ELHA

i **DPS**

intelligent
Digital Production
Support

intelligent Digital Production Support

---

i **DPS**

Digital system solutions made by ELHA

*i***DPS** is the ELHA system solution for more productivity, efficiency and transparency.

The applications are available via workstations in the company network or with customer approval also worldwide via the ELHA machine service portal. As an option, dashboards for mobile devices can be offered.

Basis for all applications is a machine-installed industrial PC with a database, dashboards and an innovative remote access solution. Customer-specific add-ons are possible.

Your benefits

✓ Very high process / machine transparency

✓ Extensive analysis / diagnosis options

✓ Basic information for preventive maintenance

✓ Fast service support

✓ Applications are at the machine, in the company network and worldwide available

✓ Secure, client-controlled remote access

ELHA
*i***DPS**
intelligent
Digital Production Support
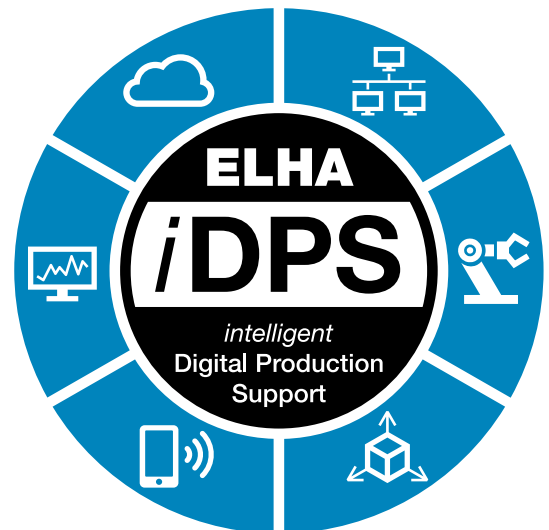
User groups

The *i***DPS** system solution is suitable for result-oriented persons and users from the following areas:
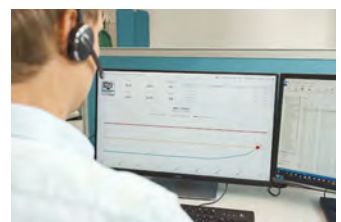
Maintenance / Installation support

Process planning / Production planning

Manufacturing control / Production management

Service

Maximum transparency and effective service are the main objectives of ELHA *i***DPS**. Therefore, the basic package already contains many useful functions and information to support the customer and ELHA in case of analysis.

BASIC

Free services during the warranty period!

Machine Service Portal	Machine Productivity Monitoring	Machine Process Analyzer	Machine Health Inspector

- ■ Secure network
- ■ Service ticket
- ■ Online conferences
- ■ Asset file
- ■ Remote access

- ■ Production status
- ■ Production output
- ■ Production times
- ■ Machining status

- ■ Process data

- ■ Alarm history
- ■ Components operating hours

ADD-ON

Machine Digital Simulation

- ■ Virtual process commissioning
- ■ Training at the virtual model

ADVANCED

Machine Process Analyzer	Machine Health Inspector

- ■ Trend analysis process (vibration, torque)
- ■ Tool monitoring

- ■ Trend analysis
- ■ Collision report
- ■ Detailed analysis

Digital twin for a realistic, virtual process environment based on the real machine data of the machine-tool.

The advanced package allows more sensor-based transparency in process and condition of the wear-prone components such as ball screws, bearings and guided lines. Damages will be minimized or avoided by shutting down as quickly as possible in the event of a collision.

MACHINE SERVICE PORTAL

Machine Service Portal

With the MSP-application, ELHA guarantees fast worldwide diagnostic support. Basis is a service ticket which is created by the customer.

Your benefits

✓ Explicit, standardised communication channels

✓ Transparent communication history

✓ Worldwide diagnostic support

✓ Detailed remote diagnosis

✓ Optimal „on-site service" scheduling

Ideal for service
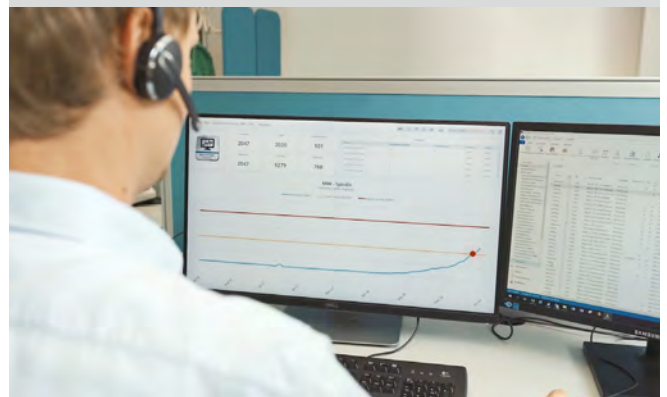
Secure network technology

- Secure VPN-connection to the machine
- Full connection control on customer side
- Connection to ELHA central server only possible by customer
- Only one port which has to be opened on the customer side (port 443)

ELHA Service Cockpit | ELHA Central Server | ELHA Site Control | ELHA Customer Cockpit
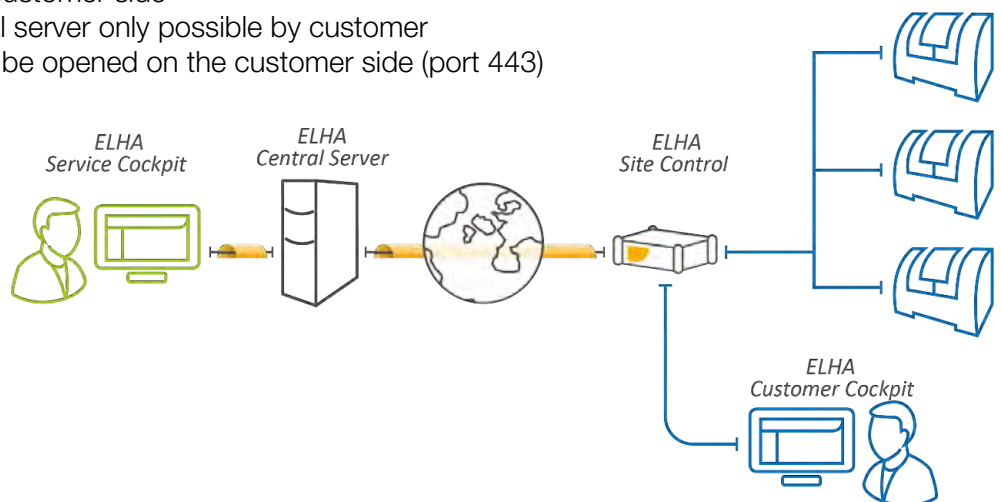
Service ticket

In case of service, the machine operator decides whether and when to grant access to the machine. The machine operator can be certain at all times that no one can establish a connection without his permission. A ticket is automatically created by a service request.

