

# Installation of winLIFE 2023

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# 1. General Information

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**winLIFE** has been developed and extensively tested for Microsoft Systems (OS) with 64 bit. You can use the following Operating Systems:

Windows 11; Windows 10; Windows 8.1; Windows 8; Windows Server 2012; Windows Server 2012R2; Windows Server 2016

winLIFE is available as 64 bit software. It was developed with C# including .NET Framework 4.8. The application uses a database for the storage of the S-N curves and material data.

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For a local database use Microsoft SqlLocalDB 2019.

For a central database use a Microsoft SQL Server from version 2012.

The full version of winLIFE can only be used with a **USB-dongle**. If you bought a network dongle you have access to any required work station with which you are connected with LAN. The password contains the access to the provided range of functions (winLIFE modules).

**winLIFE 2023** is a programme that requires certain preconditions for the installation and operation. See also the [system requirements](#)

To install **winLIFE 2023** you must have **administrator rights**. To use the programme itself, you do **not have to have** administrator rights.

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Note: You can select the language of the homepage by clicking on the flag. The language of the winLIFE installation does not depend on this selection. You can select the winLIFE language after the installation of winLIFE.

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## 2. Available Installation Variations

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### 2.1. Full Version

If you install winLIFE, all modules will be copied onto the hard disk. However, these modules will only work by using the correct password which was given to you. If you extend your licence, you do not have to reinstall winLIFE. You only have to enter the corresponding security code.

You can use either a local dongle or a network dongle. You can switch between these two dongles during the operation.

For the installation of **winLIFE 2023** you must have administrator rights because the programme is protected by a dongle. You require drivers for the dongle which can only be installed with administrator rights. For the execution of the programme itself you **do not** need to have administrator rights.

#### 2.1.1. Installation without Administrator Rights

For this installation there are two possibilities:

**1.) The user gets the administrator rights only for the installation the programme. Afterwards, he can use the computer without administrator rights.**

Log in as a user with administrator rights and start the installation. Log off after the installation has been carried out. Then log in again as a user **without** administration rights. On the desktop you will see a symbol for **winLIFE 2023**. Start the application and wait until the **configuration** is completed. The configuration requires the installation CD in the drive.

**2.) The user carries out the installation under his username**

You are logged in as a user without administrator rights. After putting the installation CD in the drive, a browser window is shown with the installation guide. You **cannot** carry out the installation from here! Instead, open the folder DVD:\winLIFE\ by using the explorer of the DVD drive and with the right-hand mouse key click on the Setup.exe. In the menu shown select “execute as... “. In the following dialogue select the option “following user” and enter the user information and password. The selected user must have administrator rights! After the installation has been carried out, the first time you start the programme the **configuration** will be carried out. – see no. 1.

#### 2.1.2. Installation as an Update from a previous Version e.g. 3.2

If you update from a previous version, then the first time you start the licenced version, an extensive update of the winLIFE database is carried out. This might take several minutes.

With this update the material tables from the FKM guideline and the complete material database – until now only available in internet – is loaded. If you make a backup copy of your winLIFE 3.2 database after this update, the next time you start this update will be repeated.

### 2.1.3. Common central S-N Curve Database

If you **do not** need to have common access to common S-N curves and material data within a company, a local database (SqlLocalDB 2019) will be installed.

If you **do** need common access to common S-N curves and material data within a company, you will have access to a common SQL-server database with this version. This variation requires a MS SQL server from version 2012.

You can either use a MS SQL server available in your company or install a MS SQL Server Express which is put at your disposal by Microsoft for free.

If you install of a new SQL server, take care that the server authentication mode is set to „SQL Server- and Windows-authentication mode “.

With this installation step you install the application winLIFE on your PC and the winLIFE database on a SQL-server. To carry out this installation step your user must have sufficient rights to create a new database and a database user. It is also possible to use a SQL-server-user during the installation who disposes of these rights.

With the installation the **winLIFE database** with the corresponding data is installed on the SQL-server. Furthermore, the „winLIFEsql“ database and a log-in „winLIFEUser“ with the role public and dbcreator is created on the SQL server. The password for the SQL-server – authentication of the log-in “winLIFEUser” - was set with dbcreator.

There is also the possibility to switch between the databases later.

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## 2.2. Tutorials / Manual / Publications

### Install English tutorials

The **winLIFE Tutorials (de, en)** are video examples which demonstrate the use of winLIFE with concret examples.

After the installation you can start these tutorials directly from the winLIFE programme. Since the videos are shown in a browser window, it is necessary to have an installation of MS Silverlight.

### Open installation information

Opens this installation information in your PDF-reader

### Open manual

Opens the winLIFE manual in your PDF-reader

### Open publications

Opens the directory on the DVD with the list of winLIFE publications

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## 2.3. Interface FEMAP 12.0

If you use FEMAP, the interface programmes can be installed automatically with this installation programme.

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## 2.4. System Components for manual Installation

There are certain requirements for installing and running **winLIFE 2023**. If your current operating system does not have the necessary components, these are usually installed automatically with the installation.

If for any reason the installation programme cannot install the necessary component, you can find them on the DVD in the directory **Prerequisites** or you click on the corresponding links on the home page.

## 3. winLIFE Modules

There are the following modules of winLIFE:

- winLIFE FKM QUICKCHECK
- winLIFE BASIC
- winLIFE GEARWHEEL&BEARING
- winLIFE MULTIAXIAL
- winLIFE MULTIAXIAL MULTICORE
- winLIFE CRACKGROWTH
- RANDOM FATIGUE
- winLIFE STATISTIC
- VIEWER4WINLIFE

If you install winLIFE, all modules are installed on your computer simultaneously. Which modules you can use depends on the licence that was given to you with the installation. If you increase your licence for additional modules, you don't have to install them, but you will require a different code.

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Note: You always need winLIFE BASIC. This means the use of winLIFE GEARWHEELS&BEARINGS or winLIFE MULTIAXIAL or winLIFE CRACKGROWTH needs winLIFE BASIC too.

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All winLIFE modules can be found on the installation DVD. However, you will only be able to access the modules included on the licence you have purchased.

If winLIFE is to be used without a dongle or security code, it is available in a demonstration mode which has to be installed additionally and which is limited in its functionality and speed. The demonstration version **cannot** be changed into a full version.

The full version needs a dongle in any case. Modules which are not available in your licence can be used in limited form as a demo version. The same applies for the first start after the installation before you have entered your licence password.

The DVD includes documentation as well as publications concerning fatigue life calculations with winLIFE in PDF format.

## 4. System Requirements

**winLIFE 2023** is a programme that requires certain preconditions for installation and operation.

To install and use **winLIFE 2023** you need to have **administration rights**. It is **not necessary** to have administrator rights to run the programme.

- Microsoft Windows Installer 4.5 or higher
- .NET Framework 4.8
- Sentinel Dongle Driver

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### 4.1. winLIFE full Version

The software **winLIFE 2023** is a .NET Framework 4 application. During the installation of winLIFE it is checked if this framework is available on the computer. If this framework is missing, the component will automatically be installed.

The application **winLIFE 2023** is available in several languages (momentarily in German and English). Therefore, the installation of a .NET Framework 4 Language Pack – German is necessary. This concerns in particular calculator with the English version of the Windows - operating system. This component will automatically be installed if it is not available on the computer.

To start the programme **winLIFE** the corresponding symbol is created on the desktop and in the program start – menu. After successful installation plug the dongle on the computer. The dongle is recognized by the operating system and is activated (it lights up)

After that, the programme can be started.

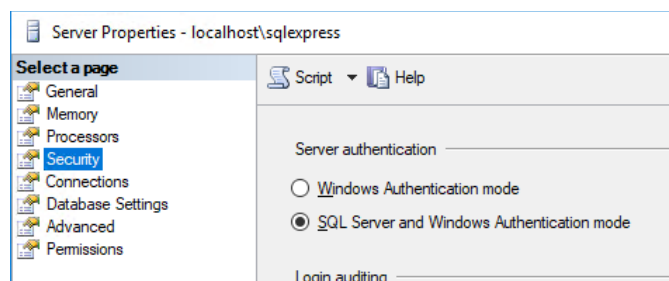
You can use a centrally installed SQL-server database for a central common database.

