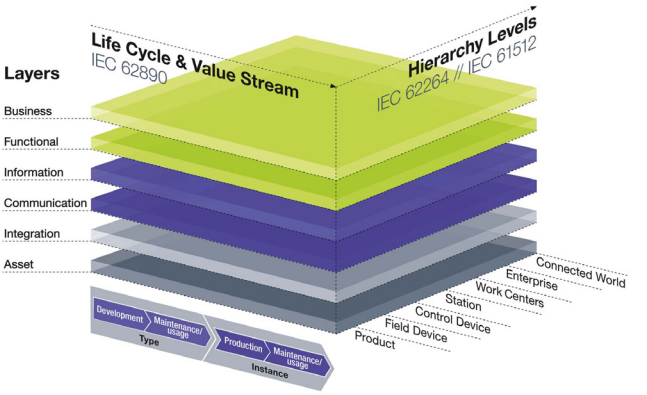
The very far-reaching vision and goals of Industrie 4.0 are illustrated by the in-depth definition of "Platform Industrie 4.0": "Industrie 4.0" stands for a **new level of organisation and control of the entire value chain across the life cycle of products**.

This cycle is orientated towards the ever increasing individualised customer requirements, encompassing the idea, the development, the assignment, the manufacturing, the delivery of the product to the end customer and the recycling, including the associated services. The basis is the **availability of all relevant information in real time** by **connectivity** of all instances involved in value creation and the ability to derive the optimum value creation flow from the data at each point in time.

Linking people, objects and systems **creates cross-company added value networks that are dynamic, real-time optimised and self-organising and that can be optimised in accordance with criteria such as costs, availability and resource useage.**

Targets Industrie 4.0

- More extensive **digitisation** and **automation of value chains/ networks**
- **New business models** and new forms of added value
- **Efficient production of customised products “batch size of one”**
- **Flexibilisation**
- Further **increase in efficiency** (in terms of productivity and resource efficiency)
  - Improved **information** and transparency as a basis for optimising decisions and processes
    - New design for work



Reference architecture model Industrie 4.0 (RAMI 4.0)

➡ thus overall **increase in competitiveness in global competition**.

To allow the far-reaching vision of I 4.0 to be realised, comprehensive foundations must be laid, particularly in relation to the security of networked systems, legal frameworks, standardisation and research & development.

2015	2018	2025	2035
MIGRATION STRATEGY			
		INDUSTRIE 4.0	

The industry is currently at the beginning of this development and is first of all pursuing a migration strategy towards I 4.0.

The I 4.0 solutions currently offered are often isolated solutions, such as distinct production units or assistance systems, that use available solutions directed towards I 4.0.

At the same time, existing components and systems are naturally also used, if their characteristics meet the current requirements for the development towards to I 4.0 or can be adapted to do so.

Our Capability:

HYDAC offer a wide range of products and services and possess in-depth application knowledge, making HYDAC a partner for all kinds of I 4.0 developments. Furthermore, we work with our customers on future-focused products, digital services and new business models.

Fluid Conditioning Systems

Stationary and mobile fluid conditioning systems for filtering, dewatering, degassing and conditioning operating fluids

- Control and system integration via standardised network interfaces (e.g. Ethernet, TCP/IP)

Fluid Condition Monitoring Sensors

Sensors for recording solid and liquid contamination in fluids such as wear particles, dirt particles, water and external fluids

- Measurement data provision via Ethernet interface and standard fieldbus protocols
- Parameterisable threshold value monitoring

Condition Monitoring Unit CMU 1000

System for recording and processing measured data for up to 8 sensors

- Simple programmability of measured-value evaluation and processing
- Generation of smart data (action recommendations/warnings)
- Connectivity via Ethernet

Fluid Condition Monitoring modules and systems

Compact fluid sensor modules and solutions for assessing the fluid condition.

- Measurement data provision and system integration (e.g. central control and condition monitoring systems) via standardised interfaces and protocols
- Parameterisable threshold value monitoring

Machine Condition and Performance Reporting

System condition reports and action recommendations compiled on basis of measured fluid and non-fluid data and process parameters

- Cyclic and event-based delivery of system condition reports via e-mail

Smart Filter industry with HPT 500 IO-Link

Filters with sensors for recording the differential pressure

- Bidirectional communication via IO-Link provision of measured values in digital form/IO-Link
- Digital quality protection

Remaining service life prediction for smart filters

Algorithm for

- determining the dirt load percentage
- determining the expected remaining service life

on basis of differential pressure, flow rate and temperature

Intelligent valve X-efficiency

Coaxial valve with water hammer damping, switch position indicator, automatic holding current reduction, adapter solution

- Bidirectional communication via IO-Link
- Adaptive parameterisable interface for further customer-specific functions
- Retrofittable

Variable-speed drives

Needs-based energy provision

- Increased efficiency of hydraulics
- connectivity and data exchange at fieldbus level
- Intelligent modular systems for control tasks and workflows directly to the drive controller