When a connection with the machine is established by a service technician, his presence is registered. The processing times of all employees involved in a service request are recorded and logged. The list of online times will is saved and available for evaluation.

Online conferences

The conference center is a multifunctional communication tool. It contains a text conference module, a webcam module and a whiteboard module. These components allow users who are logged in on the same ELHA site control or central server to exchange text, video, audio and images in real time. Mobile participation is possible with a smartphone, a windows tablet or data glasses.
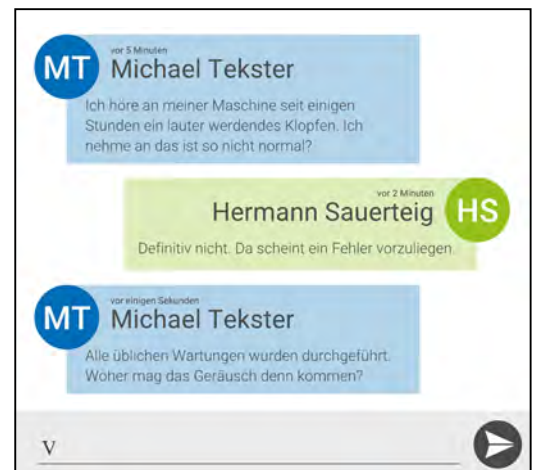
Asset file

ELHA MSP offers comprehensive management functions: customer and machine data, service information, documents and contracts are stored clearly and can be accessed at any time. A service archive and logging of all service activities are included functions.

Remote access

In case of service, access to all released components which include an IP-address, is possible. The machine operator determines which components are released: CNC control, CNC HMI, PLC control, mobile panels, camera, robot controller, robot HMI, etc.

MACHINE PRODUCTIVITY MONITORING
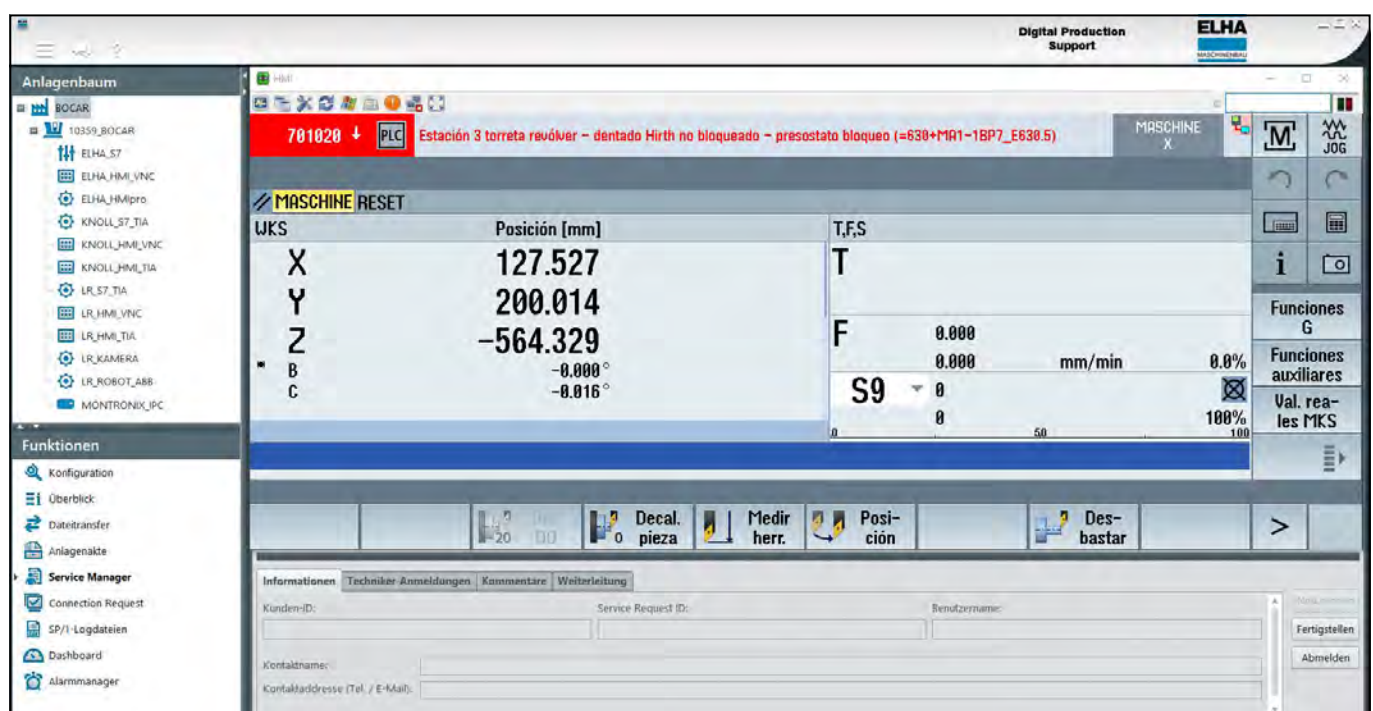
Machine Productivity Monitoring

With MPM-application a fast and clear overview of all relevant information regarding productivity in form of tables or diagrams is possible. Production-relevant data are stored locally on an industrial PC.