For this purpose, you need a Microsoft SQL server. From version SQL server (Express) 2008R2.

You can either use a MS SQL server available in your company or install a MS SQL Server Express which is put at your disposal by Microsoft for free.

It is necessary that the server authentication mode at the server is set to „SQL Server- and Windows- authentication mode“.

You will find this setting in the server properties:



## 4.2. Important Windows- Installer Parameter

The Windows Installer is fully integrated in the Windows operating system. To carry out the installation successfully and to use the programme without any problems it is important to have the following registrations:

In the key HKEY\_LOCAL\_MACHINE\SOFTWARE\Policies\Microsoft\Windows\Installer the DWORD-values:

"AllowLockdownBrowse"=dword:00000001

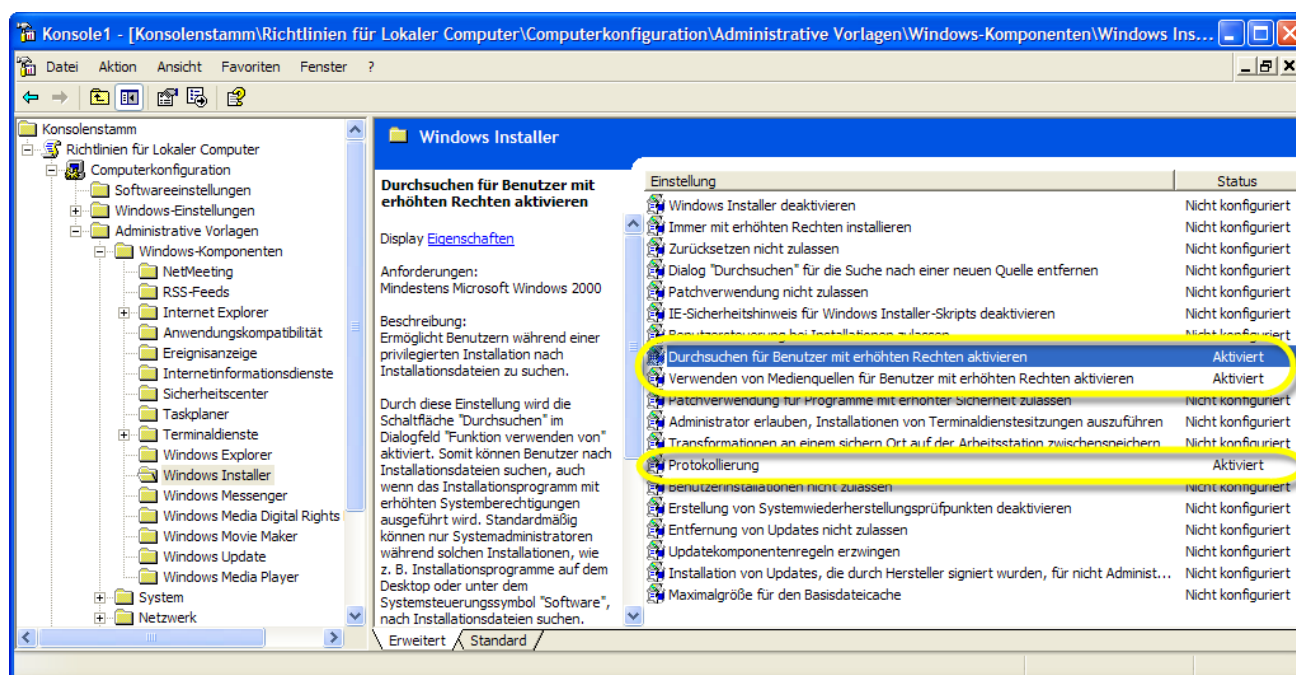
"AllowLockdownMedia"=dword:00000001

and the character string:

"Logging"="voicewarmup"

It is only possible for a user with administration rights to create or change these entries

It is possible to edit the entries directly in the registry using regedit.exe or to load the group guidelines object console into the management console and to make the changes there. To do this, start mmc.exe and add the Snap-In group guidelines object editor for the local computer. Open the folder ,Windows Installer' in 'Administrative templates' under 'Windows components'. Here are the settings for the software installation on the computer. In the following diagram you can see the relevant activated settings:



The user should activate the following settings.

During the installation the activated logging writes a MSIxyz.LOG file into the directory C:\Documents and Settings\User\Local Settings\Temp. If there are problems with the installation, this log file can be helpful in resolving them.



## 5. Full Version

Before you start the installation, please read the notes for the dongle. ([Hints to local USB-Dongle](#))

With this step you install winLIFE on your computer. That means that the winLIFE database with the corresponding data will be installed on the SQL server or on the SqlLocalDB.

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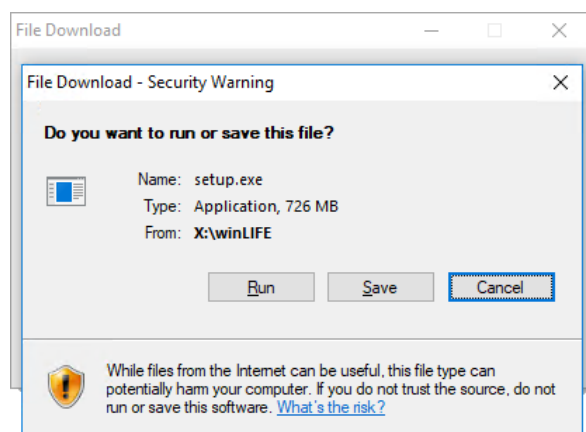
### 5.1. Installation of the Application winLIFE 2023

The application winLIFE 2023 installs the features on the computer:

1. Application
2. Examples

Start the installation of winLIFE 2023 from your browser with **start**

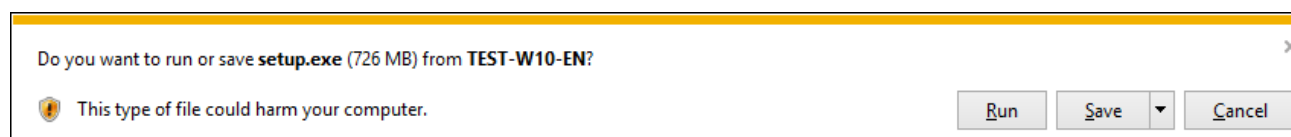
Possibly two security questions follow after the start.



Select: **Run**

It might appear another security question that can look different according to the used standard browser and operating system.

Here, we see a security warning of the internet explorer (Windows 10):

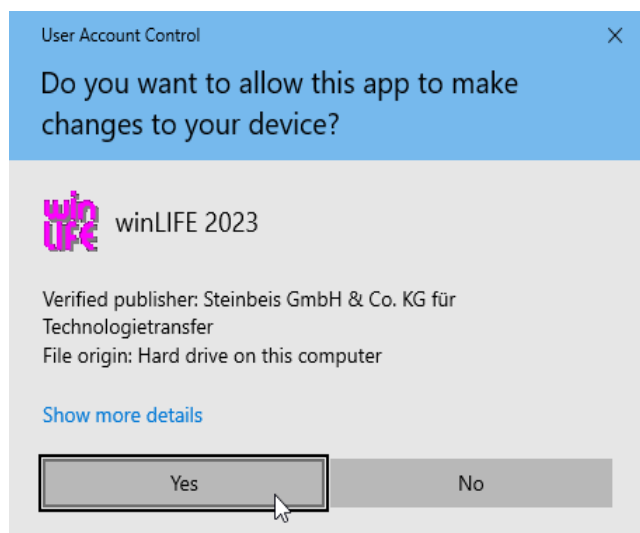


Select: **Run**

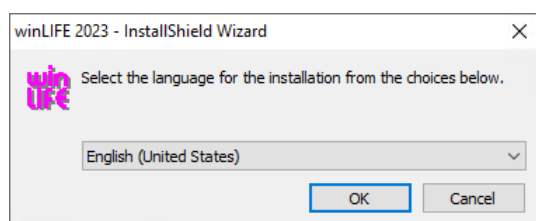
Should your browser not offer **run**, you have to save the Setup.exe first. Then click „run“ or start directly from the directory DVD:\winLIFE\.