Online configurators

Dimensioning and configuring of electro-cylinders and DVA kits

- In download zone:
  - Data sheet of the configured product
  - CAD data
- Preliminary customer design
- Shorter run times of the ordering process
- Better options for system planning on the customer side

QR code on name plate

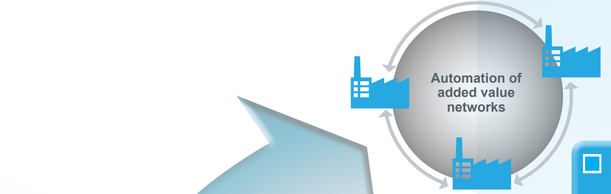
QR code link on the corresponding product website

- All product-relevant data can be viewed:
  - Parts list
  - Operating instructions
  - Data sheets
  - 3D data

Remote commissioning kit

Online commissioning support on customer side

- Rapid assistance for commissioning and service
- Kit easy to use
- Higher productivity for the application engineers
- No connection to customer's network structure required (security)



New business models and additional value creation steps

e.g. on the basis of

- Additional digital services
- Digitally charged products
- Marketing of products "as a service", for example:
  - Rental models
  - Operator models
  - Outcome-based remuneration

Digitisation

Digitising data makes it possible to shift business activities from the real world to the virtual one.

Digital replication or virtual representation of information, products, functions, processes and value creation networks in virtual reality is the basis for:

- More extensive **automation of production processes**
- More extensive **automation of added value steps and value chains**
- **New added value steps, additional digital services (e.g. digital service and commissioning)**
- **Optimisation of development, simulation, virtual testing**
- **In all, therefore, for cyber physical systems (CPS)/ Industrie 4.0 / IIoT**

Flexibility

Developments such as the desire for individualised products with mass production pricing (thus ultimately for individualised mass production), shorter and shorter technology, innovation and product life cycles and resource shortage keep applying new demands when it comes to flexibility. To this end, Industrie 4.0 pursues goals such as:

- The adaptable factory
  - Plug & produce modules/systems
- Smart production
  - Systems that can organise and optimise themselves
  - Smart workpieces that control their production
  - Self-learning machines and systems
- Flexibilisation of value creation networks

Connectivity and communication

- Identifiability
- Bidirectional communication capability
- Standardised, digital interfaces and protocols
- Remote access to products, data and information
- Security for connected systems

Increased efficiency

- Productivity
- Resource efficiency
- Machine availability
- Service, condition-based or predictive maintenance
- Energy efficiency
- Material consumption, environmental impact
- Assistance systems, redesigned work structure

Relevant information available in real time

- Process data
- Condition data
- Smart data (e.g. action recommendations)
- Smart products
- Cloud
- Internet/WWW

CO3 hydraulic power unit with fieldbus interface

Variable-speed, pressure-controlled

- Communication direct or via fieldbus
- Provision of process and operation data such as pressure, oil temperature, frequency, current consumption, running time

AutoFilt® RF3 / RF4 Control Unit ACU

Continuously working, self-cleaning automatic back-flushing filter for separating particles from low-viscosity fluids

- Open connectivity to all standard customer interfaces (1x Ethernet, 1x serial RS-232 C / RS 485)
- Remote monitoring possible with smartphone or tablet
- Self-diagnosis, system diagnosis, process monitoring
- Bidirectional communication of component activity

TestCube TCM-800

End-of-line testing as integral part of series production of machines and systems

- Automated workflow for production-specific test functions with documentation.
- Provision of measured values, diagnostic data and reports locally and via standard interfaces to the customer system (Modbus TCP / OPC).

Smart accumulator thanks to p_0 guard

Detection of deviating accumulator pre-charge pressure (p_0)

- by means of pressure monitoring on fluid side
- Stand-alone data interpretation
- Alarm in the case of pressure deviation

Smart accumulator – thanks to Bladder Integrity System (BIS)

Detection of defects in accumulator bladder

- Detects liquid in the bladder
- Provides accumulator condition data
- HART protocol for data output
- Plannable accumulator service ➡ system availability

Sensors with self-diagnosis

Measurement of pressure, distance/position, angle

- Independent check of correct function
- Increased machine availability and efficiency in case of service (no need for fault-finding)

Combination sensors

Pressure/temperature, distance/position/temperature, fluid level/temperature, temperature/humidity/ conductivity/DC (HLB), pressure/temperature/integrity of accumulator bags (BIS)

- Process/condition data
- Only one process interface and one electrical interface

IO-Link sensors

Sensors to measure pressure, differential pressure, distance, temperature, fluid level, humidity and oil ageing

- Bidirectional communication via IO-Link
- In addition to switching output, measured values and diagnostic data provided in standardised digital format

Bluetooth pressure transmitter

Wireless pressure transmitter, mainly for service and commissioning

- Standard Bluetooth interface
- Sensor operation and provision, visualisation and, as applicable, evaluation of measured data via smartphone/tablet and app