Your benefits

✓ Transparency regarding output and productivity

✓ Problem identification / analysis of causes of the discrepancies

✓ Available at any time, stationary and mobile

Ideal for manuf. control / prod. management

Production status

■ CNC operating mode   ■ function type   ■ production status   ■ authentication

Production output

■ workpiece-specific   ■ shift-specific   ■ week-specific

iDPS - MPM - Production Output / MPM - Production Output - Weekly …

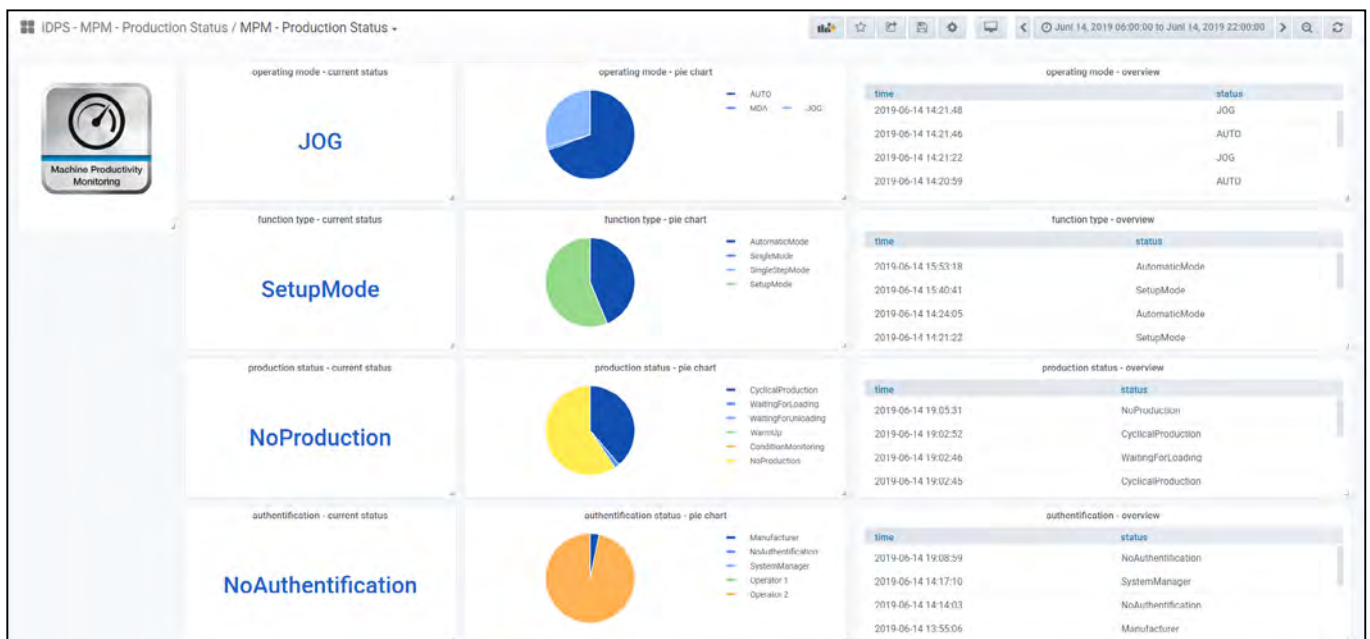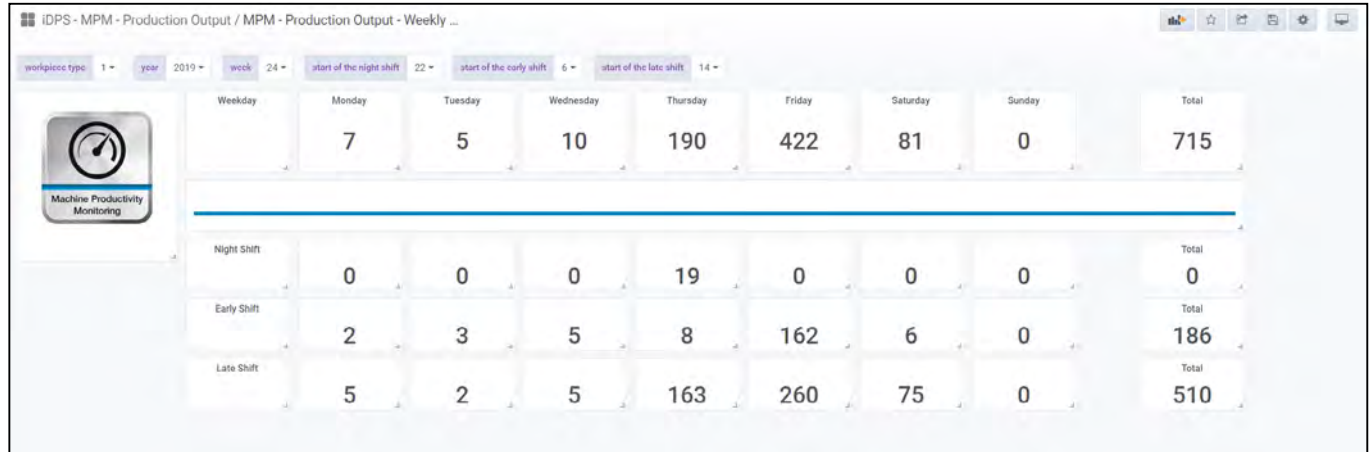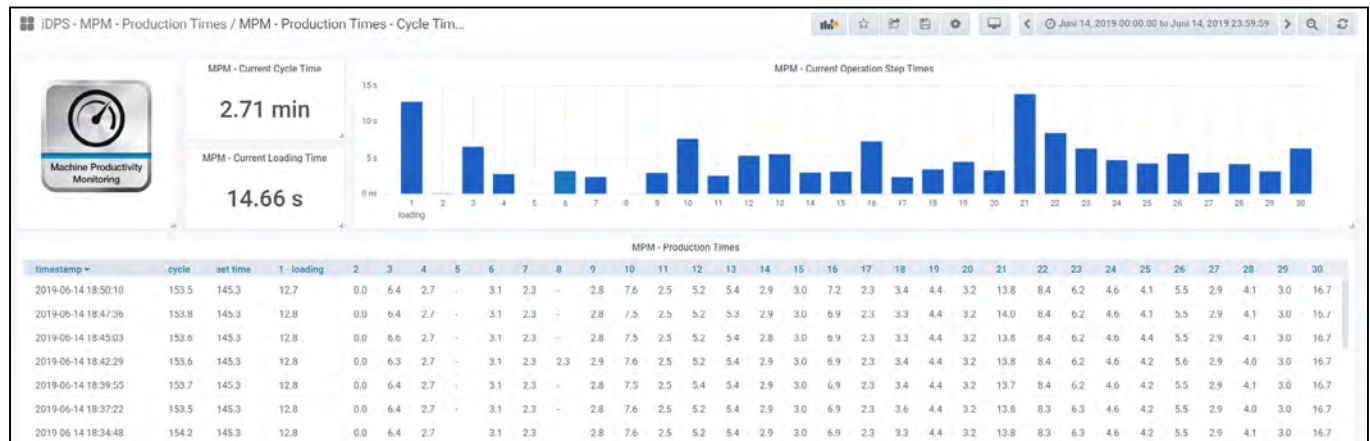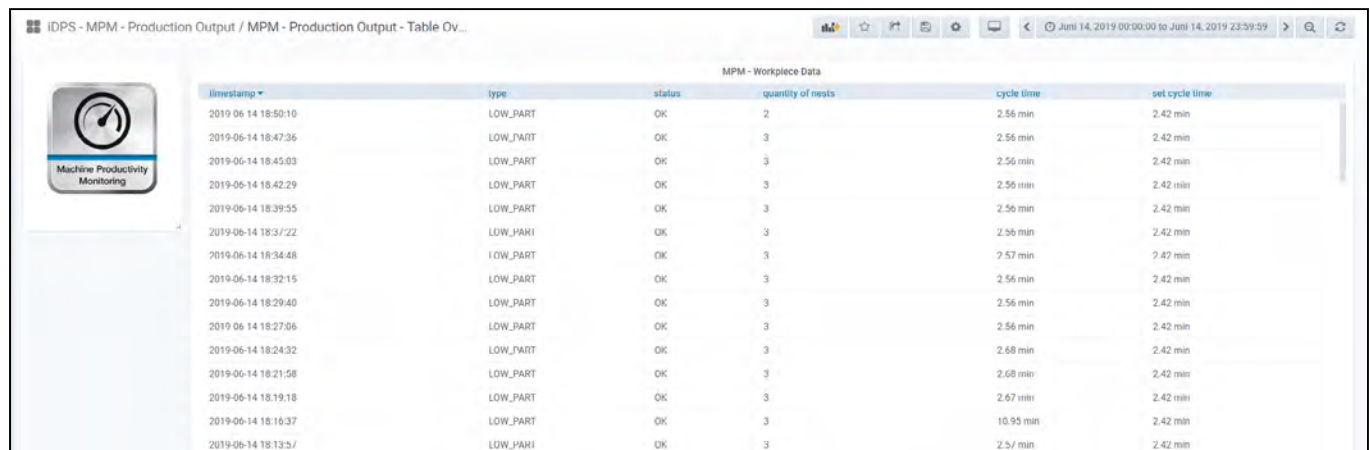workpiece type 1 ▾   year 2019 ▾   week 24 ▾   start of the night shift 22 ▾   start of the early shift 6 ▾   start of the late shift 14 ▾