Now the Setup is started and leads you through the installation. Another security questions follows which differs depending on the operating system.

Here you see the user account control of Windows 10:

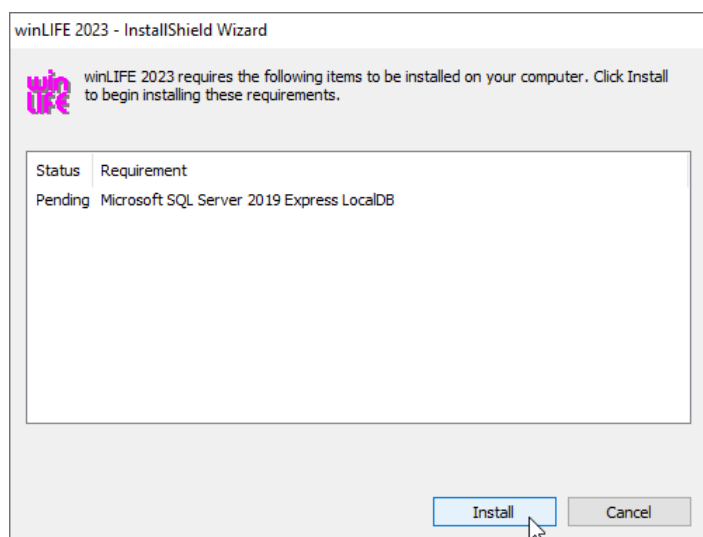


Select: **Yes**

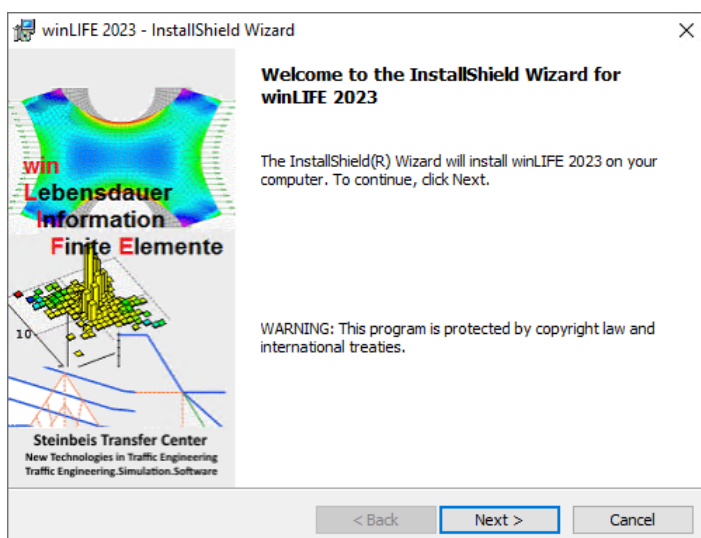
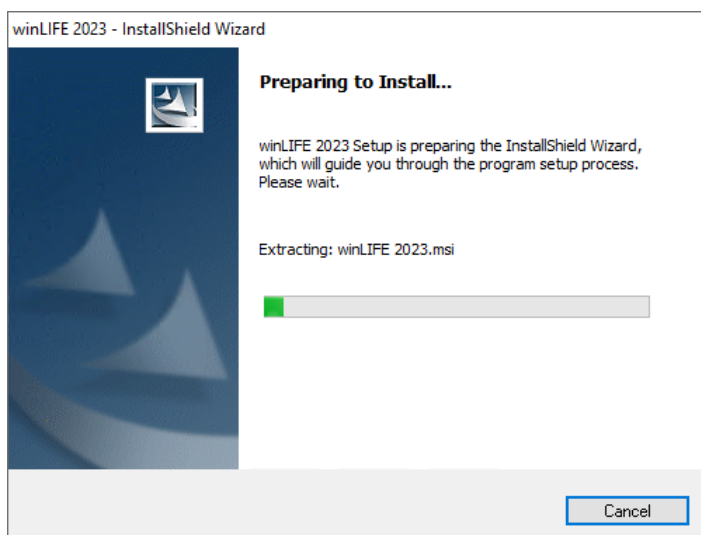


You can select the language for the installation in this dialogue. winLIFE will be started in this language. The language can also be changed afterwards under ,Extras | Settings | Set application language‘.

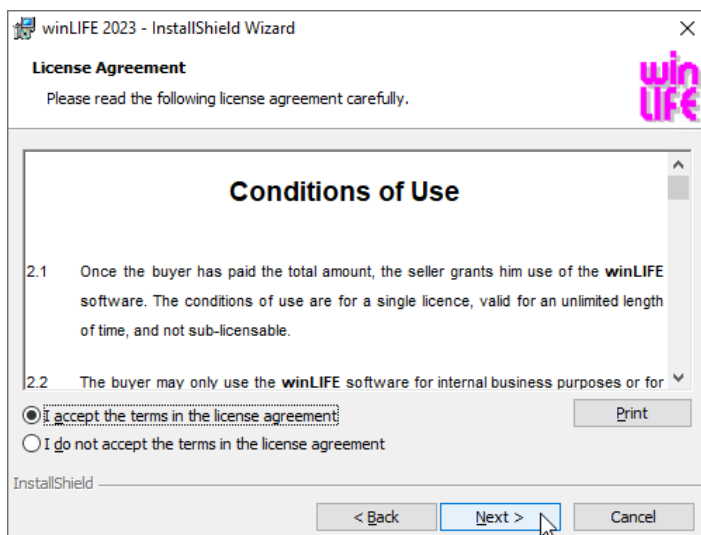
Before the installation is carried out, a check takes place to make sure that none of the system components required for winLIFE to run is missing. If any are missing then the following dialogue appears for each missing system component, in this example the missing Microsoft SQL Server 2019 Express LocalDB RTM (x64) and Microsoft Visual C++ Runtime.



Select **Install**



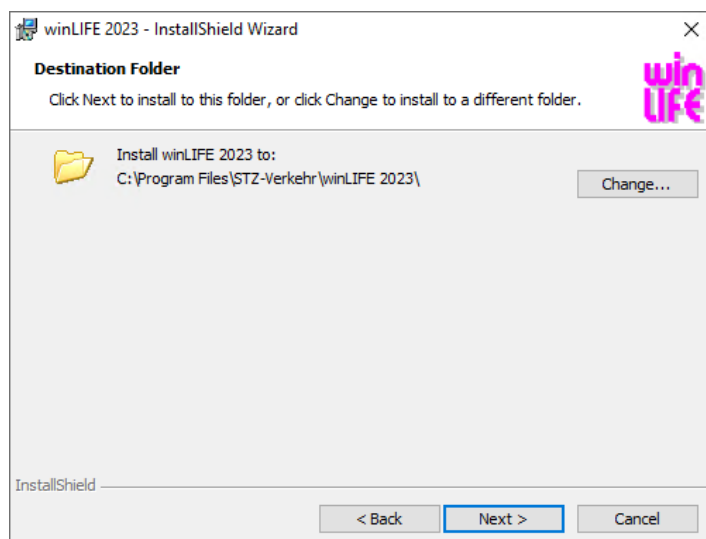
Select **Next**



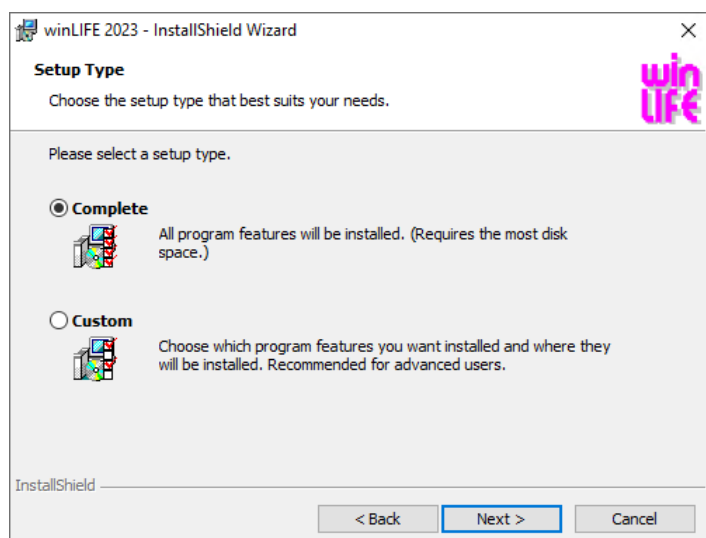
In this dialogue you should read the licence terms. If you agree to these terms select **Next**.

