eltimon®

Free Your Tool Monitoring With
eltimon

The revolutionary system **eltimon** (**e**lectronic **l**ive **t**ool **i**ntegrated **mon**itoring) for digitization of live tools, angle heads in machining centers and driven tools in CNC lathes

The No. 1 on the Market

The World of eltimon

Free Your Tool Monitoring With
eltimon

The revolutionary system eltimon (electronic live tool integrated monitoring) for digitization of live tools, angle heads in machining centers and driven tools in CNC lathes.

- Visualization using **eltimon-App** on your mobile phone
- Data storage in the **eltimon-core** in the live tool
- Synchronization through **eltimon-cloud**
- Real time analyses, trends and status
- Augmented operator, decision-support, reminders, transparency
- Maximum lifetime for your live tools

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eltimon® Live tool

eltimon®

Soft ware

APP

eltimon® Core

eltimon® Sensor

eltimon® Energy source
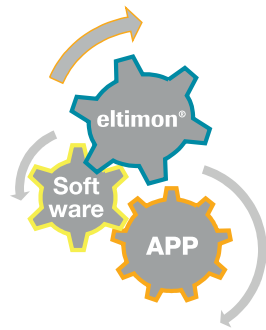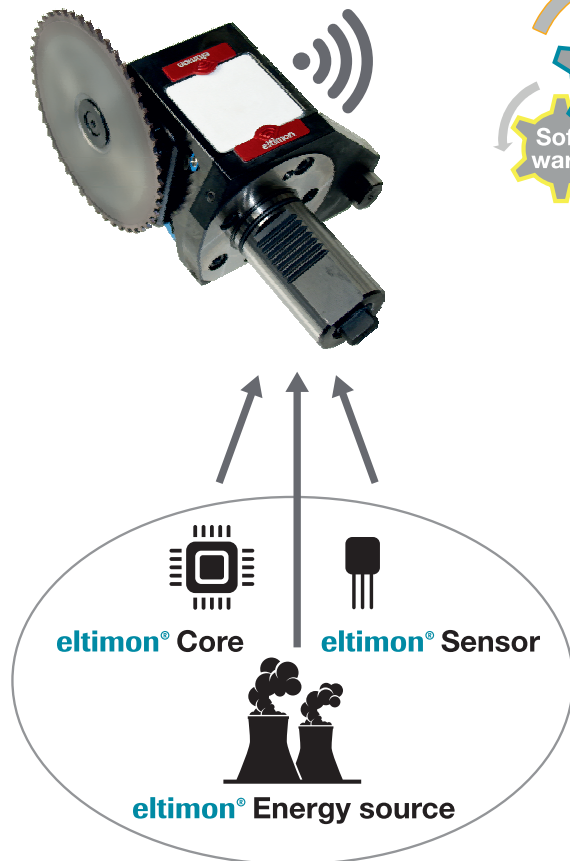
eltimon® Cloud

Enduser live tool monitoring:
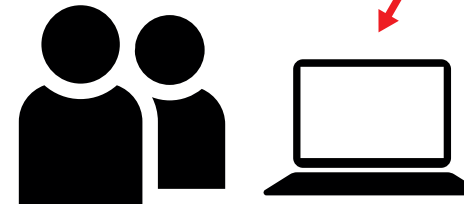✓ Status
✓ Availability
✓ Performance
✓ Predictive maintenance
✓ Service logbook
✓ Technical information

eltimon®

Soft ware

APP

eltimon® Data download

## Customer

eltimon Technology

eltimon captures the state of the tool transmission via sensors, processes the raw data to usable information and stores the information in the eltimon-core, located in the live tool.

- Sensor technology: USA (e.g. silicon chip)
- Wireless data transfer: Japan
- Energy harvesting concept for **eltimon**
- System to minimise energy consumption for **eltimon**
- **eltimon** Reading device = consumer electronics: mobile phone or tablet
- **eltimon** lifetime: data acquisition for up to 10 years, or driven tools in use for up to 6000 hours

- **eltimon** Cloud server: customer-related data only individually accessible for **eltimon** driven tools in the property of the customer
- **eltimon** data availability: no eltimon-specific limitation in the driven tools or in the cloud
- Data security: Encryption against unauthorized data manipulation in **eltimon** driven tools

Black Box for Live Tools: Safe Use of Data for Years

```
v
v
1
1
0
0
1
1
0
1
```

`>> 0110011001101     011001101011 <<`
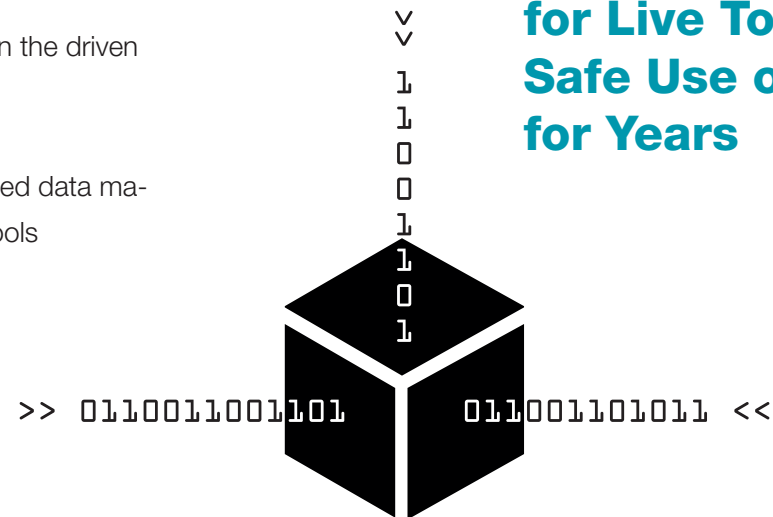
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eltimon Data Structure

- **eltimon** data are generated inside the Live tool
- **eltimon** data are stored inside the individual Live tool
- **eltimon** tool data can be read out:
  - and analyze with your mobile phone
  - everywhere: in the machine, on the shelf …
  - even if **eltimon** is completely powerless

