



intelligent Digital Production Support

i DPS

*i*DPS

Digital system solutions made by ELHA

iDPS 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
- \checkmark Applications are at the machine, in the company network and worldwide available
- ✓ Secure, client-controlled remote access



User groups

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



Maintenance / Installation support



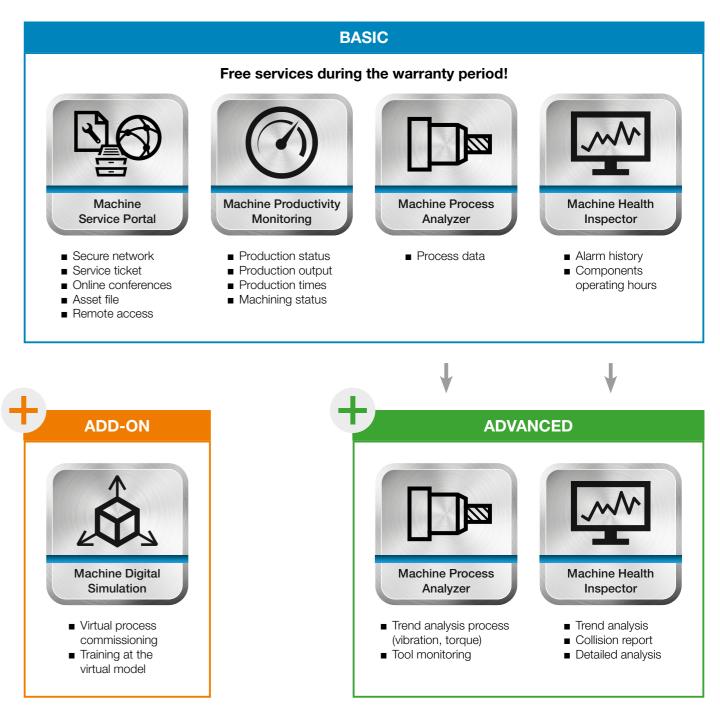
Process planning / Production planning



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.



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 wearprone 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.

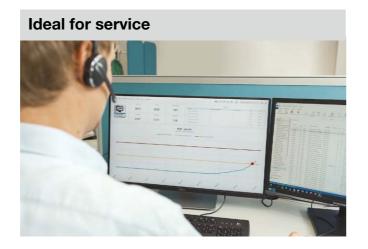
MACHINE SERVICE PORTAL



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

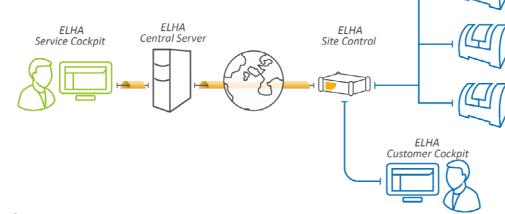
Your benefits

- \checkmark Explicit, standardised communication channels
- \checkmark Transparent communication history
- ✓ Worldwide diagnostic support
- ✓ Detailed remote diagnosis
- ✓ Optimal "on-site service" scheduling



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)



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.

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BOCAR		9 # 🖾
B 10359_BOCAR	701020 +	PLC Estación 3 torreta revólver – dentado Hirth no b
- the elha_s7		
ELHA_HMI_VNC	and the second second second	
ELHA_HMIpro	MASCHINE RE	SET
	UKS	Posición [mm]
KNOLL_HMI_VNC	Х	127.527
KNOLL_HMI_TIA		
- 💽 LR_S7_TIA - 📰 LR_HMI_VINC	Υ	200.014
LR KAMERA	Z	-564.329
LR_ROBOT_ABB	* В	-0.000 °
	C	-0.016°
	_	
Inktionen		
Konfiguration		
i Überblick		
Dateitransfer		Page Do Decal.
Anlagenakte		P20 DO Pieza
Service Manager	Informationen Techni	iker-Anmeldungen Kommentare Weiterleitung
Connection Request	Kunden-ID:	Service Request ID:
SP/1-Logdateien	Kunden-ID:	Service Request iD:
-		
Dashboard	Kontaktname:	





	Digital Production Support	
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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. Productionrelevant data are stored locally on an industrial PC.