Now you can select the path for the installation.

The installation path used for the winLIFE installation is C:\Programme (x86)\STZ-Verkehr\winLIFE 2023\. You should not change this installation path unless you have a good reason.



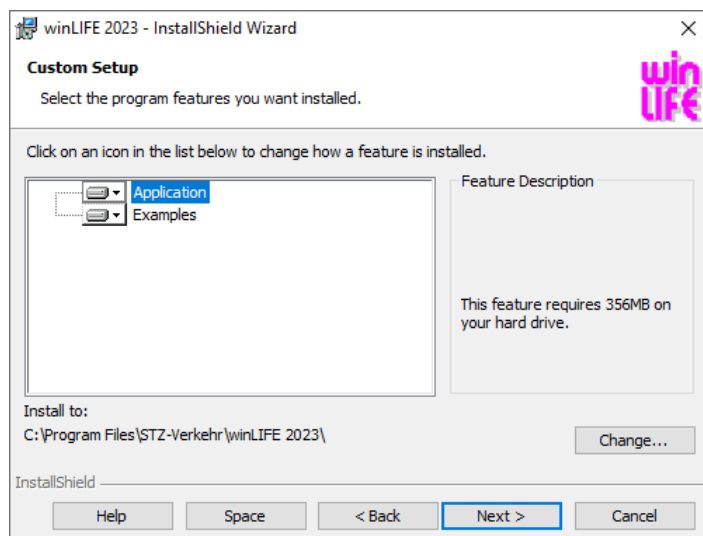
### Select **Next**



The installation can be carried out as a complete or user-defined one. The user-defined installation offers the user the possibility to select the features and to change the installation path for the examples.

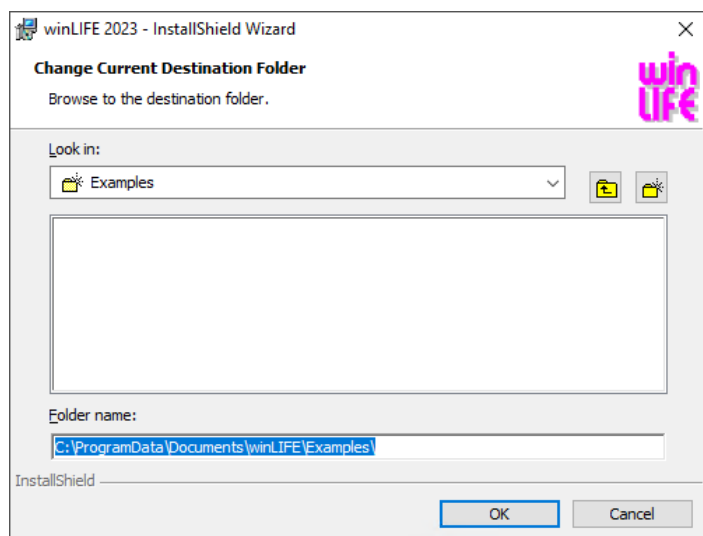
### Select **Next**

If you have selected user-defined, you can select optional whether you want to install the examples and the help.

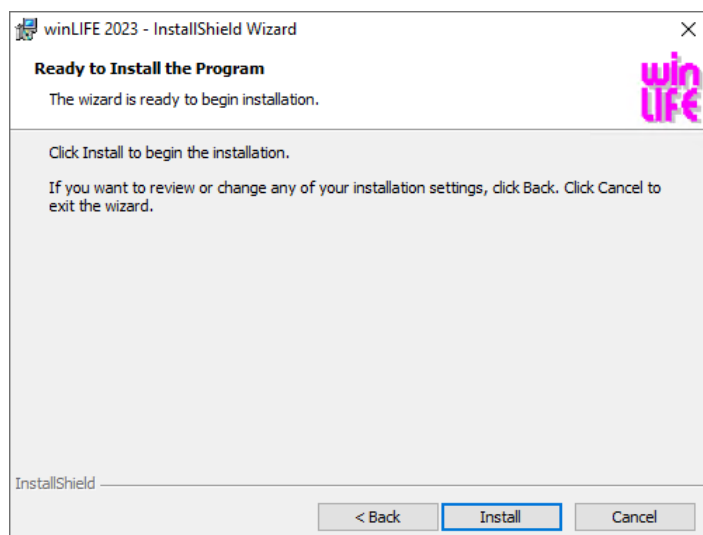


Select **Next**

In the next dialogue you can change for instance the path for the examples.

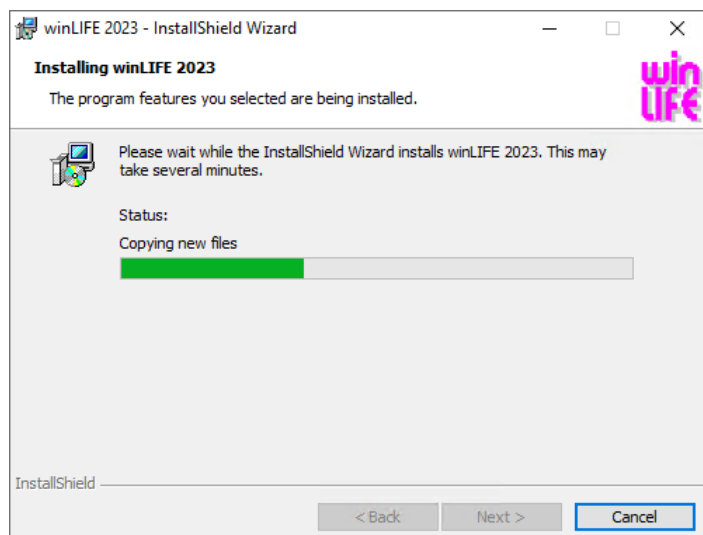


Select **OK**

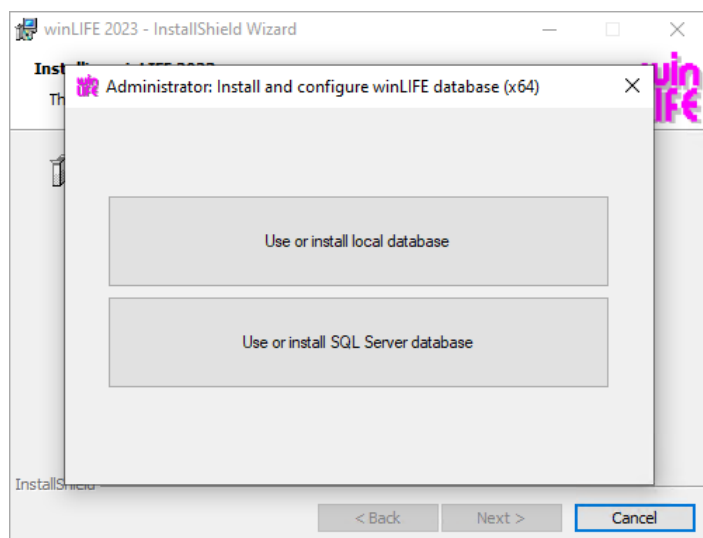


### Select **Install**

The installation gets started; all files of the installation package will be installed on the computer. During the installation the driver of the dongle is also installed and a service is provided and started. During this process the dongle must not be plugged on.