- **eltimon** data is avaliable in the cloud for:
  - Tool history
  - Machines or departmental evaluations
  - Management of preventive maintenance
- **eltimon** data can be downloaded from the owner of the tools from **eltimon**-cloud to their own systems
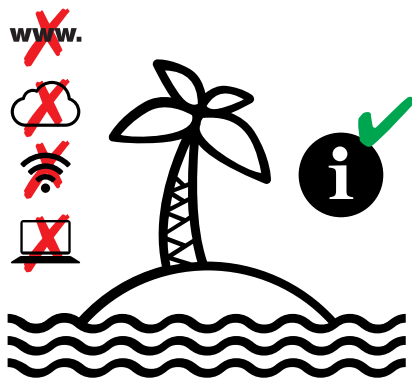
Data Available without Infrastructure
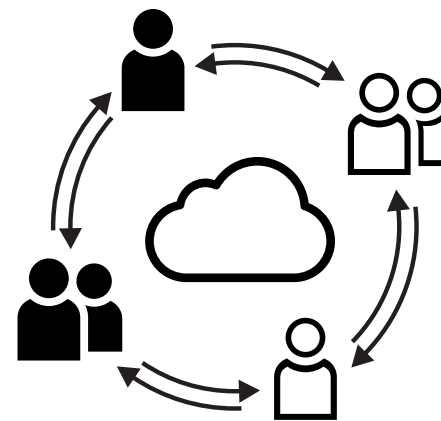
Customer-specific Configurable: eltimon Cloud

eltimon Sustainability

- **eltimon** extends the lifetime of your Live tools
- **eltimon** saves material consumption in the production
- **eltimon** saves the exchange of bearings and gears
- **eltimon** saves maintenance efforts
- **eltimon** reduces the reject rate
- **eltimon** improves the reliability in the production process
- **eltimon** saves cost, time, energy and material
- **eltimon** saves standby tools
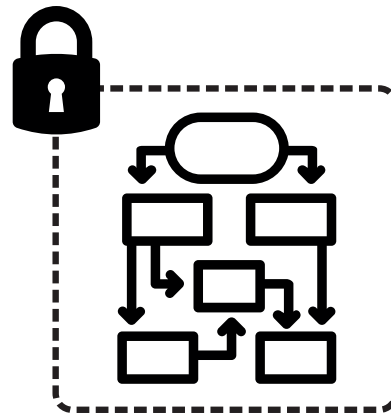
No Influence on Existing Workflows by eltimon

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eltimon Industry 4.0 (IIoT)

- **eltimon** can be connected to your machine
- **eltimon** data can contribute to a more efficient production process
- **eltimon** data can be used for your virtual factory
- **eltimon** controls the preventative maintenance
- **eltimon** allows more transparency in the production
- **eltimon** data are part of digital data, which are available for analyses

eltimon Advantages

- **eltimon** is the efficiancy booster for your production
- **eltimon** improves your preventive maintenance
- **eltimon** reduces rejects
- **eltimon** improves the reliability in the production
- **eltimon** helps to avoid »crashs«
- **eltimon** tools are 100% ready for industry 4.0 (IIoT)
- **eltimon** avoids unplanned downtime
- **eltimon** extends the lifetime of your Live tools
- **eltimon** saves cost, time, energy and material

**Augmented Operator:
Direct Decision Support**
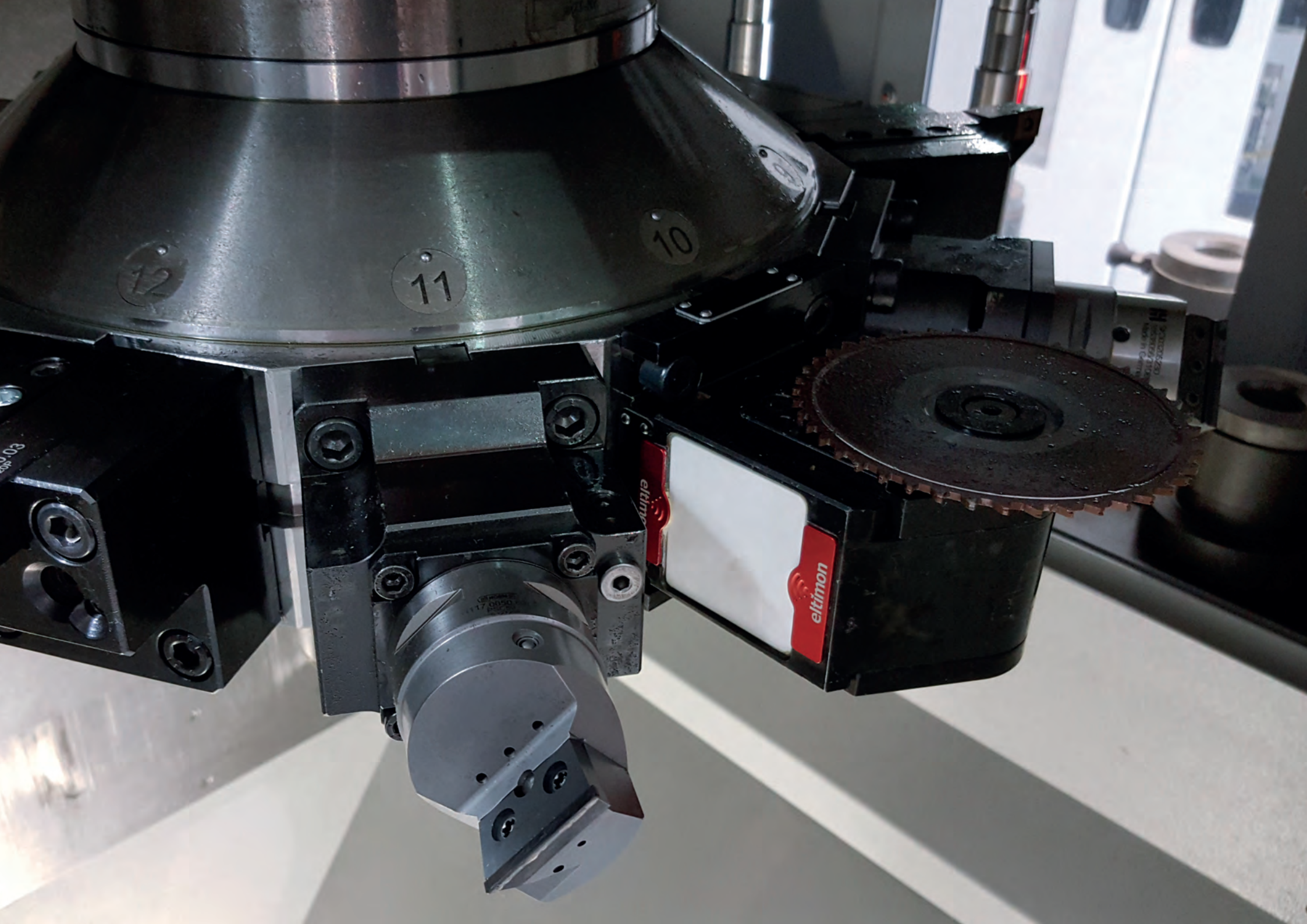
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eltimon App