Weekday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Total
	7	5	10	190	422	81	0	715
Night Shift	0	0	0	19	0	0	0	Total 0
Early Shift	2	3	5	8	162	6	0	Total 186
Late Shift	5	2	5	163	260	75	0	Total 510

Machine Productivity Monitoring

Production times

■ workpiece code   ■ time stamp   ■ machining time   ■ machining step times   ■ workpiece change time

iDPS - MPM - Production Times / MPM - Production Times - Cycle Tim…   Juni 14, 2019 00:00:00 to Juni 14, 2019 23:59:59

MPM - Current Cycle Time **2.71 min**

MPM - Current Loading Time **14.66 s**

MPM - Current Operation Step Times

MPM - Production Times

timestamp ▾	cycle	set time	1 - loading	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
2019-06-14 18:50:10	153.5	145.3	12.7	0.0	6.4	2.7	-	3.1	2.3	-	2.8	7.6	2.5	5.2	5.4	2.9	3.0	7.2	2.3	3.4	4.4	3.2	13.8	8.4	6.2	4.6	4.1	5.5	2.9	4.1	3.0	16.7
2019-06-14 18:47:36	153.8	145.3	12.8	0.0	6.4	2.7	-	3.1	2.3	-	2.8	7.5	2.5	5.2	5.3	2.9	3.0	6.9	2.3	3.3	4.4	3.2	14.0	8.4	6.2	4.6	4.1	5.5	2.9	4.1	3.0	16.7
2019-06-14 18:45:03	153.6	145.3	12.8	0.0	6.6	2.7	-	3.1	2.3	-	2.8	7.5	2.5	5.2	5.4	2.8	3.0	6.9	2.3	3.3	4.4	3.2	13.8	8.4	6.2	4.6	4.4	5.5	2.9	4.1	3.0	16.7
2019-06-14 18:42:29	153.6	145.3	12.8	0.0	6.3	2.7	-	3.1	2.3	2.3	2.9	7.6	2.5	5.2	5.4	2.9	3.0	6.9	2.3	3.4	4.4	3.2	13.8	8.4	6.2	4.6	4.2	5.6	2.9	4.0	3.0	16.7
2019-06-14 18:39:55	153.7	145.3	12.8	0.0	6.4	2.7	-	3.1	2.3	-	2.8	7.5	2.5	5.4	5.4	2.9	3.0	6.9	2.3	3.4	4.4	3.2	13.7	8.4	6.2	4.6	4.2	5.5	2.9	4.1	3.0	16.7
2019-06-14 18:37:22	153.5	145.3	12.8	0.0	6.4	2.7	-	3.1	2.3	-	2.8	7.6	2.5	5.2	5.4	2.9	3.0	6.9	2.3	3.6	4.4	3.2	13.8	8.3	6.3	4.6	4.2	5.5	2.9	4.0	3.0	16.7
2019-06-14 18:34:48	154.2	145.3	12.8	0.0	6.4	2.7		3.1	2.3		2.8	7.6	2.5	5.2	5.4	2.9	3.0	6.9	2.3	3.3	4.4	3.2	13.8	8.3	6.3	4.6	4.2	5.5	2.9	4.1	3.0	16.7

