CELOS® from DMG MORI

Platform of industrial Digitization

DMG MORI Software Solutions GmbH
Dr. Holger Rudzio, Munich, 23th November 2016

DMG MORI

Content of Presentation

_ DMG MORI – Global Integrated Machine Tool Company

_ „GLOBAL ONE" Initiative to be #1 for our Customers worldwide

_ Digitization – Motivation to get smart

_ Digitization – Perspectives & Priorities

_ CELOS® of DMG MORI – Smart Platform for digital Transformation

_ Digital Workflows in the Era of Industry 4.0

_ Monitorung as Base of continuous Improvement

_ Predictive Maintenance and data based Services

_ Perspective

DMG MORI

DMG MORI – Global Integrated Machine Tool Company

With consolidated **Sales of more than 3.5 billion €** and **over 12,000 employees,** DMG MORI is one of the **World's leading Machine Tool Manufacturer.**

DMG MORI – The Course of Cooperation

› 2009

Start of Partnership

› 2011

Expanding our Cooperation

First joint Exhibition appearance at EMO in Hannover

› 2012

Combining of Strengths in Europe

› 2013

March

The Cooperation Agreement sets the Framework for strengthening the trustfully Partnership of GILDEMEISTER and MORI SEIKI.

October

DMG MORI SEIKI

One Partnership – One Name

DMG MORI

The new common Branding for global Sales and Service.

› DMU 80 P duoBLOCK®

CELOS®

› NLX 2500 | 700

Our new DMG MORI Design either in „black" or „white".

› 2014

Grand Opening of Global Headquarters in Europe and Asia

Winterthur

Tokyo

› 2015

January

Das Cooperation Agreement 2015 sets the Framework for the Takeover Offer by DMG MORI SEIKI CO., LTD.

April

Conclusion of the voluntary public Takeover Offer (Voting Share CO., LTD.: 52,54 %)

June

As further Sign of the continued growing together the Cooperation Partners adapt their Company Names.

DMG MORI
AKTIENGESELLSCHAFT

DMG MORI
COMPANY LIMITED

December

CO., LTD. holds of AG 60,67 % at 31 Dec 2015 *

› 2016

April

CO., LTD. increases stock share to 76,03 %.

August

With the entry in the Commercial Register on 24 August 2016 the control and profit assumption agreement become effective.
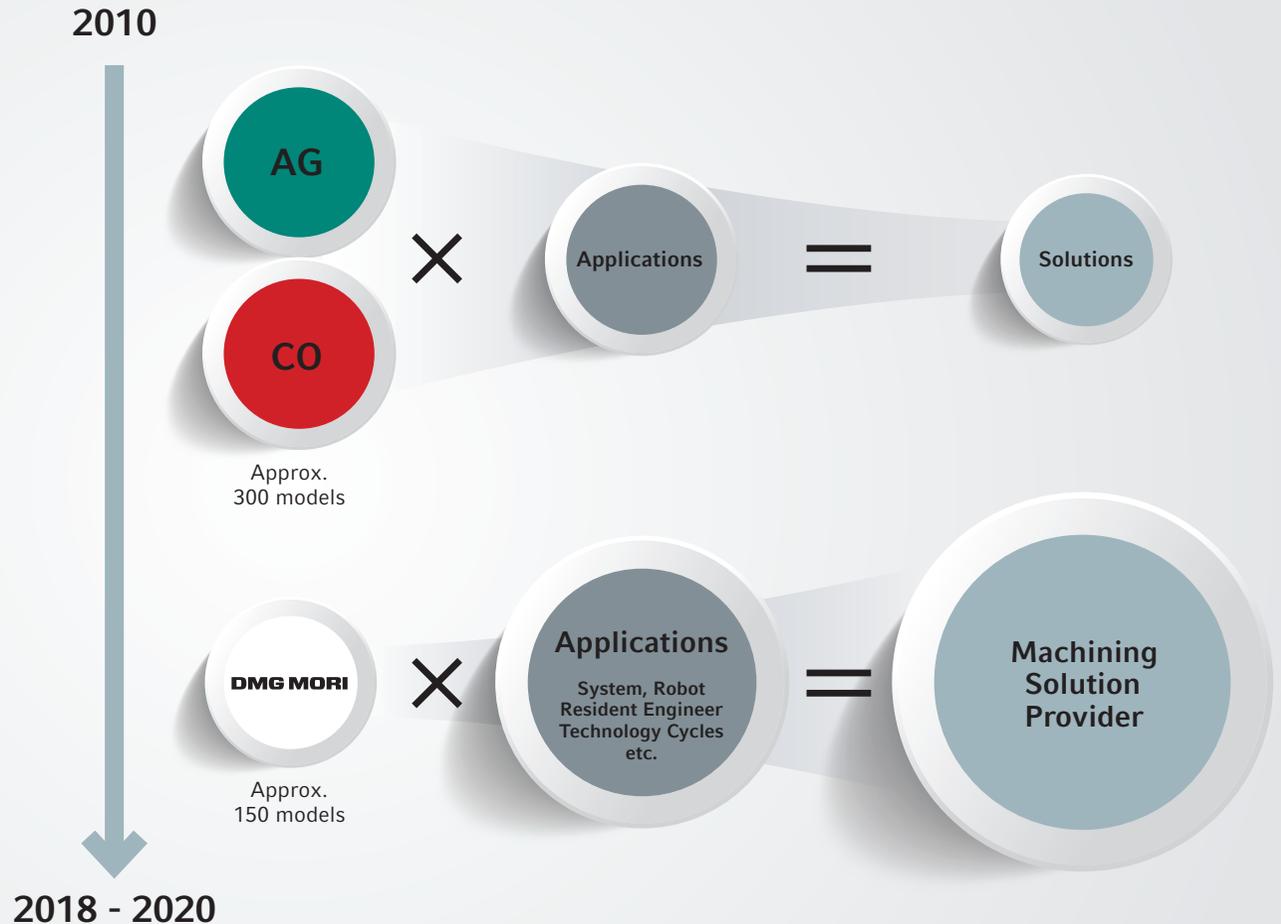
Realignment as global integrated machine tool builder.