Instead of "Data for: DEMO" appears in reality: "Data for: XXXXXXXXX" **(unique serial number of the Live Tool)**

The Live Tool cockpit appears at first after reading the data. The traffic light colours are showing the status and areas for more attention. With click or touch more information is avaliable: for instance for rpm. →
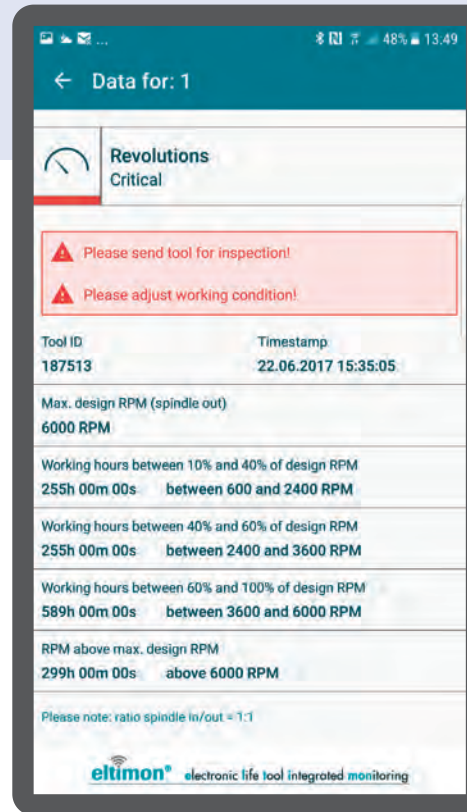
Detailed information to rpm and working hours for the defined rpm ranges. In this case we see 299 h above design rpm. Therefor warnings in RED colour.
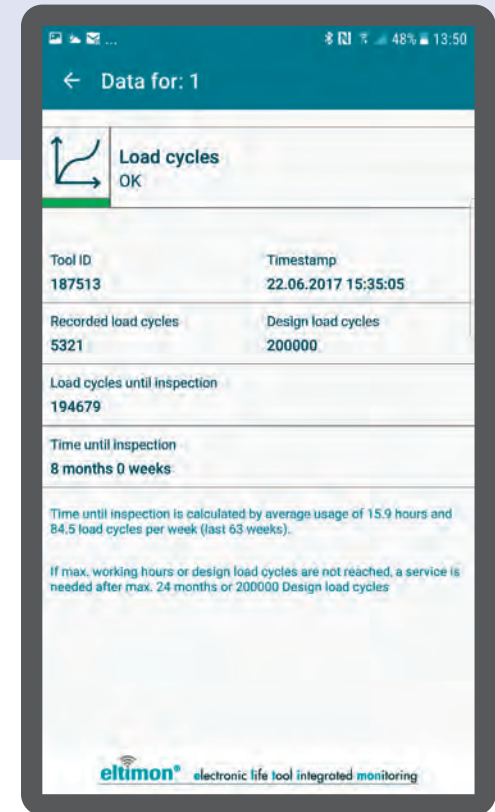
Detailed information to load cycles through the data cockpit. The achieved load cycles could be for instance the number of drilled holes.

The recommended date for maintenance is beeing calculated out of 3 criteria:

1. Achieved working hours
2. Achieved load cycles
3. Elapsed time since delivery

Screen 1 — Data for: DEMO (Basic Data)

Tool ID	Serial Number
187513	DEMO
Drawing number	Time of delivery
00048893	04/2014

Main dimensions (length x width x height)
383 mm	232 mm	220 mm

Shaft	Interface to cutting tool
HSK100	fd27
Weight	Torque (out)
0.16 kg	22 Nm
Max. RPM in	Max. RPM out
6000	6000
Type of cooling	Pressure of cooling media
Without cooling	70 bar
Direction of rotation	Type of lubrication
Input to output = no rotation direction reversal	Long life grease lubrication

Power
10 kW

Screen 2 — Data for: DEMO (Services)

Service 1
04/2016

Service 2
08/2015

Service 3
01/2015

Screen 3 — Service 1: 04/2016 (Exchanged parts)

Seal

Bearing

Gear

Drive spindle/shaft

Screen 4 — Service 1: 04/2016 (Before service)