Processing status

■ workpiece code   ■ time stamp   ■ workpiece type   ■ planned machining time   ■ real machining time

iDPS - MPM - Production Output / MPM - Production Output - Table Ov…   Juni 14, 2019 00:00:00 to Juni 14, 2019 23:59:59

MPM - Workpiece Data

timestamp ▾	type	status	quantity of nests	cycle time	set cycle time
2019-06-14 18:50:10	LOW_PART	OK	2	2.56 min	2.42 min
2019-06-14 18:47:36	LOW_PART	OK	3	2.56 min	2.42 min
2019-06-14 18:45:03	LOW_PART	OK	3	2.56 min	2.42 min
2019-06-14 18:42:29	LOW_PART	OK	3	2.56 min	2.42 min
2019-06-14 18:39:55	LOW_PART	OK	3	2.56 min	2.42 min
2019-06-14 18:37:22	LOW_PART	OK	3	2.56 min	2.42 min
2019-06-14 18:34:48	LOW_PART	OK	3	2.57 min	2.42 min
2019-06-14 18:32:15	LOW_PART	OK	3	2.56 min	2.42 min
2019-06-14 18:29:40	LOW_PART	OK	3	2.56 min	2.42 min
2019-06-14 18:27:06	LOW_PART	OK	3	2.56 min	2.42 min
2019-06-14 18:24:32	LOW_PART	OK	3	2.68 min	2.42 min
2019-06-14 18:21:58	LOW_PART	OK	3	2.68 min	2.42 min
2019-06-14 18:19:18	LOW_PART	OK	3	2.67 min	2.42 min
2019-06-14 18:16:37	LOW_PART	OK	3	10.95 min	2.42 min
2019-06-14 18:13:57	LOW_PART	OK	3	2.57 min	2.42 min

MACHINE PROCESS ANALYZER

Machine Process Analyzer

The MPA-application provides detailed information about the machining process. Process-relevant data for workpiece and step-specific machining are stored with a time stamp.

Your benefits

✓ Potencials for development of further productivity and cost optimisation

✓ Workpiece-specific analysis of the machining situation

✓ Identification and analysis of abnormal machining conditions

Ideal for manuf. control / prod. management

Process data

Workpiece-specific logging of process-relevant machining parameters. Including nominal values for spindle speed, feed rate, tool number, tool status, tool length, tool radius, machining step times, main machining time, non-productive times and temperatures.

timestamp ▼	step	duration	G0	G1	feed	speed	temp.
2019-06-14 18:35:46	14	2.88 s	606.00 ms	0 ns	1	9646	29
2019-06-14 18:33:13	14	2.86 s	598.00 ms	0 ns	1	9646	29
2019-06-14 18:30:39	14	2.87 s	607.00 ms	0 ns	1	11937	29
2019-06-14 18:28:05	14	2.88 s	596.00 ms	0 ns	1	9646	29
2019-06-14 18:25:31	14	3.13 s	598.00 ms	12.00 ms	1	9646	29

| tool id	length	radius	tool life	life set	life warn	mtx active	tool no.	wpc no.
TR171_COMBITOOL	100	142,000	0	0	0	true	31	11
TR171_COMBITOOL	100	142,000	0	0	0	true	31	11
TR171_COMBITOOL	100	142,000	0	0	0	true	31	11
TR171_COMBITOOL	100	142,000	0	0	0	true	31	11
TR171_COMBITOOL	100	142,000	0	0	0	true	31	11

Trend analysis ADVANCED

Processing step-specific current and vibration values from the tool and workpiece sides are integrated and displayed on a trend graph. Based on this information imminent and past quality problems can be identified. Component diagnosis via the machine health inspector is recommended in case of trend-discrepancies.
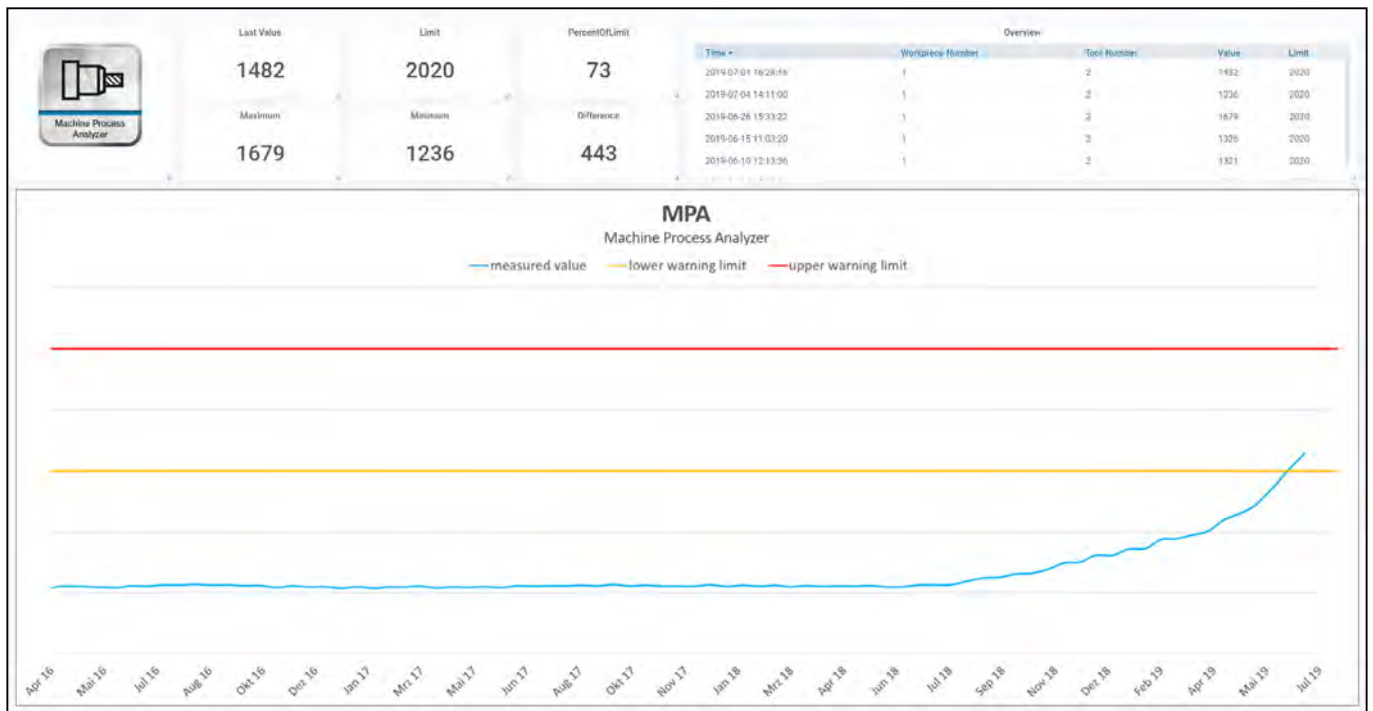
ADVANCED