"Global One"

*Source: Publication in accordance with financial Statement of DMG MORI COMPANY LIMITED on 10 February 2016

DMG MORI – Strategic Policies of Vision 2020

_ Strengthen the **Development of cutting-edge Technologies**

_ Create **new Customer Value** that **combines hightech Products & intelligent Software Systems**

_ Provide more **intelligent Products faster and efficiently**

_ Provide **best Solutions and Services** for each Customer

_ **Keep on evolving**

2010

AG

CO

Approx.
300 models

$\times$

Applications

$=$

Solutions

DMG MORI

Approx.
150 models

$\times$

Applications

System, Robot
Resident Engineer
Technology Cycles
etc.

$=$

Machining Solution Provider

2018 - 2020

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DMG MORI – GLOBAL ONE

„OUR GOAL: TO BE #1 FOR OUR CUSTOMERS WORLDWIDE"

Machine Tools
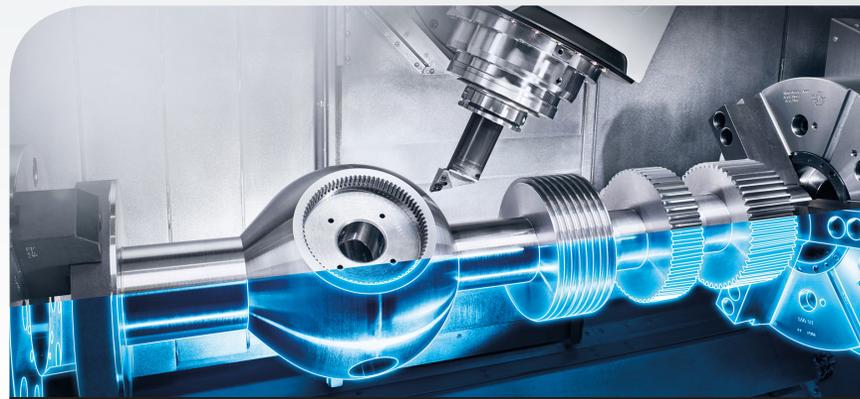
Software Solutions

Automation

Service Solutions

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Automation

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DMG MORI – Topics 2016

1 CELOS® and Industry 4.0

2 Innovations - 12 world premiers in 2016

3 Process & Handling Automation
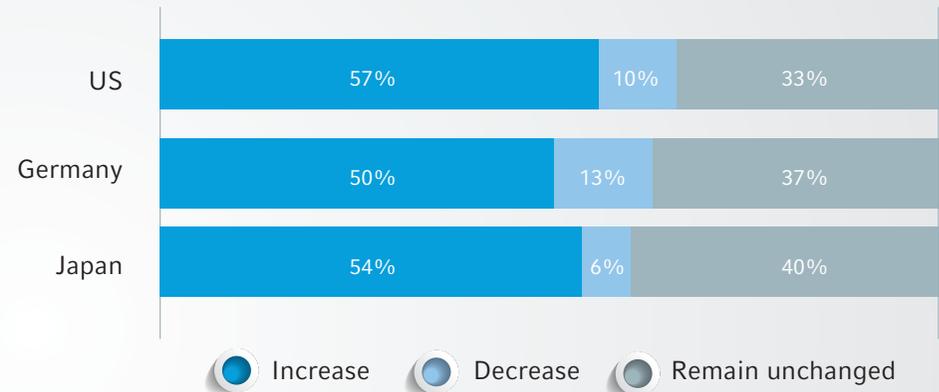

4 Additive Manufacturing & ULTRASONIC

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Automation