Production output

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

	Juliput / Will Will I	roduction Output -	reekly						曲 🖒 🖄 🗎 🕯
ype 1 • year 2019	• week 24 •	start of the night shift	22 • start of the e	early shift 6 • start of	f the late shift 14 -				
	Weekday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Total
		7	5	10	190	422	81	0	715
nine Productivity Monitoring									
	Night Shift	0	0	0	19	0	0	0	Total
	Early Shift								Total
		2	3	5	8	162	6	0	186
	Late Shift								Total
		5	2	5	163	260	75	0	510

Production times

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

		MPM - Currer	nt Cycle Time													М	PM - Cu	irrent Og	peration	Step Tir	mes											
\bigcirc		2.71	min	15 :																												
Machine Productivity Monitoring	,	MPM - Current	1 Loading Time	5 s		1 2 ding	3	4	5	0	7	8	9	10	11 1	2 13	8 14	15	18	17	18	19	20 1	21 22	23	24	25	26	27	28 2	29 30	2
				-								MP	M - Prod	uction)	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
2019-05-14 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
019-06-14 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
			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 18:37:22	153.5	145.3	12.0	0.0	50.19	Ac. 1																										

Processing status

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

III iDP

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				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
vity	2019-06-14 18:45:03	LOW_PART	OK	3	2.56 min	2.42 min
	2019-06-14 18:42:29	LOW_PART	ОК	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	ок	3	2.56 min	2.42 min
	2019-06-14 18:29:40	LOW_PART	ок	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

Your benefits

- ✓ Transparency regarding output and productivity
- ✓ Problem identification / analysis of causes of the discrepancies
- ✓ Available at any time, stationary and mobile



Production status

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

	operating mode - current status	operating mode - pie chart	0	perating mode - overview
$\left(\right)$		- AUTO	time	status
		- MDA - JOG	2019-06-14 14:21:48	JOG
U	JOG		2019-06-14 14:21:46	AUTO
Machine Productivity			2019-06-14 14:21:22	JOG
Machine Productivity Monitoring			2019-06-14 14:20:59	AUTO
	function type - current status	function type - pie chart		function type - overview
		- AutomaticMode	time	status
		- SingleMode - SingleStepMode	2019-06-14 15:53:18	AutomaticMode
	SetupMode	- SetupMode	2019-06-14 15:40:41	SetupMode
			2019-06-14 14:24:05	AutomaticMode
			2019-06-14 14:21:22	SetupMode
	production status - current status	production status - pie chart	pr	oduction status - overview
		- CyclicalProduction	time	status
		WaitingForLoading WaitingForUnloading	2019-06-14 19:05:31	NoProduction
	NoProduction	- WarmUp	2019-06-14 19:02:52	CyclicalProduction
	inter reduction	ConditionMonitoring NoProduction	2019-06-14 19:02:46	WaitingForLoading
			2019-06-14 19:02:45	CyclicalProduction
	authentification - current status	authentification status - pie chart		uthentification - overview
		- Manufacturer	time	status
		 NoAuthentification SystemManager 	2019-06-14 19:08:59	NoAuthentification
	NoAuthentification	- Operator 1	2019-06-14 14:17:10	SystemManager
		Operator 2	2019-06-14 14:14:03	NoAuthentification
			2019-06-14 13:55:06	Manufacturer



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.

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.

ſ		1		Last Valu			20				ntOfLimit	
Ма	chine Process Analyzer	,		Maximum 167			Minin 123				erence 43	
		J						5	-measure	ed value		MPA ine Proces wer warnir
No.	enai16	10126	puelto	04226	Derto	1an17	Mar 17	Mail	hungy	RUBIT	ONELT	Nout

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.

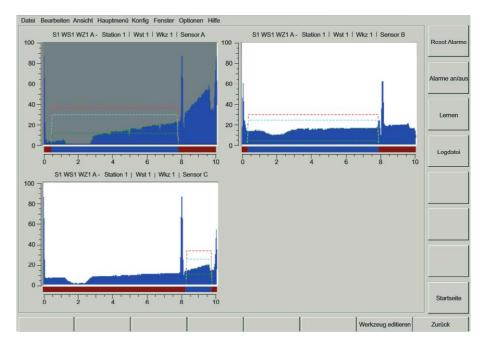
timestamp 🕶	step	duration	G0	G1	feed	speed	temp.
2019-06-14 18:35:46	14	2.88 s	606.00 ms	0 ns	1	9646	29
2019-06-14 18:33:13	14	2.86 s	598.00 ms	0 ns	1	9646	29
2019-06-14 18:30:39	14	2.87 s	607.00 ms	0 ns	1	11937	29
2019-06-14 18:28:05	14	2.88 s	596.00 ms	0 ns	1	9646	29
2019-06-14 18:25:31	14	3.13 s	598.00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

ADVANCED

Toolmonitoring

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.