Tool-monitoring

Monitoring of the machining process via motor current of the axes or spindles which are involved in the process. The acceleration sensors, mounted at the tool carrier (main spindle) or work-piece carrier (feed axes) can also be used for monitoring.
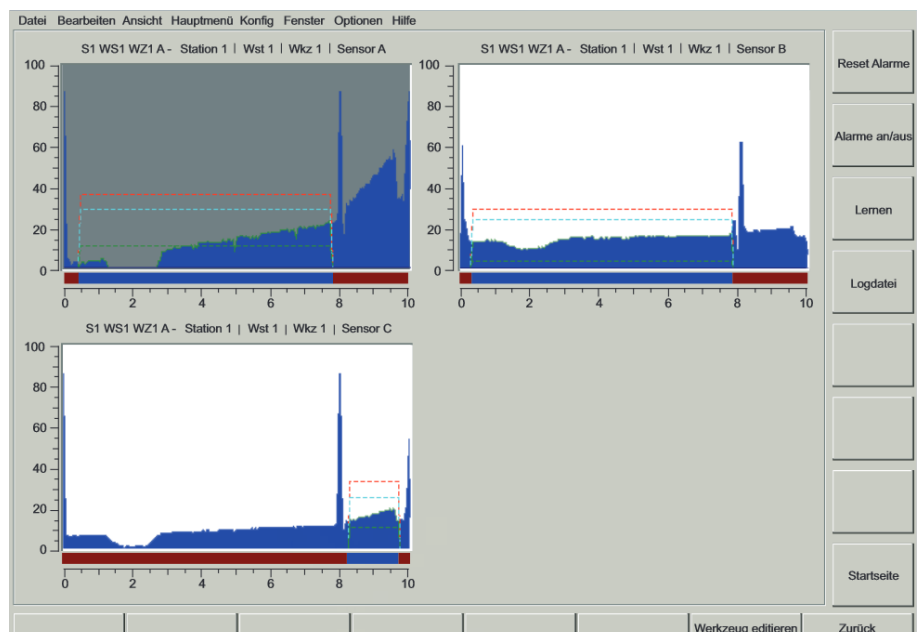
MACHINE HEALTH INSPECTOR

The MHI-application provides information for the operator about the condition of the wear-prone components which are installed in the machine and shows alarm messages that have occurred.

Machine Health Inspector

Your benefits

✓ Prevention of unplanned machine down-times

✓ Significant increase of machine availability

✓ Optimization of maintenance tasks and spare parts management

✓ Transparency for condition of machine components due to irregularities

Ideal for maintenance / installation support

Alarm history

■ alarm messages   ■ chronological with date / time of the event   ■ alarm specific with frequency

MHI - Alarms - Error-Overview ordered by timestamp

Time ▼	Number	Source	Message
2019-06-14 20:16:08	701020	PLC	Station 3 Revolver - Hirthverzahnung nicht verriegelt - Druckschalter Verriegeln (=630+MA1-1BP7_E630.5)
2019-06-14 20:16:08	701020	PLC	Station 3 Revolver - Hirthverzahnung nicht verriegelt - Druckschalter Verriegeln (=630+MA1-1BP7_E630.5)
2019-06-14 19:06:18	701301	PLC	Safety - NOT-HALT Bedienpult betätigt (=070+BP1-5SF4, =074+HS1-1KF2.1:DI1/DI5)
2019-06-14 19:06:18	701301	PLC	Safety - NOT-HALT Bedienpult betätigt (=070+BP1-5SF4, =074+HS1-1KF2.1:DI1/DI5)
2019-06-14 19:00:30	701020	PLC	Station 3 Revolver - Hirthverzahnung nicht verriegelt - Druckschalter Verriegeln (=630+MA1-1BP7_E630.5)
2019-06-14 19:00:30	701020	PLC	Station 3 Revolver - Hirthverzahnung nicht verriegelt - Druckschalter Verriegeln (=630+MA1-1BP7_E630.5)