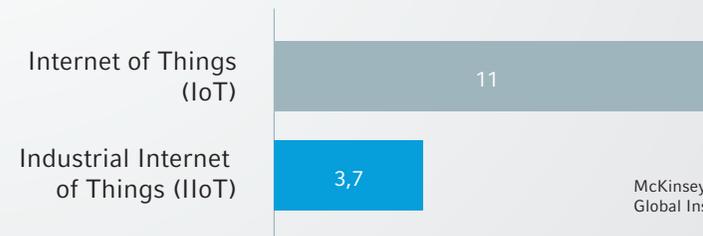**DMG MORI**

Digitization – Smart Industry

THE FIVE THESES OF DIGITIZATION

1. The Digital Revolution is an **unstoppable global Trend**

2. Industry 4.0 opens up an enormous Potential for **added Value and more Competitiveness**

3. SMEs cannot manage **Digital Change** by their own Recources

4. Customers needs comprehensive Software Products, **software-related Services** and tailormade **digital Turnkey Solutions**

5. Those solving a Customer's Future Problems will **win a Future Customer**

MOST US, GERMAN AND JAPANESE COMPANIES EXPECT INDUSTRY 4.0 TO INCREASE THEIR COMPETITIVENESS

	Increase	Decrease	Remain unchanged
US	57%	10%	33%
Germany	50%	13%	37%
Japan	54%	6%	40%

● Increase ● Decrease ● Remain unchanged

POTENTIAL ECONOMIC IMPACT SIZE IN 2025, $ TRILLION

Internet of Things (IoT)	11
Industrial Internet of Things (IIoT)	3,7

McKinsey
Global Institute Analysis, 2015

Digitization – Perspectives & Priorities

Customer Perspective – internally*
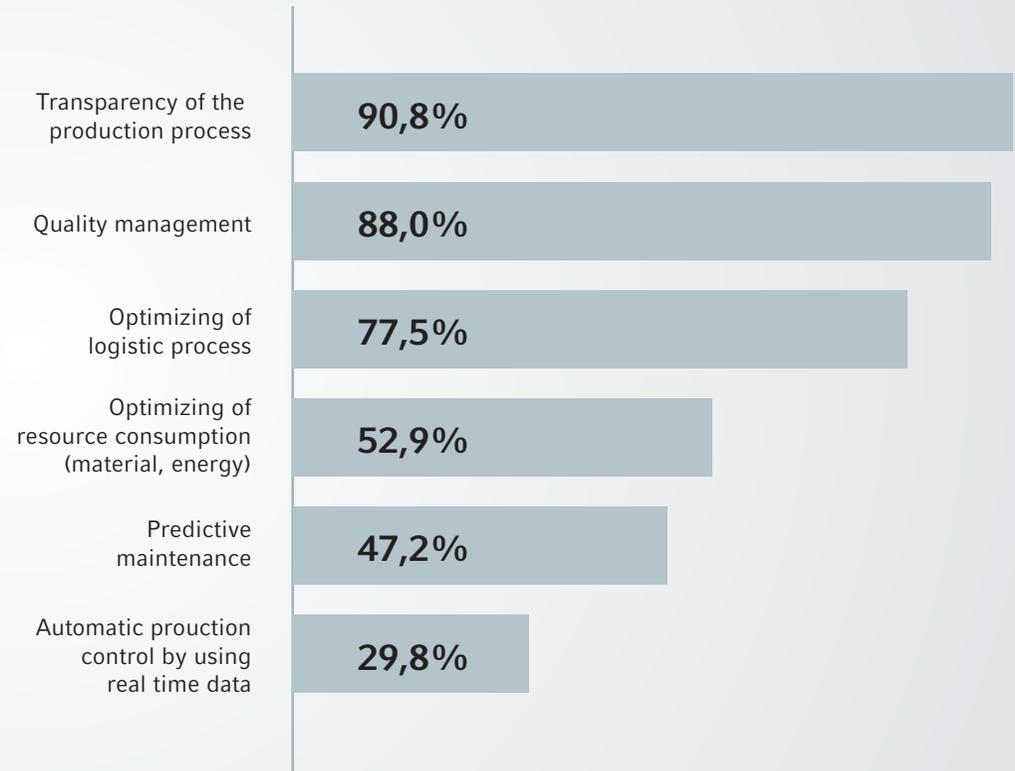
_ Heterogeneous Machine Park of different generations (conventional / control)
_ Insufficient Master Data Registration and Availability
_ Lower Digitization in the Field of Production and Manufacturing
_ Absentee personel Resources
_ Lack of Knowhow