If the installation on the computer does not find any settings of previous winLIFE-installations, the following dialogue appears:

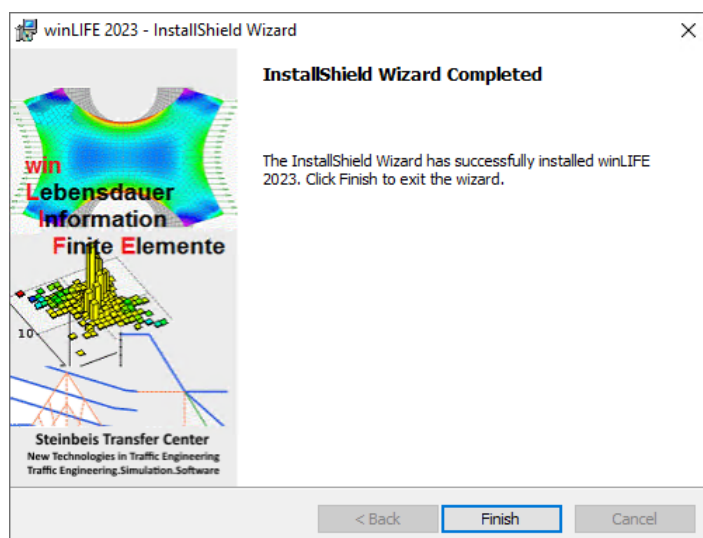


In this dialogue you select between the local database „Use or install local database“ and a central common database „Use or install SQL Server database“.

The following steps are described in the following chapters.

At the end of the installation a dialogue is shown which informs you about the successful installation. Now you can start winLIFE.

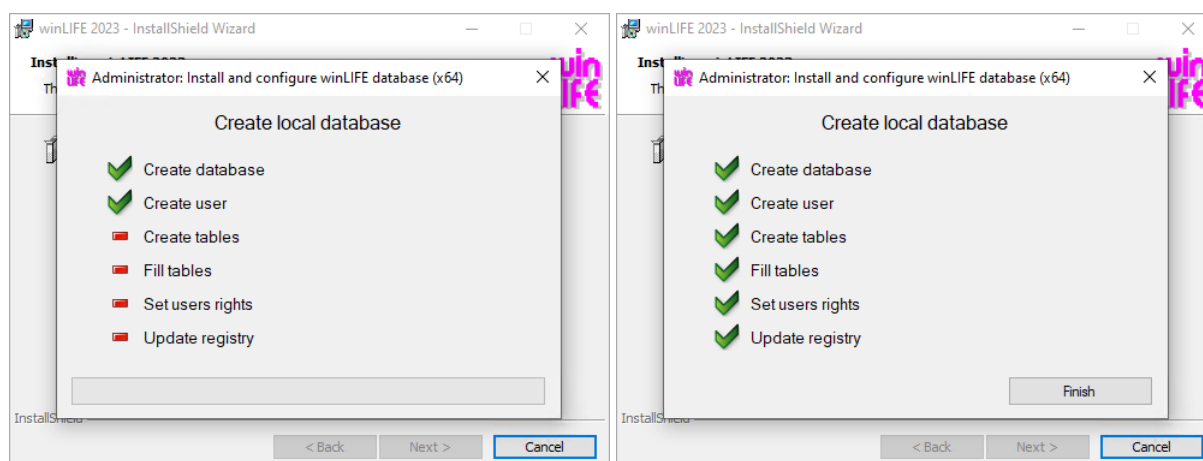
Before you click on **Finish**, plug the dongle into the USB-Port.



After the installation an icon winLIFE 2023 is available on the desktop and in the program start menu for starting the application.

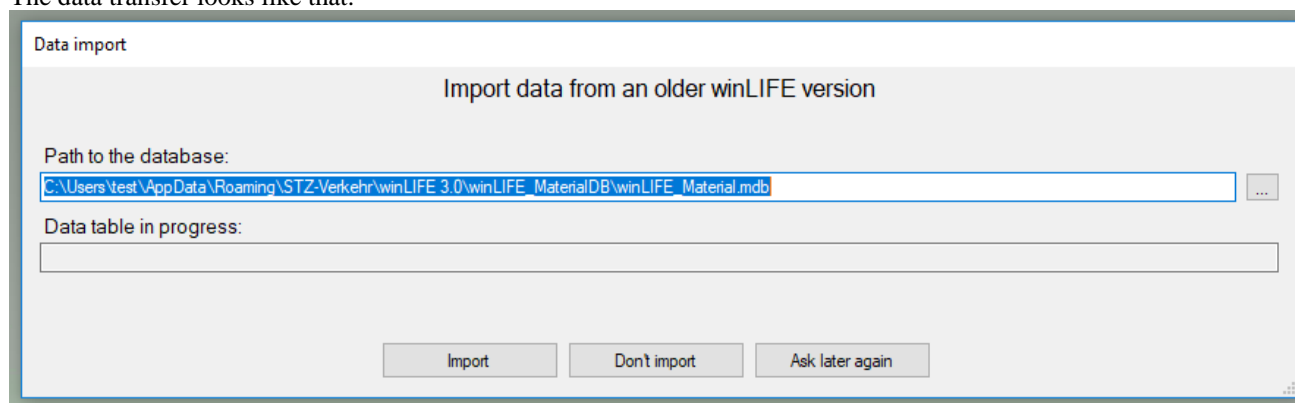
### 5.1.1. Local Database

In case of the local database a database is created for the user on the SqlLocalDB 2019. Taking another user, this is executed again at the start.



Starting winLIFE 2023 you can also import the data of the old MS ACCESS – winLIFE DB. This option is bound at the user and requires no administrator rights. It can be that more than one user have used **winLIFE** on a computer. The data transfer is carried out only once per user. This is only carried out if a valid licence is registered.

The data transfer looks like that:



Here you have three possibilities:

1. **Import:**  
Import the existing data from the Access database.
2. **Don't import:**  
Do not import the existing data, winLIFE will not ask you again.
3. **Ask later again:**  
Do not import the existing data yet, winLIFE will ask you again at the next start.

### 5.1.2. Central common Database

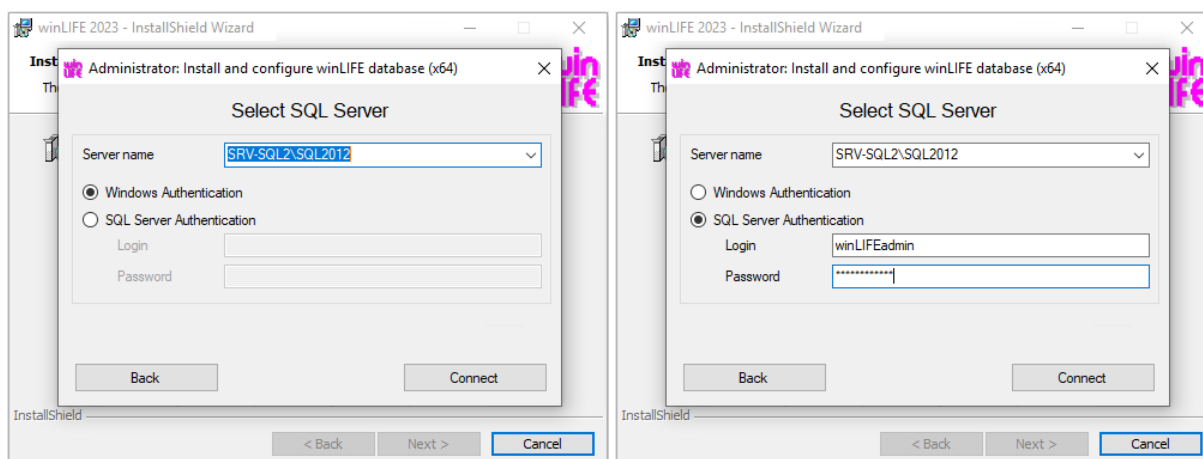
In case of a common central database a database for all users is created on a SQL server, respectively an existing database is selected.

Should the programme find a usable setting from a previous installation, this setting is simply taken and, in this case, the following dialogues will not appear.

Otherwise, the programme tries to find all available SQL server. Afterwards, you can select one in the list. If the required server is not listed, you can enter it manually.