Working hours
75

Temperature working hours below 85 °C
123

RPM working hours below max. design
45   below 6000 RPM

Information about basic data of the Live Tool.
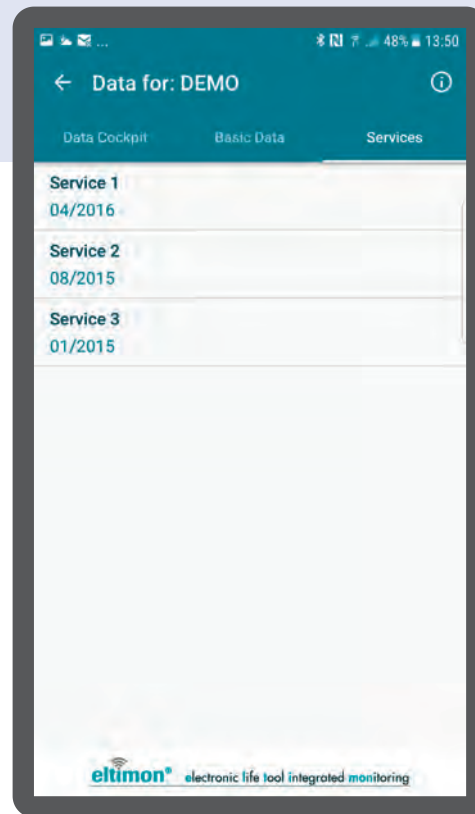
if there are services or maintenances carried out, information is to be found behind the button "Services".
With more clicks info to the specific service will be found →
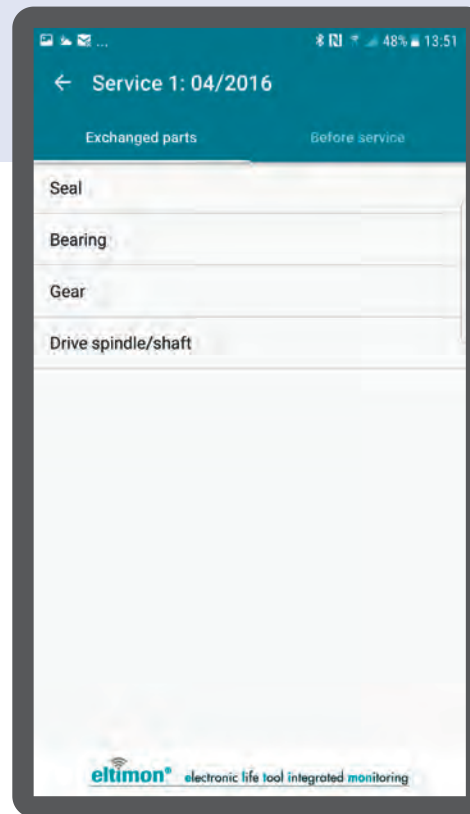
These parts have been exchanged at Service #1. Important data before a service was carried out (before the counters are set back to zero): button "Before service" →
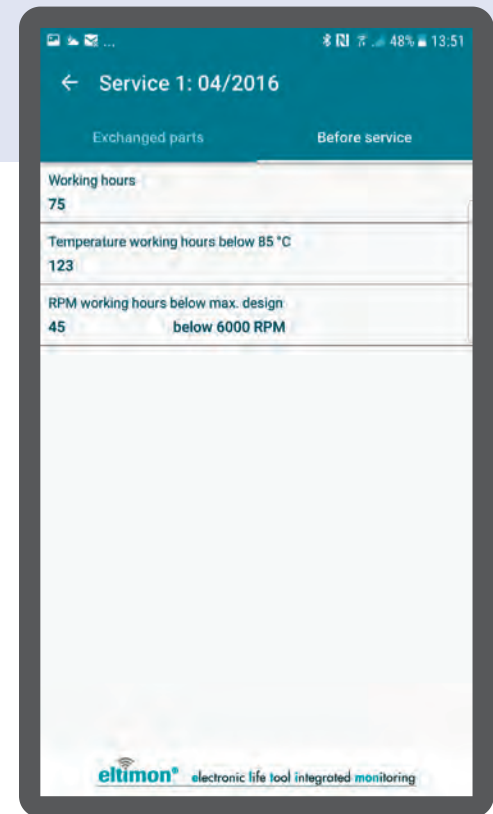
Before Service 2: 444 working hours in total. There off 321 h below 85°C and 23 hours below design rpm.

Further info is available regarding temperatures and working hours.

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Data Security
- Protection against unauthorized access
- Unique mapping
- All data are stored anonymously
- Link to sensitive customer data (Workpiece, machine, plant part, etc.) does not occur, or only by the customer!

Analyses
- Preventive maintenance
- Parameters, trends, life cycle
- Tool history
- Service history
- Comparisons of equivalent live tools

Cloud Communication
- Upload of information and pictures
- How-to-use advice, service
- Automatic reminders

Cloud Communication: Upload, Download, Advice, Reminders

Push-Service: Automatic Messages acc. to Desired Criteria

Dashboard (total number of tools with data: 1)

Filter datasets by readingdate

From

| 23 | Juni | 2016 |

Until

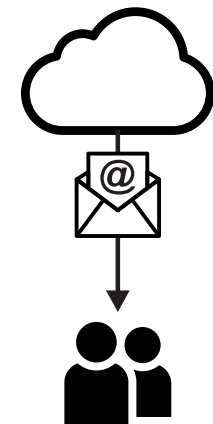| 24 | Juli | 2017 | ✓ |

Search: | Tool ID... | 🔍 |

	Tools: 1	❗ Critical: 0	⚠ Warning: 0	✅ OK: 1	🔧 Service: 0	☁ Missing Data: 0

Result	Serial number	Tool ID	Reading date	Manufacturer	Department	Status	
1	8185501	188824	01.06.17 08:42:08	Mimatic Tool Systems	Fertigung	🕐 ⌒ ⤴ 🌡 🔧	›

Dashboard

- Status overview for life tools
- Search for tools of the same kind

All tools

+ Add new tool

Only show devices from department

| All Departments... |
| All Departments... |
| Fertigung |

✓

Search: | Tool ID... | 🔍 |

Serial number	Tool ID	Reading date	Manufacturer	Department	Status	Comment	Date activated			
8185501	188824	01.06.17 08:42:08	Mimatic Tool Systems	Fertigung	🕐 ⌒ ⤴ 🌡 🔧		01.02.17 13:28:11	📊 ✎	›