Customer Perspective – externally*

_ Unclear Interface Situation
_ Unresolved Security Questions
_ Absentee real time Communication
_ High Demand for Investment
_ High Complexity
_ Low Security of Investment
_ Unsafe Profit Forecast
_ No proven Solutions available

Customers key priorities of digitization

Transparency of the production process	**90,8%**
Quality management	**88,0%**
Optimizing of logistic process	**77,5%**
Optimizing of resource consumption (material, energy)	**52,9%**
Predictive maintenance	**47,2%**
Automatic prouction control by using real time data	**29,8%**

* Synthesis of different studies of leading institutes and consulting companies

Source:
VDMA Readiness Study 2016

CELOS® – Smart Platform for digital Transformation

APP based Surface with
unique Multi-Touch Operating.

_   Easy Machine Operation
_   Longer Machine running time
_   More efficient Production Workflows

HIGHLIGHTS

_   Open Platform for
    continuous further Development
_   Monitorung and Data Analytics
_   Digital Workflows
_   Increasing transparency
_   Unique CELOS® APP Technology

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CELOS® – Digital Manufacturing Workflow
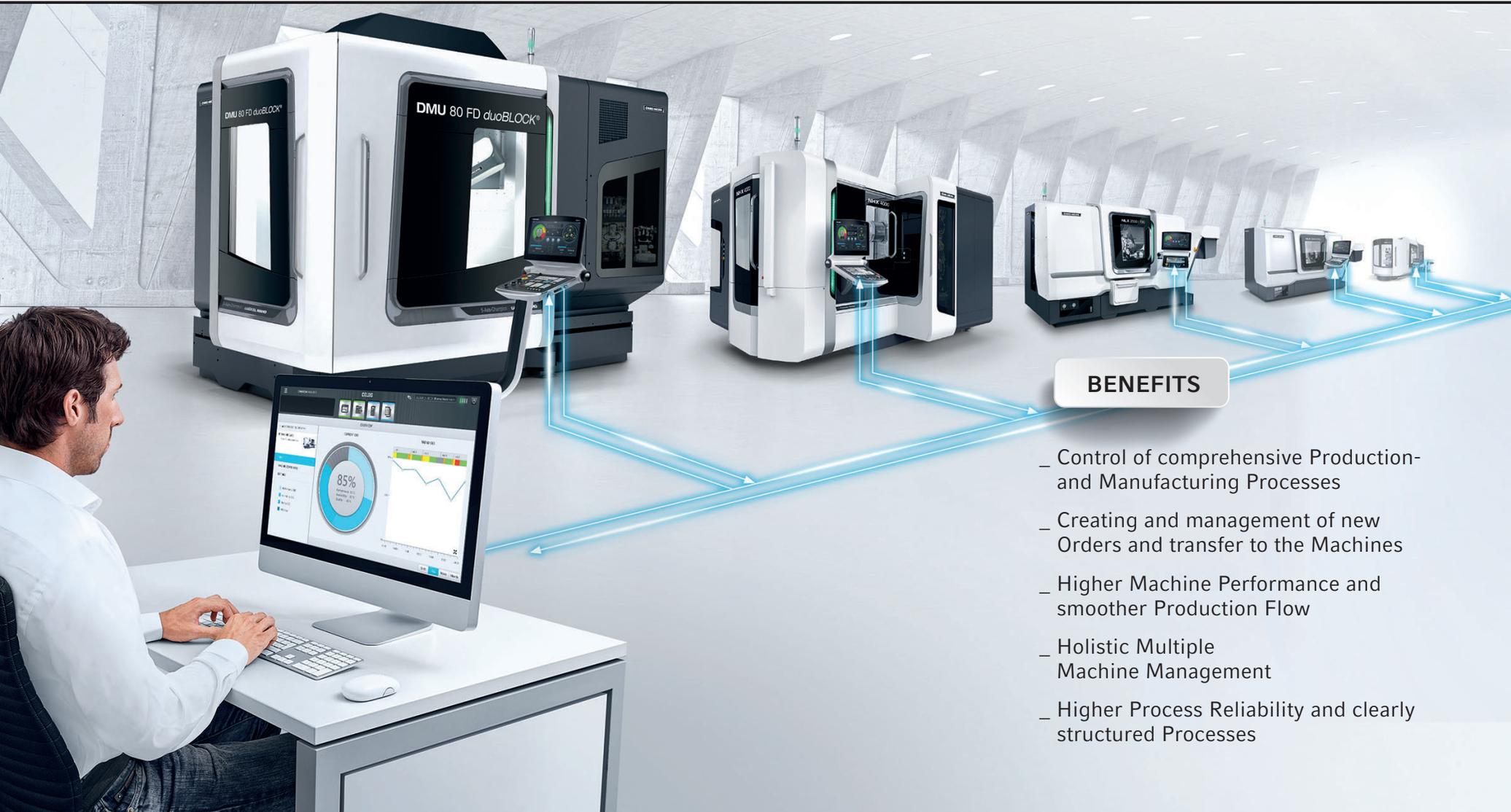
BENEFITS