Cooling monitor

PC software for observing all process parameters in the cooling system (passive or active cooler)

- Communication via RS232, USB or Ethernet
- Visualisation, recording of temperature progression, output of status messages (multiple language).
- Remote control, remote diagnosis

Compressor coolers

Active cooling system for water, oil and other fluids

- Bidirectional communication via RS232, Profibus, ProfiNet or EtherCAT, CANopen, Ethernet
- Modification of process parameters (e.g. target temperature), output of diagnostic data

Non-linear power control

Model-based controller for precise and rapid control of various heat exchangers

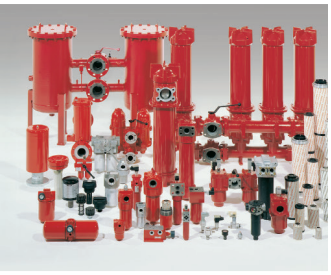
- Data exchange via TCP/IP protocol
- Monitoring of cooling liquid supply, reporting of non-permitted operating states, logging of operating data such as temperatures and cooling capacities
- Self-teaching

Eco-Box

System for increasing energy efficiency (uses passive cooling operation in addition to compressor cooling, where possible)

- Bidirectional communication to compressor cooler via RS485
- Automatic closed-loop control of entire system composed of active and passive coolers

Accumulators 30.000

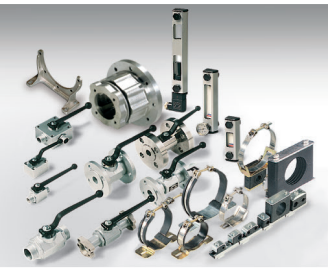


Fluid Filters 70.000

Process Technology 77.000

Filter Systems 79.000

Compact Hydraulics 53.000



Accessories 61.000

Electronics 180.000

Cooling Systems 5.700

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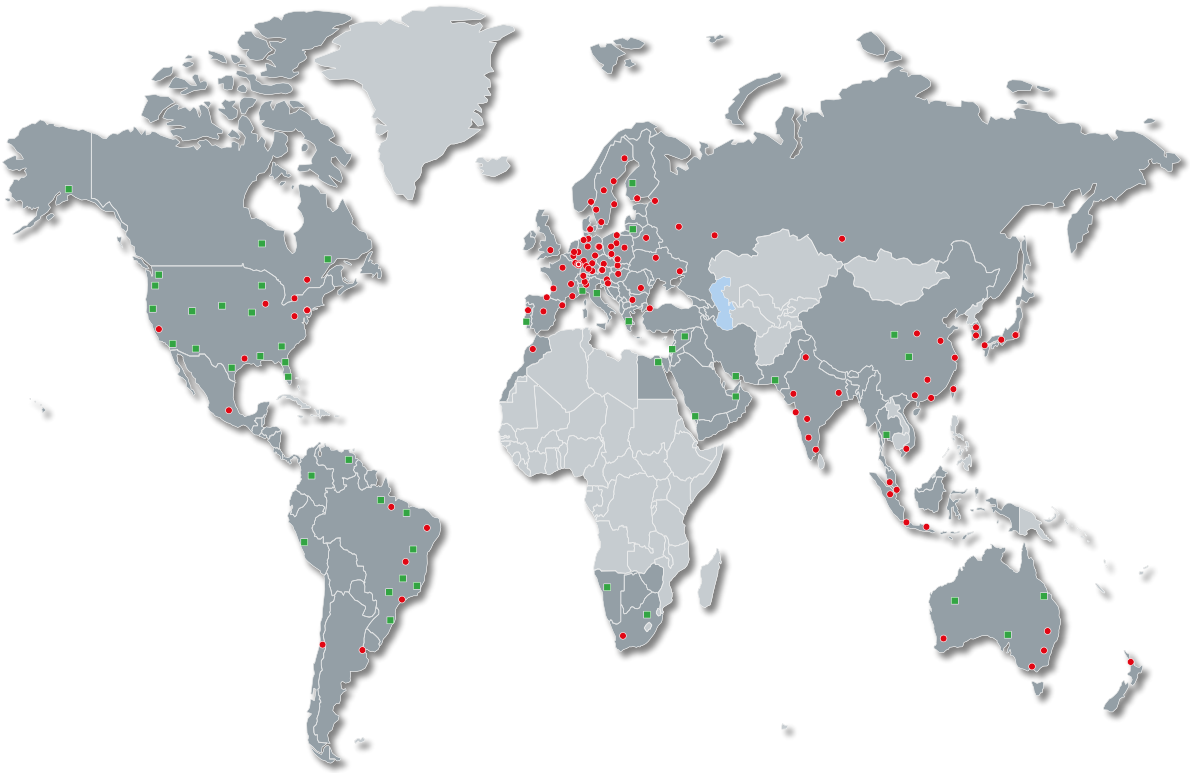

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