- All tools – related to department
- Search for tools of the same kind
- Add new tools

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Back	Data sets for tool with serial number: 8185501				⬆ Upload file

Serial number	Tool ID	Reading date	Manufacturer	Department		
8185501	188824	01.06.17 08:42:08	Mimatic Tool Systems	Fertigung	🕐 ⌢ ⤳ ▮ 🔧	›
8185501	188824	04.04.17 13:43:47	Mimatic Tool Systems	Fertigung	🕐 ⌢ ⤳ ▮ 🔧	›
8185501	188824	04.04.17 13:43:47	Mimatic Tool Systems	Fertigung	🕐 ⌢ ⤳ ▮ 🔧	›
8185501	188824	04.04.17 13:43:47	Mimatic Tool Systems	Fertigung	🕐 ⌢ ⤳ ▮ 🔧	›
8185501	188824	24.03.17 14:10:36	Mimatic Tool Systems	Fertigung	🕐 ⌢ ⤳ ▮ 🔧	›
8185501	188824	10.02.17 11:37:02	Mimatic Tool Systems	Fertigung	🕐 ⌢ ⤳ ▮ 🔧	›
8185501	188824	09.02.17 08:53:50	Mimatic Tool Systems	Fertigung	🕐 ⌢ ⤳ ▮ 🔧	›
8185501	188824	08.02.17 09:41:24	Mimatic Tool Systems	Fertigung	🕐 ⌢ ⤳ ▮ 🔧	›
8185501	188824	08.02.17 09:41:24	Mimatic Tool Systems	Fertigung	🕐 ⌢ ⤳ ▮ 🔧	›
8185501	188824	08.02.17 08:50:46	Mimatic Tool Systems	Fertigung	🕐 ⌢ ⤳ ▮ 🔧	›

1 2 >

- Data sets chronologically listed for **one** tool
- Add Info as PDF or JPG file

Details for tool with serial number: 8185501

← Back   Details for tool with serial number: 8185501   ⓘ Information

Serial number	Tool ID	Reading date	Manufacturer	Eltimon version	Battery
8185501	188824	01.06.2017 08:42:08	Mimatic Tool Systems	01.00.0	88 %

🕐 Working hours ⌄

🌡 Temperature ⌄

◠ Revolutions ⌄

📈 Load cycles ⌄

Basic Data (8185501)

Drawing number	Time of delivery	Main dimensions (length x width x height)
50060	01.09.2016 00:00	207mm x 140mm x 94mm
Weight	Shaft	Interface to cutting tool
8,00 kg	BMT55	ER32
Max. torque	Direction of rotation	Max. rpm in
50 Nm	Eingang zu Ausgang = keine Drehrichtungsumkehr	6500
Max. rpm out	Type of cooling	Pressure of cooling media
6500	externe Kühlmittelzufuhr	70 bar