_ Control of comprehensive Production-
and Manufacturing Processes

_ Creating and management of new
Orders and transfer to the Machines

_ Higher Machine Performance and
smoother Production Flow

_ Holistic Multiple
Machine Management

_ Higher Process Reliability and clearly
structured Processes

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CELOS® Digital Workflows – Utilities

TECH CALCULATOR
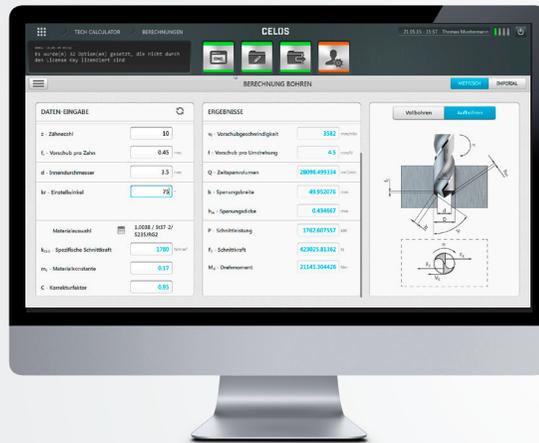
DOCUMENTS

BENEFITS

_ Material and Process dependent Calculation of
  Spindle Speed, Feed Rate and Spindle Load

_ Norm compliant Ermittlung of defined measurements
  for threads or fits
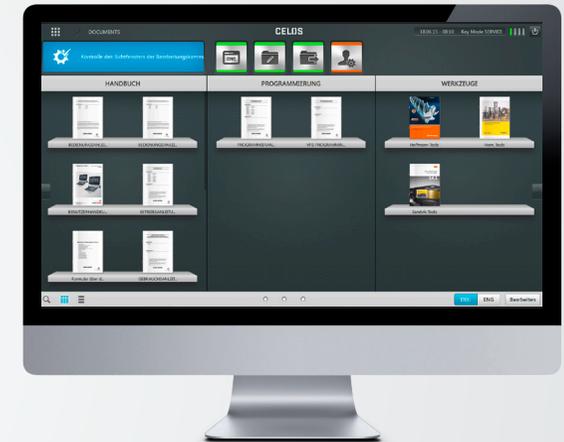
BENEFITS

_ Storing of all Customer specific Documents

_ Full-Text Search and Bookmark Function for
  recurring Reference Sectors

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CELOS® Digital Workflows – Digital Process Chain

3 EXTENSION LEVELS OF DIGITIZATION

1   Integration 1 x Machine in a Company Network

2   Networking of multiple machines

3   Connection with ERP System (e.g. SAP)

ORDER → **PROCESS PLANNING / WORK PREPARATION** → **MANUFACTURING**

ORDER MANAGEMENT		CELOS® PC VERSION		MACHINES	
JOB MANAGER	CAD/CAM VIEWER	JOB MANAGER	JOB SCHEDLUER	JOB ASSISTANT	TOOL HANDLING
		TECH CALCULATOR	DOCUMENTS	SERVICE AGENT	MESSENGER

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CLOUD
SMART DATA

MESSENGER   PERFORMANCE
MONITOR   CONDITION
ANALYZER

DMU 50

DMC 650 V

DMC 80 U

CELOS

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CELOS® – Monitoring APPs

MESSENGER

BENEFITS

_ Clear Live-Status Presentation of all
  connected Machines

_ Analyse of Runtime,
  Downtime, Disruptions and Faults

PERFORMANCE MONITOR

BENEFITS

_ Measuring of Key Performance Indicators

_ Order based Performance Analysis

_ Available for Machines, PCs,
  Tablets & Smartphones

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CELOS® – CONDITION ANALYZER

CONDITION ANALYZER

BENEFITS

_ CNC Program Optimization

_ Early detection of machine faults

_ Analyzation of causes of failure

_ Data collecting for long-term Analyzation

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CELOS® – Digital Maintenance Workflow