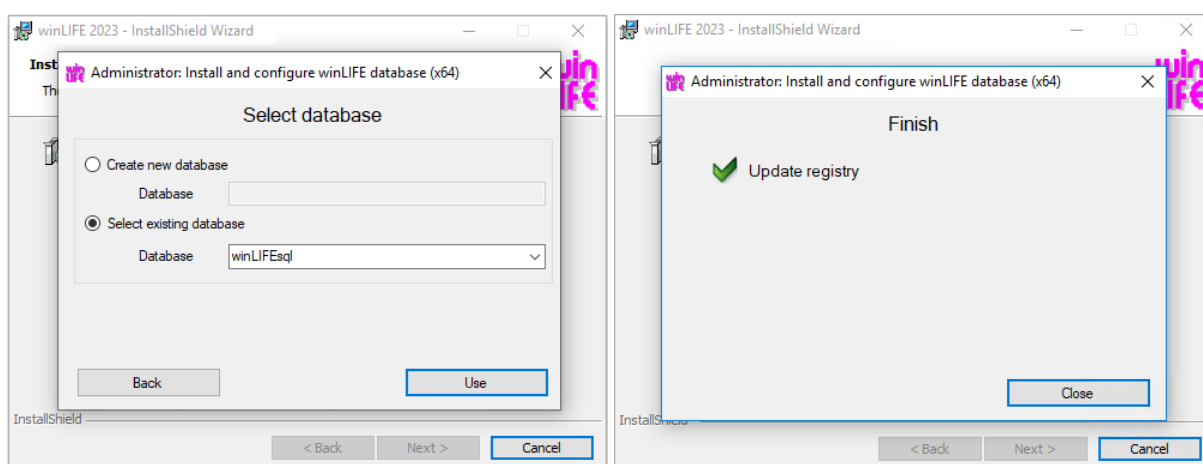
There are two possibilities to connect with the SQL server; on the one hand you can connect by means of your Windows log-in and on the other hand you can connect by means of a SQL Server-User in case that your Windows-user does not have sufficient rights.





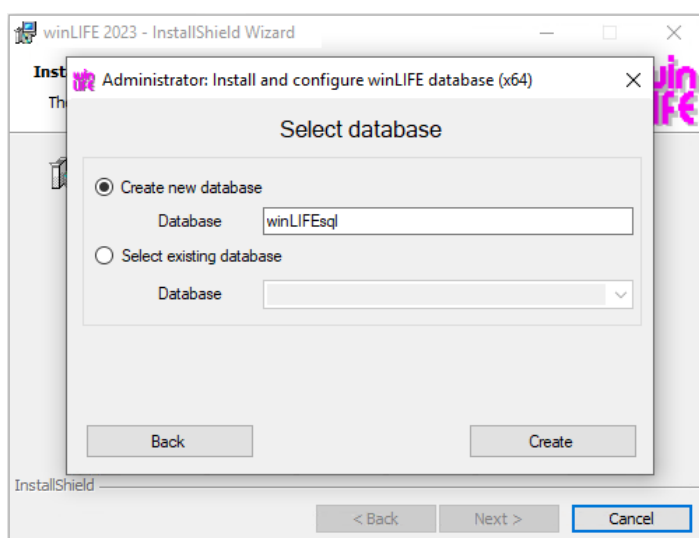
If everything is set correctly, click on **Connect**.

If a usable winLIFE database is found on the server, the programme proposes to use this database.

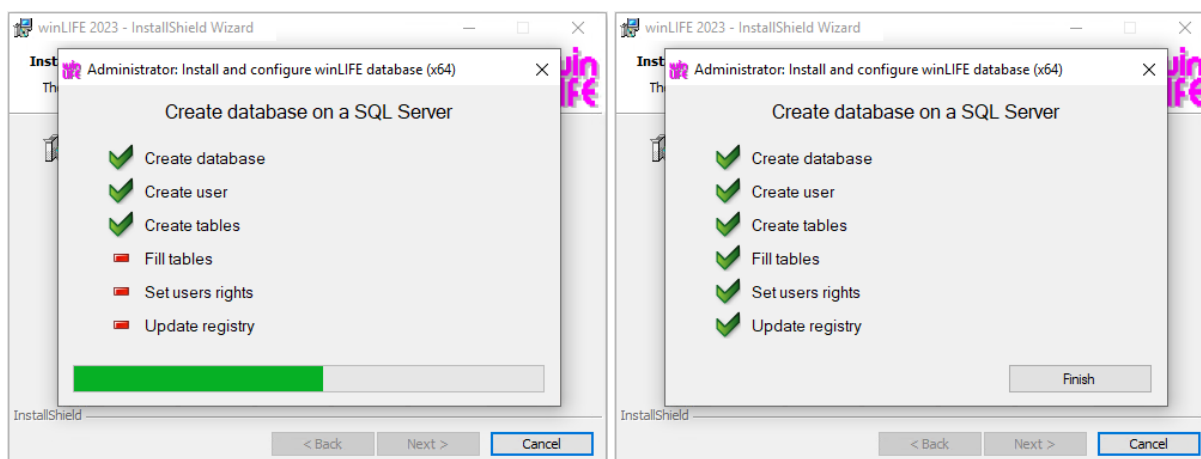


Select **Use**. The dialogue, shown on the right side, appears.

Otherwise, you have to create a new database:



Click on **Create**

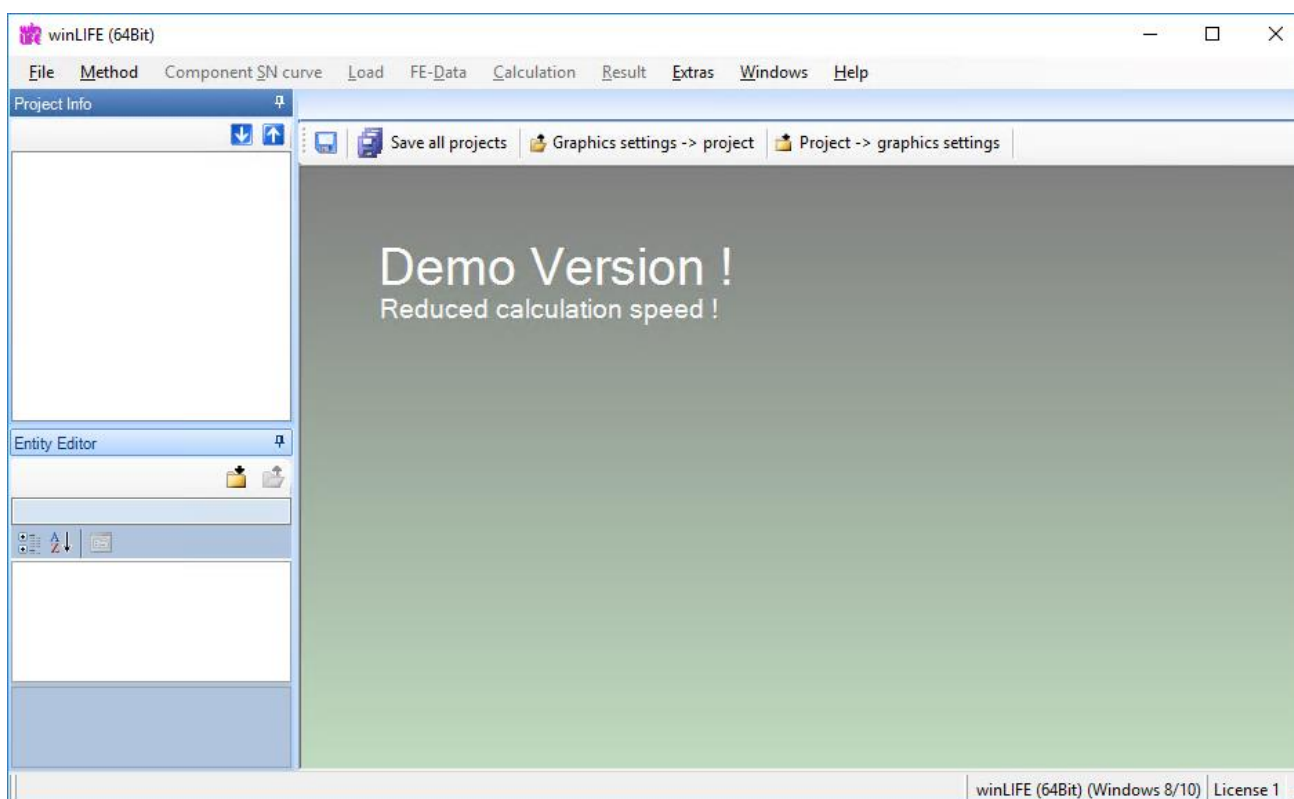


Click on **Finish**

## 6. Entering Licence Data for winLIFE 2023

### 6.1. Entering the Licence

After the installation winLIFE 2023 starts without entering the licence data in a DEMO – Mode. The program functions are limited to demo programme level.