- **One** data set from the customer app
- Information on the data collection type and conclusions
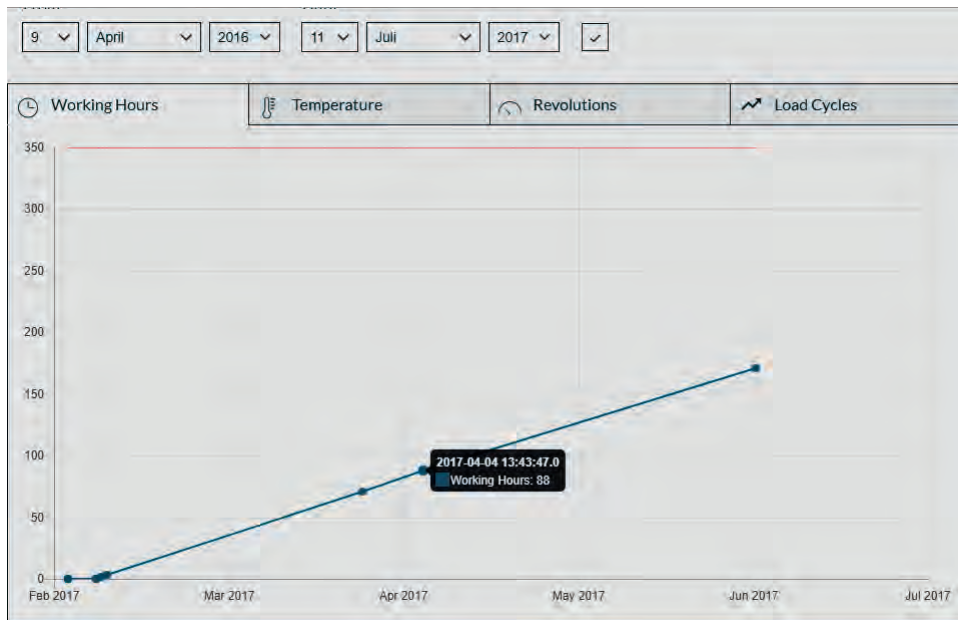
Reliable trend for achieved working hours with few data sets. Detailed data by touch over: black field. The number of data sets depend on the user.
The linearity of the trend: it is most likely a process close to serial production.
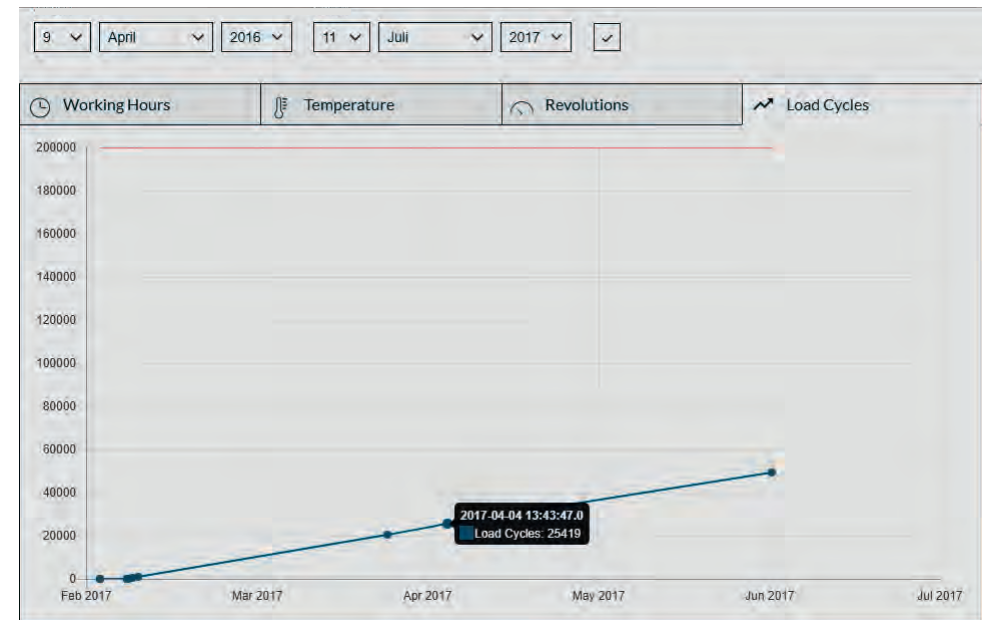
Trend for load cycles (e.g. number of drilled holes): reliable trend with few data sets possible. Detailed data by touch over.
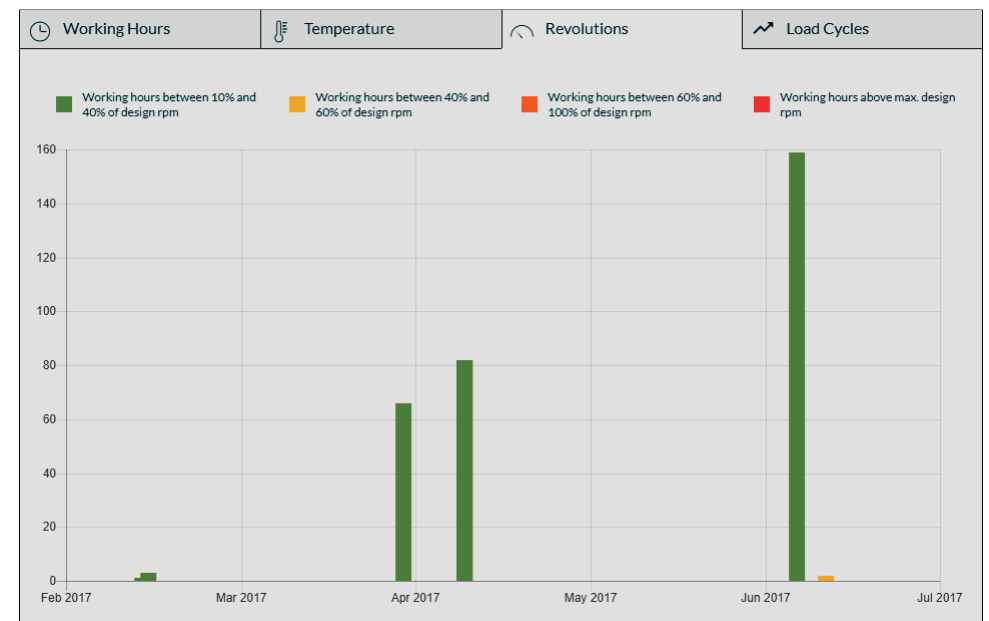From the number of working hours and load cycles the average process time of 12 sec. is to be calculated.

Left dashboard:

| 🕐 Working Hours | 🌡 Temperature | ◔ Revolutions | 📈 Load Cycles |

■ Working hours at temperature between 20 and 50 °C ■ Working hours at temperature between 50 and 75 °C ■ Working hours at temperature between 75 and 85 °C ■ Working hours at temperature above 85 °C

(bar chart, y-axis 0–180, x-axis Feb 2017 – Jul 2017)

Right dashboard:

| 🕐 Working Hours | 🌡 Temperature | ◔ Revolutions | 📈 Load Cycles |

■ Working hours between 10% and 40% of design rpm ■ Working hours between 40% and 60% of design rpm ■ Working hours between 60% and 100% of design rpm ■ Working hours above max. design rpm

(bar chart, y-axis 0–160, x-axis Feb 2017 – Jul 2017)

The tool was working only between 20 °C and 50 °C angefallen.

The tool was working mainly between 10 and 40 %
of the design rpm. Only 2 hours between 40 and 60 %
of the design rpm. Many more tool related data are to be
found in the eltimon cloud.

Manage users fo ⋯ ⋯ chnologie

ID	Last name	First name	⋯name		Status	Department	Roles	
15	Bäc	Christian		ogie. ie	active	Fertigung	Company admin	✎ 🗑
31	Fäu	Walter			active	F	Company admin	✎ 🗑
38	Gr	T		rom	⋅itation pending	Fertigung	Department user	✎ 🗑
39	⋅ ⋅	Timo		m	active	Fertigung	Department user	✎ 🗑
30	Kei	Markus			active	f ⋯	Company admin	✎ 🗑
14	Ni	Joh			active	Fertigung	Company admin	✎ 🗑
16	Ok	⋯	aa		⋯e	Fertigung	Company admin	✎ 🗑

- Manage users and user rights
- Invite new users – authentication

(Names erased)

Company & Departments

⋯ Technologie

Street: ⋯ ⋯ eg 9
City: ⋯ ⋯
Phone: ⋯
E-Mail: in⋯ ⋯de
Website: w⋯ e.de
Registered devices: 1

Departments

ID	Name	Street and number	Zip & city	Registered devices	
1	Fertigung	Industr	3.	1	✎
2	⋅ ⋅	⋅	3	0	✎

- Address management
- Add new departments

(Names erased)

eltimon Protection

eltimon is Used in Very „Hostile" Environments

- Vibrations, comparable with a vibrating plate
- Flying chips, which can cause holes in steel
- Coolant-lubricant, such as acidic rain on the car window

Mimalit is a Composite Material Developed for eltimon

- Highly resistant to breakage
- Extremely wear-resistant
- Completely resistant against flying chips
- Transparent data transfer

eltimon Lab

An **eltimon** laboratory with a test rig for complete **eltimon** tools and data evaluation was built according to the latest ESD guidelines.