Senso Info

CONDITION ANALYZER „Yellow Lights"

Service Agent

Buying, Maintenance, or DMG MORI direct

Order e.g. at DMG MORI Service

Shipment

CONDITION ANALYZER „Green Lights"

Installation

...with Documentation, Video Instructions

Maintenance Customer

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CELOS® – First Premium Partner APPs

BENEFITS

_ Integration of software solutions as CELOS® Partner APP, including Look & Feel

_ Tested and certified by DMG MORI

_ Proven solutions, perfect integrated in CELOS®, for smooth operations with performing Interfaces

BLUM

HAINBUCH

SURFACE ANALYZER

_ Machine integrated roughness measuring

_ InProcess quality control of surfaces

_ Certified for medical and aerospace

CLAMP CHECK

_ Increased machine safety due to monitoring of clamping forces

_ Wireless measuring, even while processing

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CELOS® – Customer Survey

FUNCTIONAL REQUIREMENTS

_ Integration of CAD Functions

_ Integration of 3rd Party Machines / other Technologies

_ Function extension CELOS® TECH CALCULATOR
  (e.g. pipe threads, UNC, etc.)

_ Integrated Office Functions

_ Notes as PopUp

_ Easy Picture upload from Smartphone oder digital Camera

_ Connection to ERP/MDE/BDE System

_ Expanded Tool Handling

_ Connections between APPs

_ WLAN Integration of Machines

_ Suitability for small Batches and individual Production

_ Secure Connectivity to IT and Cloud Architectures

CUSTOMER SURVEY

Hamburg 2.07

Berlin 1.40

Bielefeld 2.25

Hilden 1.91

Frankfurt 1.77

Stuttgart 2.15

München 2.19

CH 1.00

Average: 1,98

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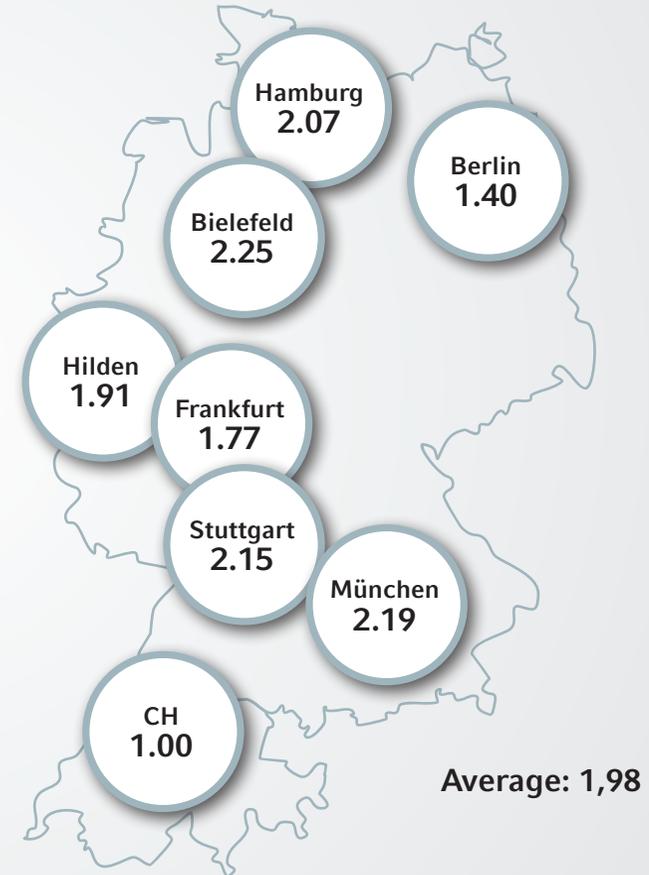
CELOS® Evolution – Status Quo Version 3

**CELOS® VERSION 3
50 NEW FEATURES**

Setup time integration increase Process Overview

New Formats
Word, Excel, IGES, STEP increase the Possibilities for Job Data Integration