MHI - Alarms - Error-Overview ordered by frequency

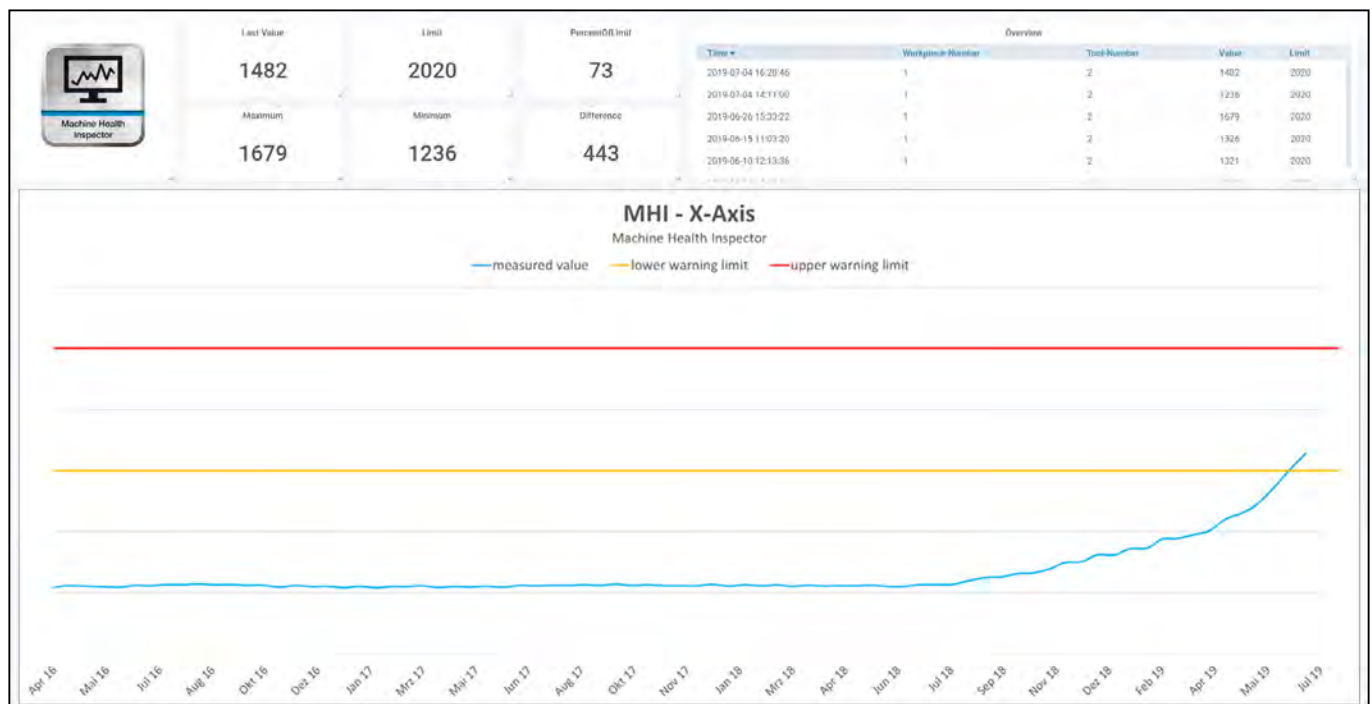| frequency ▼	Number	Source	Message
4	701020	PLC	Station 3 Revolver - Hirthverzahnung nicht verriegelt - Druckschalter Verriegeln (=630+MA1-1BP7_E630.5)
2	701301	PLC	Safety - NOT-HALT Bedienpult betätigt (=070+BP1-5SF4, =074+HS1-1KF2.1:DI1/DI5)

Components operating hours

Operating times of the machine, the machining spindles and the spindle bearings

Cycle Counter	SR1S1-Spindle - Operating Hours	SR1S2-Spindle - Operating Hours
36731	76.86	76.66

SR1S3-Spindle - Operating Hours	SR1S4-Spindle - Operating Hours
76.77	0

Row 1 - Operating Hours	Row 2 - Operating Hours	Row 3 - Operating Hours	Row 4 - Operating Hours
6.96	4.65	2.66	10.99

Row 5 - Operating Hours	Row 6 - Operating Hours	Row 7 - Operating Hours	Row 8 - Operating Hours
6.00	15.96	23.85	5.97

Cycle Counter - Overview

timestamp ▾	cycle counter
2019-07-04 14:58:59	36731
2019-07-04 12:00:48	36712
2019-07-04 09:25:16	36711
2019-07-04 08:37:53	36711

Operating Hours - Overview

timestamp ▾	type	type no.	operating hours
2019-07-04 14:58:59	row	1	6.96
2019-07-04 14:58:59	row	2	4.65
2019-07-04 14:58:59	row	3	2.66

1 2 3 4 5

Trend analysis (condition monitoring) ADVANCED

For diagnosis, axes and spindles are moved via a part program. Vibrations during the movement are integrated and displayed in a trend graph. Defined limit values exist for pre-warning and alarms. In case of reaching or exceeding a limit, a component-specific and detailed analysis is available.

Last Value	Limit	PercentOfLimit
1482	2020	73

Maximum	Minimum	Difference
1679	1236	443

Overview

Time ▾	Workpiece-Number	Tool-Number	Value	Limit
2019-07-04 16:20:46	1	2	1482	2020
2019-07-04 14:11:00	1	2	1236	2020
2019-06-26 15:33:22	1	2	1679	2020
2019-06-15 11:03:20	1	2	1326	2020
2019-06-10 12:13:36	1	2	1321	2020

MHI - X-Axis
Machine Health Inspector

— measured value   — lower warning limit   — upper warning limit

Collision report   ADVANCED

In case of a collision, all movements are stopped as quick as possible. Collision-relevant information such as program number, program block, tool data, active coordinate system, active G-codes, etc. are stored with time stamp in a database. This information can be evaluated by using a dashboard.

Detailed analysis   ADVANCED
(Condition monitoring)

- Component-specific analysis after warning in axis / spindle trend
- Recording of vibrations directly at the bearing, ballscrew, guide-carriage of the affected axis / spindle with mobile 3-axis acceleration sensor
- Comparison with new condition state
- Analysis based on bearing-specific characteristics (FFT-analysis)
- Analysis of the vibration pattern