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eltimon Requirements

What You Need
- **eltimon** Live Tool
- Mobile phone
- **eltimon** App

What Needs to Be Done to Take Advantage of eltimon

Nothing!
- Data is generated fully automatic and stored
- Data will not be lost
- All work processes remain unchanged

Data readout
- At any time you want
- Regular reading of data improve the data basis for analyses

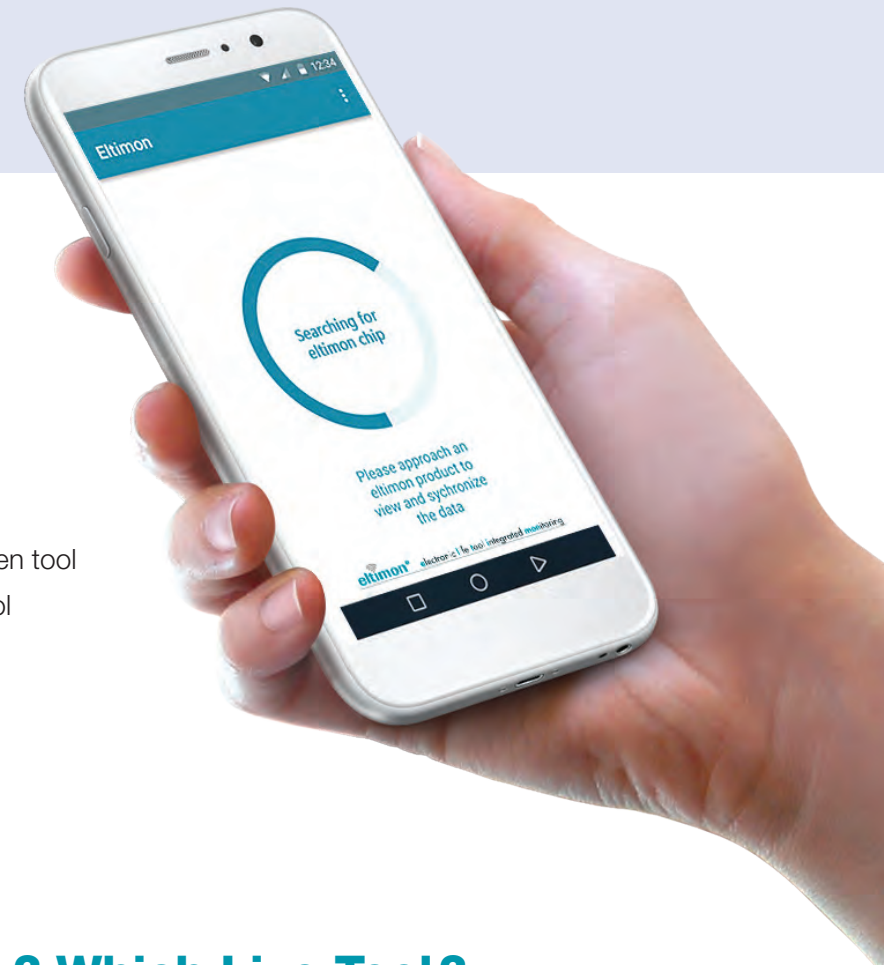## What Needs to Be Done to Take Advantage of eltimon? Nothing!

eltimon Features

Data Distance

= Unique mapping

= Simple handling without coupling

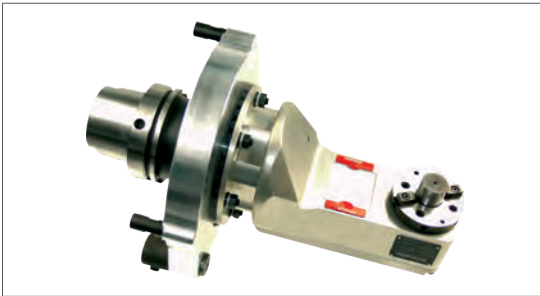= A mobile phone + an app = many driven tools

= Energy-optimized

Intelligence

= Data are processed using **eltimon** in the driven tool

= Data are stored with **eltimon** in the driven tool

Where Are the Data? Which Live Tool?
eltimon = Unique mapping!
eltimon = Unique Detection of the Live Tool!

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eltimon Live Tools

eltimon Data Security, Sensitive Data, Access Procedures

eltimon N 1.0 components inside the Live Tool

- There is maximum security, as well regarding the environment and neighborhood.
- No electromagnetic waves are emitted, **no radio signals** of any frequency.
- There is **no electromagnetic pollution**.
- Only non-sensitive data are collected and saved inside the Live Tool.
- The attempt of illegal data access is very difficult, because a person has to closely approach the Live Tool with the reading device. eltimon is using a standardized data format of the NFC-Forum. Other data formats are actively sending data, which makes access attempts from decent distance possible.
- Illegal access attempt with a non eltimon reading device: if the device could be placed within appr. one inch to the Live Tool. These illegally gained data are only numbers without any context or units like sec. A **meaningful usage** of the data **is impossible**.

- Stored data inside the Live Tool are **untouchable**. Only authorised and trained eltimon service personal has devices available to program eltimon devices. Information about maintenance and history will be stored. Counters are set to Zero after maintenance.
- The life time of the collected and stored data relates to the mechanical life time of the tool casing. The eltimon black box conserves the data even after destruction of the sensors and other parts. The **"eltimon black Box"** is accessible with an eltimon reading device and the appropriate software.

eltimon N 1.0 Customer App

Multiple security measures are applied. Only authorised people are able to use an eltimon customer app.