Intuitive loading of the Tool Magazine speeds up the Tool Process

Pallet Changer
highest Productivity by means of automated Pallet Storage

NC Program Comparison
improves Tracking of Changes

Feedback Function
for Order Interruptions to notify the Order Status

Energy-Monitoring / -analysis for Production Optimization

Quick Launch Integration
facilitates the Navigation from Control

JOB MANAGER · JOB SCHEDULER · JOB ASSISTANT · TOOLHANDLING · CONTROL · PALLET CHANGER

CAD-CAM VIEW · TECH CALCULATOR · DOCUMENTS · ORGANIZER · NETSERVICE · SERVICE AGENT

ENERGY SAVING · SETTINGS · STATUS MONITOR · MESSENGER

Spindle Performance Diagram introduces preliminary Examination of the available Spindle Power

Comments function
offering new possibilities for Documentation

Machine overlapping sending of notes optimized Communication

New Navigation aid
enables fast Switching between different APPs

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CELOS® Outlook – Always up-to-date

FUTURE RELIABILITY DUE TO NEW CELOS® UPDATES AND FUNCTIONS

CELOS® Version 4 includes 10 new optional APPs as well as overall 50 feature enhancements and improvements.

CELOS® UPDATER
FAST AND AUTOMATED UPDATES

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CELOS® Evolution – New APPS Version 4

CELOS® V3

AMB JIMTOF

CELOS® V4

16 STANDARD APPS

JOB MANAGER	JOB ASSISTANT	TOOL HANDLING	PALLET-CHANGER	CONTROL	JOB SCHEDULER
CAD-CAM VIEW	TECH CALCULATOR	ORGANIZER	DOCUMENTS	SERVICE AGENT	NETSERVICES
STATUS MONITOR	MESSENGER	ENERGY SAVING	SETTINGS		

Production: APPs for production planning and control and assisting with job processing

Utilities: Production support, conversion tools and access to reference material

Support: Maintenance and service assistant, online support from DMG MORI

Configuration: Intelligent energy management and individual configuration of all APPs

Machine views: Detailed machine and order status display, live status in real time

10 OPTIONAL APPS

3D PART ANALYZER	CLAMP CHECK	SURFACE ANALYZER	CELOS DEVELOPER	CELOS UPDATER
PALLET MANAGER	ROBO 2 GO	MESSENGER	CONDITION ANALYZER	PERFORMANCE MONITOR

_ **First optional CELOS® APPs** as base of a new CELOS® ecosystem

_ **CELOS® CLAMP CHECK** and **CELOS® SURFACE ANALYZER** as first Partner APPs

_ **CELOS® DEVELOPER** as Partner development platform

_ **50 function improvements** for existing CELOS® APPs

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CELOS® Evolution – 10 optional APPs in Version 4

PALLET MANAGER
Pallet System Management on Machines

Robo2Go
CELOS based Roboter Programming

SURFACE ANALYZER*
Integrated Roughness Control

CLAMP CHECK*
Wireless prove of Clamping Forces

3D PART ANALYZER
Use 3D Models on the Machine

CELOS® DEVELOPER
The Basis of Premium Partner APPs

CELOS® UPDATER
Fast and automated Updates

CONDITION ANALYZER
Professional Machine Signal Analysis

PERFORMANCE MONITOR
KPI and OEE Analysis at a Glance

MESSENGER
Cloud-Based Machine Status Display

AMB

JIMTOF

10 NEW OPTIONAL CELOS® APPS | 16 STANDARD CELOS® APPS
50 FUNCTION IMPROVEMENTS FOR EXISTING CELOS® APPS

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CELOS® Evolution – Integration of 3rd Party Machines