If you have purchased a licence, you should now enter the licence information.

Select in the winLIFE menu:

**Help / Licensing / Licence 1**

You can enter a maximum of 4 different licences in winLIFE. This is necessary, for example, if you have several network dongles in your network. When winLIFE starts up it will try to activate the first licence. If this does not work it will try to activate the second licence, if this does not work ..... and so on.

Enter the serial number and the password. If the entry is correct your licenced version appears in the same window.

Example: You receive the following information as an E-Mail or file

```

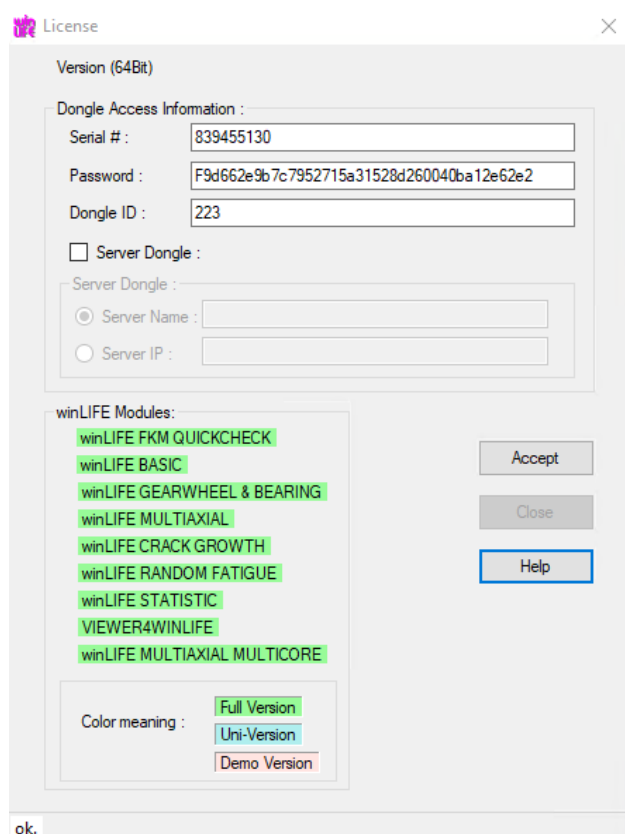
271.txt - Editor
Datei Bearbeiten Format Ansicht ?
|
Firma: frei
Benutzer:
Version: 3.20
Rechte: Basis, Getriebe u. Multiaxial
Ablauf: 30.03.2010 00:00:00

Seriennummer:1435875009
Passwort :5ea7591ff69c1e9dad6dd4009af2e32a
Dongle ID:271

Benutzername werkstoffdatenbank:271
Kennwort werkstoffdatenbank:5ea7591f
0

```

Example for entering the password for a local dongle.



The 'License' dialog box (Version 64Bit) contains the following fields and options:

- Dongle Access Information:**
  - Serial #: 839455130
  - Password: F9d662e9b7c7952715a31528d260040ba12e62e2
  - Dongle ID: 223
- ☐ Server Dongle:
- Server Dongle:**
  - ☒ Server Name:
  - ☐ Server IP:
- winLIFE Modules:**
  - winLIFE FKM QUICKCHECK
  - winLIFE BASIC
  - winLIFE GEARWHEEL & BEARING
  - winLIFE MULTIAXIAL
  - winLIFE CRACK GROWTH
  - winLIFE RANDOM FATIGUE
  - winLIFE STATISTIC
  - VIEWER4WINLIFE
  - winLIFE MULTIAXIAL MULTICORE
- Color meaning:**
  - Full Version (green)
  - Uni-Version (blue)
  - Demo Version (red)

Buttons: Accept, Close, Help, ok.

Example for entering the password for a network dongle (Server dongle).

For the server-version highlight „Server-Dongle“ in addition with a check mark and enter the server name or the IP-address on which the dongle is installed and inserted.

License

Version (64Bit)

Dongle Access Information :

Serial # : 839455130

Password : F9d662e9b7c7952715a31528d260040ba12e62e2

Dongle ID : 223

☒ Server Dongle :

Server Dongle :

☒ Server Name : w2k8-backup-srv

☐ Server IP :

winLIFE Modules:

- winLIFE FKM QUICKCHECK
- winLIFE BASIC
- winLIFE GEARWHEEL & BEARING
- winLIFE MULTIAXIAL
- winLIFE CRACK GROWTH
- winLIFE RANDOM FATIGUE
- winLIFE STATISTIC
- VIEWER4WINLIFE
- winLIFE MULTIAXIAL MULTICORE

Color meaning :

- Full Version
- Uni-Version
- Demo Version

Accept

Close

Help

ok.

After you have entered the licence information and clicked on the **Accept** button, the licenced modules will be shown in green in the dialogue.

---

Note: Generally, you will receive the serial number and password by Email. Therefore, you do not need to type in the number, but can copy with “Drag and Drop”.

---

## 6.2. Local USB-dongle

If you have a licence for one computer, you will get an USB-dongle which has to be plugged in the computer while winLIFE is used.

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Important: The dongle must not be plugged in during the installation of winLIFE!


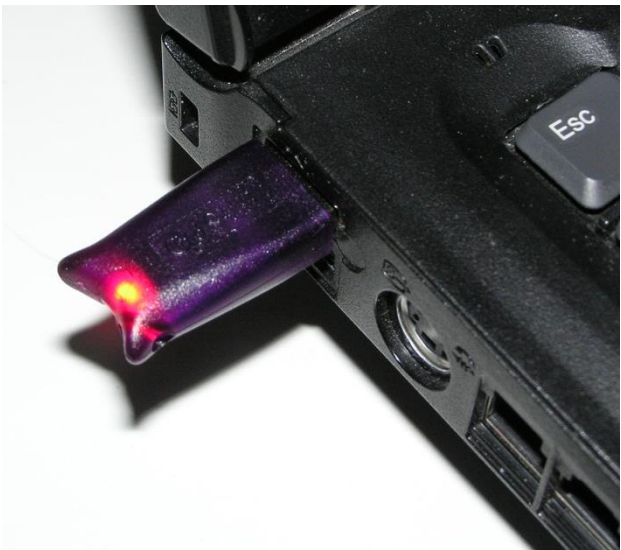
---

After installation you have to plug in the USB-dongle, enter your security code and start winLIFE.

---

Note: You need administrator rights to install winLIFE.

---

	
USB- dongle for one computer made of blue plastic	Dongle plugged in the USB-port of a computer (red light lights up when active)

## 6.3. Installation of a Server Dongle

### 6.3.1. Installation on the Server

You can acquire a server licence. Plug in a special network dongle on a computer in the network. According to the limitation of the number of licences the user can work on any computer in the network.