- There is a registration in the Google Play Store.
- There is a check with a "closed loop" procedure.
- There is a clearing only after entering a security code.

If there is illegal data access during transmission of data from customer app to the eltimon cloud:
These illegally gained data are only numbers without any context or units like sec. A **meaningful usage** of the data **is impossible**.

eltimon Cloud

The eltimon cloud und related data banks are secured through up to date safety measures and security software. There is a frequent up date for the safety measures.

Only authorised people are getting access to **their specific part** of the eltimon cloud. Procdure:

- Personal invitation
- Registration
- Checking of registered data with a "closed loop" procedure
- Individual code

Server architecture
The physical position of the servers are in Germany and hosted by a well-known provider with headquarter in Germany. The security concept provides maximum protection and availability. Data integrity is according to German laws.

- TÜV - examined data integrity according to ISO 27001
- The eltimon infrastructure is redundant has a 24/7 surveillance
- Health monitoring and Load Balancing for max. availability
- Redundant technologies
- Data mirroring
- Uninterruptable power supply
- Standby generator sets
- Modern fire protection
- Various non visible locations

eltimon Certifications

The indicated product "eltimon 1.0" is in correspondence with the following regulations of European Council

EN 61000-6-1 Electromagnetic compatibillity (EMC) generic (10-2007) Immunity standard

EN 61000-6-3 Electromagnetic compatibillity (EMC) generic (09-2011) emission standard

Immunity to high frequency electromagnetic fields
DIN EN 61000-4-3 04.2011

Interference strength DIN EN 55022 12.2011

Tests for certification have been performed:

Measuring equipment:
- Rohde & Schwarz Signal Generator SMT03
- Amplifier Research 10W1000
- Transducer EMCO 3110B
- Schwarzbeck UBA 9116
- Compotek CTA2450

- Frequency range: 80-1000 MHz
- 1-2.7 GHz (CTA2450)
- Field strength: 3 V/m 3 V/m 1 V/m
- Polarisation: horizontal / vertikal
- Modulation: AM / 1 kHz / 80 % / Sinus
- Step width 80-1000 MHz: 1% log
- Dwell time: 3.3 s

eltimon History

Summer 2012
Customers require operating hours counters for angle heads

2013
Conventional operating hours counters are installed in driven tools

Autumn 2013
mimatic starts the reflection about new digital data acquisition

Spring 2014
Foundation of mimatic R&D department: INNOVATION + marketing

Autumn 2014
Globally available technologies are investigated

Spring 2015
First technology partners are selected from USA and Europe

Summer 2015
Presentation of first hardware dummies

December 2015
First **eltimon** system has been tested successfully in Live tool

January 2016
Two OEM global players are won as pilot customers for **eltimon**

February 2016
eltimon Software specification with 233 pages
of features is ready

March 2016
60 **eltimon** Live tools are located in the order backlog

September 2016
eltimon is presented to the public:
AMB, IMTS

March 2017
eltimon Cloud
is online

May 2017
eltimon App
worldwide available
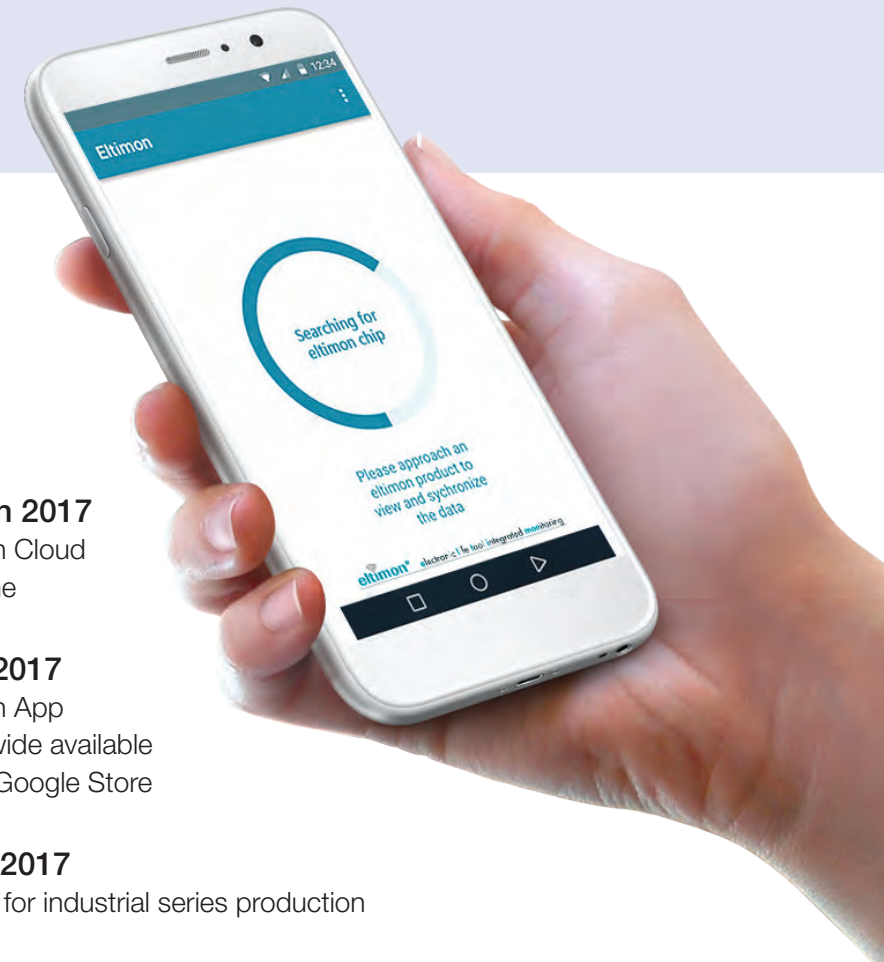in the Google Store

June 2017
Ready for industrial series production

July 2017
mimatic builds all customer-specific Live Tools with eltimon

August 2017
150 Live Tools are running in pilot applications

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