CELOS® TERMINAL

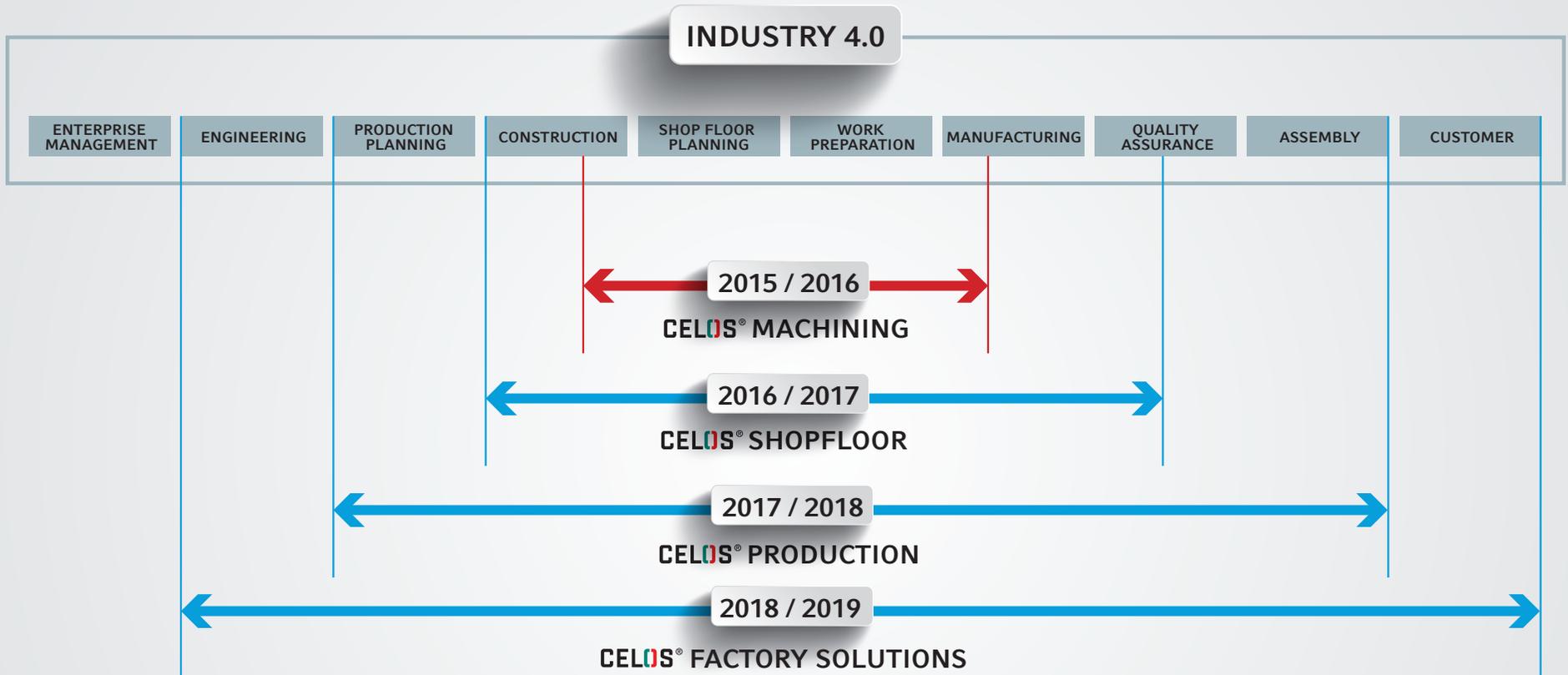**BENEFITS**

_ Compact & mobile Solution

_ Integration of installed DMG MORI Machines
without CELOS® Control

_ Integration of 3rd party machinen, manual workplaces and
maschines of other technologies

_ Multiple machine ability

CELOS® Evolution – Evolving along the Value Chain

| ENTERPRISE MANAGEMENT | ENGINEERING | PRODUCTION PLANNING | CONSTRUCTION | SHOP FLOOR PLANNING | WORK PREPARATION | MANUFACTURING | QUALITY ASSURANCE | ASSEMBLY | CUSTOMER |

INDUSTRY 4.0

2015 / 2016
CELOS® MACHINING

2016 / 2017
CELOS® SHOPFLOOR

2017 / 2018
CELOS® PRODUCTION

2018 / 2019
CELOS® FACTORY SOLUTIONS

**IMPROVING DIGITAL EXCELLENCE CREATES
ADDED VALUE FOR DMG MORI AND ITS CUSTOMERS
ALONG THE ENTIRE VALUE CHAIN**

DMG MORI

CELOS® Vision – Holistic Digital Factory Solutions

DISTRIBUTION & LOGISTICS

ENTERPRISE MANAGEMENT

ENGINEERING

ASSEMBLY

CONSTRUCTION

QUALITY ASSURANCE

CELOS®
CYBER PHYSICAL SOLUTIONS

PRODUCTION PLANNING

MANUFACTURING

WORK PREPARATION

ORDER FINE PLANNING

CELOS® Evolution – Next Steps to digital Factory

DIGITAL PROCESS CHAIN

FLAGSHIP PROJECTS

CELOS® FACTORY

_ DMG MORI Status-Quo
_ Automated Process Chain ->
  Preparation, Assistance and Monitoring
_ Software supported Programming
  and Process Automation

_ CELOS® Experience Center with
  digital „Customer journey"
_ Digitale Factor in Seebach
_ International CELOS® Hightech-Center

_ CELOS® FACTORY as customer-specific and
  „data based" Production System
_ Digital Turnkey-Solution from Planning to
  smart Production
_ Software related and Data based Services

2016 ⟶ **2020**

Many thanks for your attention!

DMG MORI Software Solutions GmbH
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