MACHINE DIGITAL SIMULATION

ELHA
MASCHINENBAU

Machine Digital Simulation
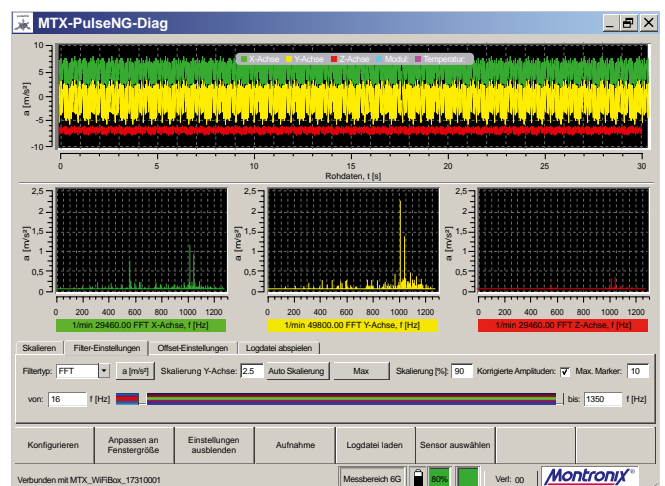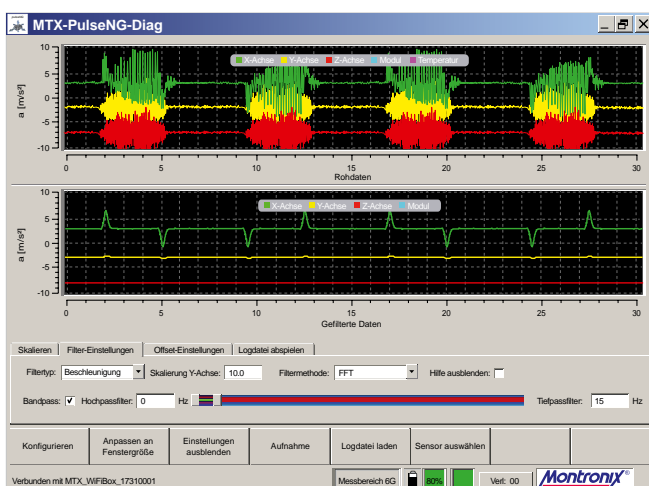
ADD-ON

The MDS-application offers comprehensive and realistic process simulations in a virtual environment. Basis is a virtual machine which is linked to the kinematic model of the real machine and other machine parameters. The user is able to simulate the machining process via virtual NC control in a highly accurate accordance to the real process.

- Digital machine twin
- Realistic simulation of the machining process including cycle times
- Consideration of real technological machine properties for the simulation

Your benefits

✓ Highly precise machining process simulation

✓ Early detection of required improvements and corrections for workpiece design and machining process technology

✓ Identification of ratio potentials for specific machining processes

✓ Collision avoidance in the early planning / programming phase

Ideal for process / production planning
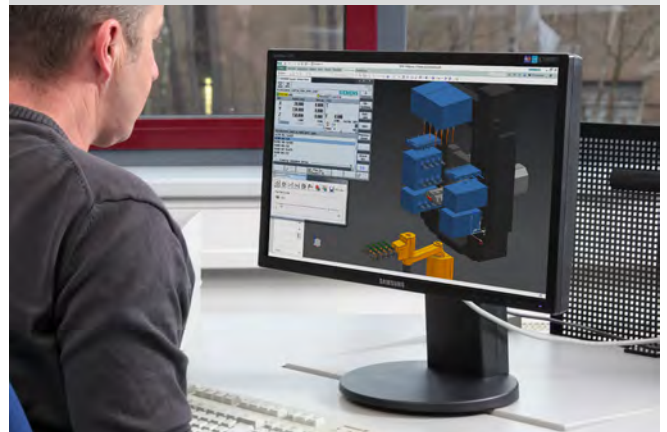
Virtual machine
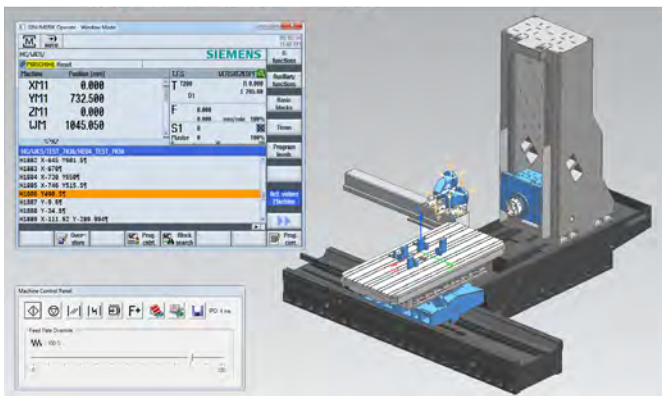
- Virtual Siemens control system
- Motion simulation
- Collision check
- Running-in of processes and process optimization
- Training of machine operators

Real machine

After simulation and testing in the virtual environment, the CNC program can be used directly
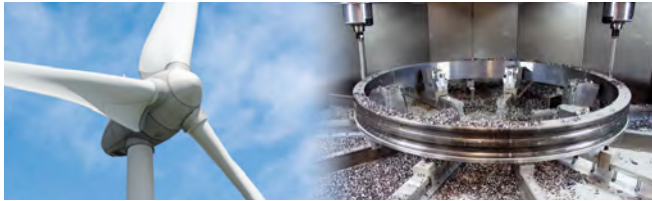
NOTES

Industries & Products

Automotive

FM
Production Modules

FM *SMART*
Transfer Centers

Energy   Large bearings

VTM
Vertical Turn-Milling Centers

RTX
Rotary Table Machining Centers
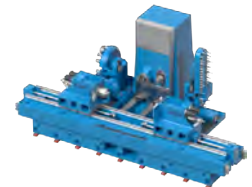
Aerospace   General machining

SMX
Special Machining Centers

SPX
Special Purpose Machines

Die and mold

Xpert-K
Horizontal Machining Centers

Xpert-V
Vertical Machining Centers

ELHA-MASCHINENBAU Liemke GmbH & Co. KG

ELHA is a family-owned company known for customized machine tools and process solutions. Many industries in the metalworking industry trust ELHA's experience and competence in the development and realisation of highly productive machining processes as well as the design and manufacture of cutting machine tools and turn-key solutions.

Plant 1
Allee 16
D-33161 Hövelhof

Plant 2
Otto-Hahn-Straße 27
D-33161 Hövelhof

Phone: +49 5257 / 508-0

Fax plant 1:   +49 5257 / 508-118
Fax plant 2:   +49 5257 / 508-208

E-Mail: info@elha.de

Hamburg
Hannover
Berlin
Hövelhof
Cologne
Frankfurt
Munich

TÜV NORD
TÜV NORD CERT GmbH
DIN EN ISO 9001/14001

VDA | Verband der Automobilindustrie