Components operating hours

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

Cycle Counter 36731	SR1S1-Spindle - Operating Hours 76.86	SR152-Spindle - Operat 76.66	35			
	SR1S3-Spindle - Operating Hours 76.77	SR1S4-Spindle - Operat	ing Hours			
Row 1 - Operating Hours 6.96	Row 2 - Operating Hours 4.65	Row 3 - Operating F	lours	Ro	w 4 - Operating Hours 10.99	
Row 5 - Operating Hours 6.00	Row 6 - Operating Hours	Row 7 - Operating H		Ro	w 8 - Operating Hours 5.97	
54-7757-182-05						
Cycle Cou	nter - Overview cycle counter	timestamp -	Operating Ho	urs - Overview	operating hours	
2019-07-04 14:58:59	36731	2019-07-04 14:58:59	row	type no.	6.96	
2019-07-04 12:00:48	36712	2019-07-04 14:58:59	row	2	4.65	
2019-07-04 09:25:16	36711	2019-07-04 14:58:59	row	3	2.66	
2019-07-04 08:37:53	36711		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	2020	PercentOfLimit	
J.W.W.	1402	2020	/3	
Machine Health Inspector	Maximum	Minimum	Difference	
	1679	1236	443	
			Machin	II - X e Health
			measured value — lowe	er warni

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



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 20:16:0	08	701020	PLC	Station 3 Revolver - Hirthverzahnung nicht verriegelt - Druckschalter Verriegeln (=630+MA1-1BP7_E630.
2019-06-14 20:16:0	08	701020	PLC	Station 3 Revolver - Hirthverzahnung nicht verriegelt - Druckschalter Verriegeln (=630+MA1-1BP7_E630.
2019-06-14 19:06:1	18	701301	PLC	Safety - NOT-HALT Bedienpult betätigt (=070+BP1-5SF4, =074+HS1-1KF2.1:DI1/DI5)
2019-06-14 19:06:1	18	701301	PLC	Safety - NOT-HALT Bedienpult betätigt (=070+BP1-5SF4, =074+HS1-1KF2.1:DI1/DI5)
2019-06-14 19:00:3	30	701020	PLC	Station 3 Revolver - Hirthverzahnung nicht verriegelt - Druckschalter Verriegeln (=630+MA1-1BP7_E630.
	20	701020	PLC	Station 3 Revolver - Hirthverzahnung nicht verriegelt - Druckschalter Verriegeln (=630+MA1-1BP7_E630.
2019-06-14 19:00:3	50	701020	110	Station 5 Revolver - Hirthverzahnung nicht vernegen - Drückschalter vernegen (=050+MAT-TDP7_E050
2019-06-14 19:00:3	50	,01020		
				MHI - Alarms - Error-Overview ordered by frequency
2019-06-14 19:00:3 frequency •	Number	Source	Message	
			Message	



	Ove	rview		
Time •	Workpiece-Number	Tool-Number	Value	Limit
2019-07-04 16:28:46	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	31	2	1326	2020
2019-06-10 12:13:36	1	2	1321	2020
	varning limit			
				/
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MACHINE HEALTH INSPECTOR

MACHINE DIGITAL SIMULATION

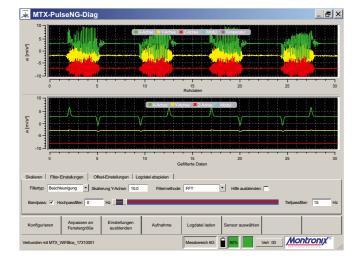
Collision report ADVANCED

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.

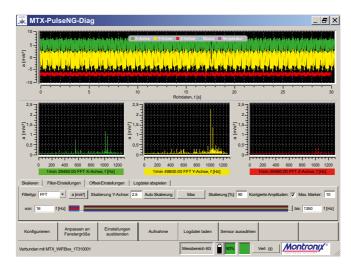
	overall counter	colreid	• time	f.		program		pro	gram line	program bloc	:k		
		114	2019	9-06-15 14:21:	44	_N_C_KOPPELN	SPF	29		N160 G0 C=0	C_2=0 C_3=0		
	week counter	5	2019	9-06-06 19:19:	:02	_N_AS01_BE_EN	ITLADEN_SPF	16	4	N600 G0 X=F	REI_X M85=11	M85=111	
Machine Health	/	a cutting	edge	MCS - X	MCS - Y	MCS - Z	WCS - X	WCS - Y	WCS - Z	G-Code 1	G-Code 2	G-Code 3	G-Code
Inspector	day counter	0		-49.999	199.988	-760.00	-49.999	199.988	-759.996	GO	G17	G40	G500
	7	0		-199,183	205.550	-267.20	-199.184	205.550	-267.200	GO	G17	G40	G500

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









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

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

Virtual machine



- Virtual Siemens control system
- Motion simulation
- Collision check
- Running-in of processes and process optimization
- Training of machine operators



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



Real machine



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

NOTES





Industries & Products



Automotive



Energy

Large bearings



Aerospace

General machining



FM Production Modules



VTM Vertical Turn-Milling Centers



SMX Special Machining Centers

Horizontal Machining Centers

Xpert-K



FM SMART Transfer Centers



RTX Rotary Table Machining Centers



SPX Special Purpose Machines



Xpert-V Vertical Machining Centers

Die and mold



ELHA-MASCHINENBAU Liemke 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.

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