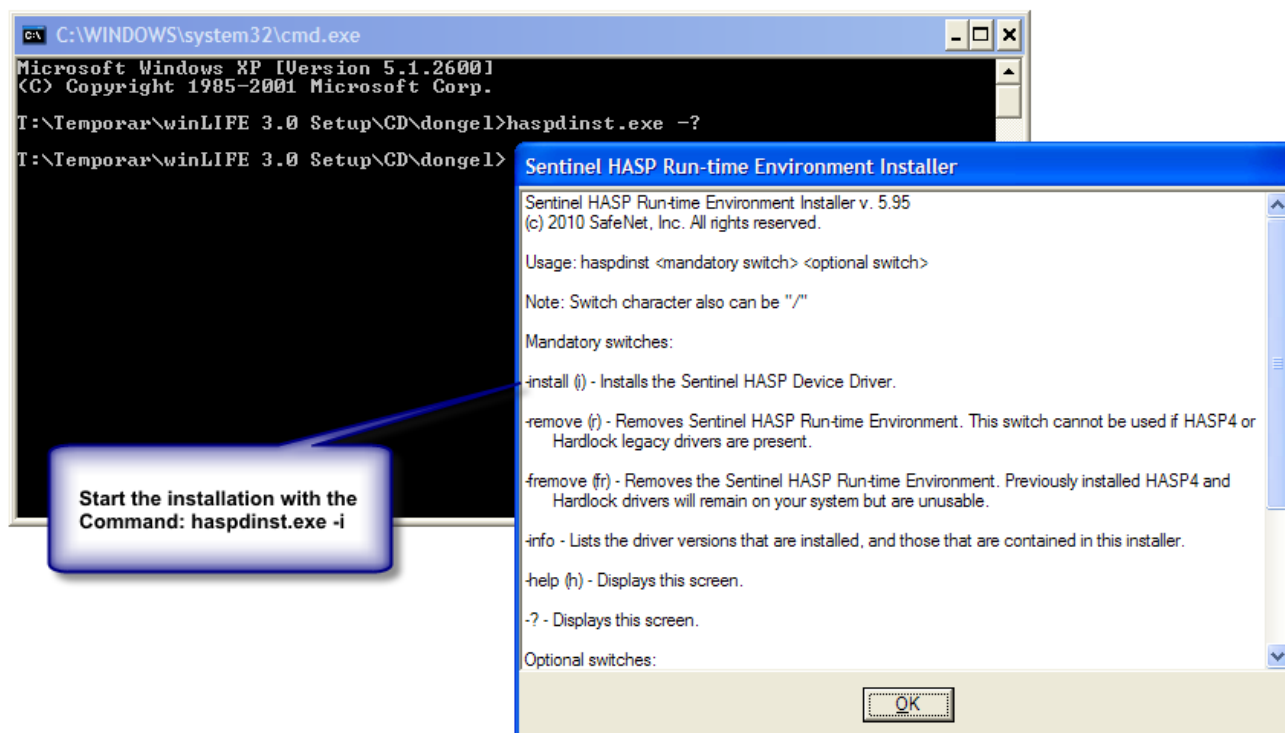
Note: The dongle must not be plugged in during the installation process.

	
Network- dongle made of red plastic	

Note: You need administrator rights to install winLIFE.

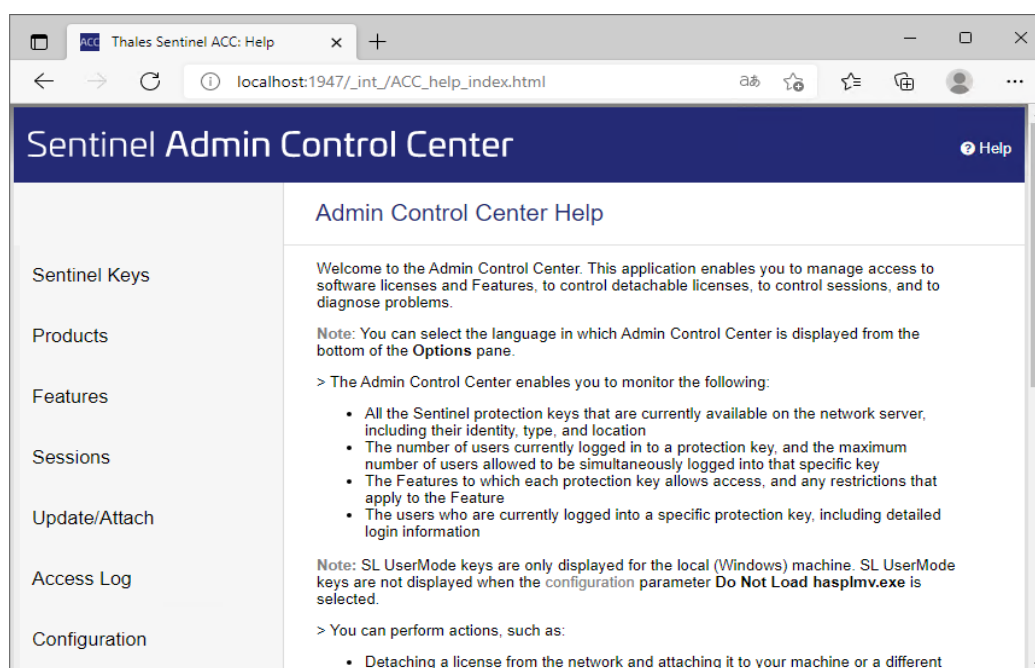
Start with system components for manual Installation | Sentinel Dongle Driver  
or

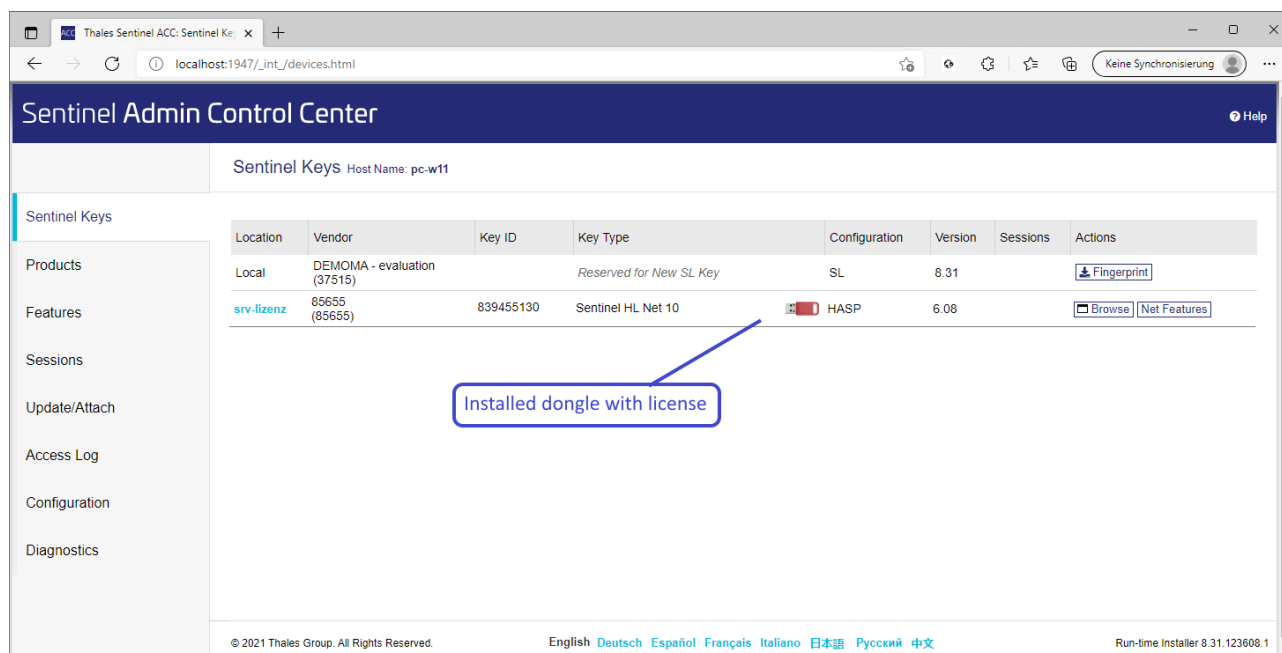
A directory called, dongle \ Sentinel\_LDK\_Run-time\_cmd\_line' is existing on the winLIFE installation CD/DVD. This directory contains a file named **haspdinst.exe** which is necessary for the installation of the required components and services on the server. As a support, you can let you show the available parameters. Execute the installation.



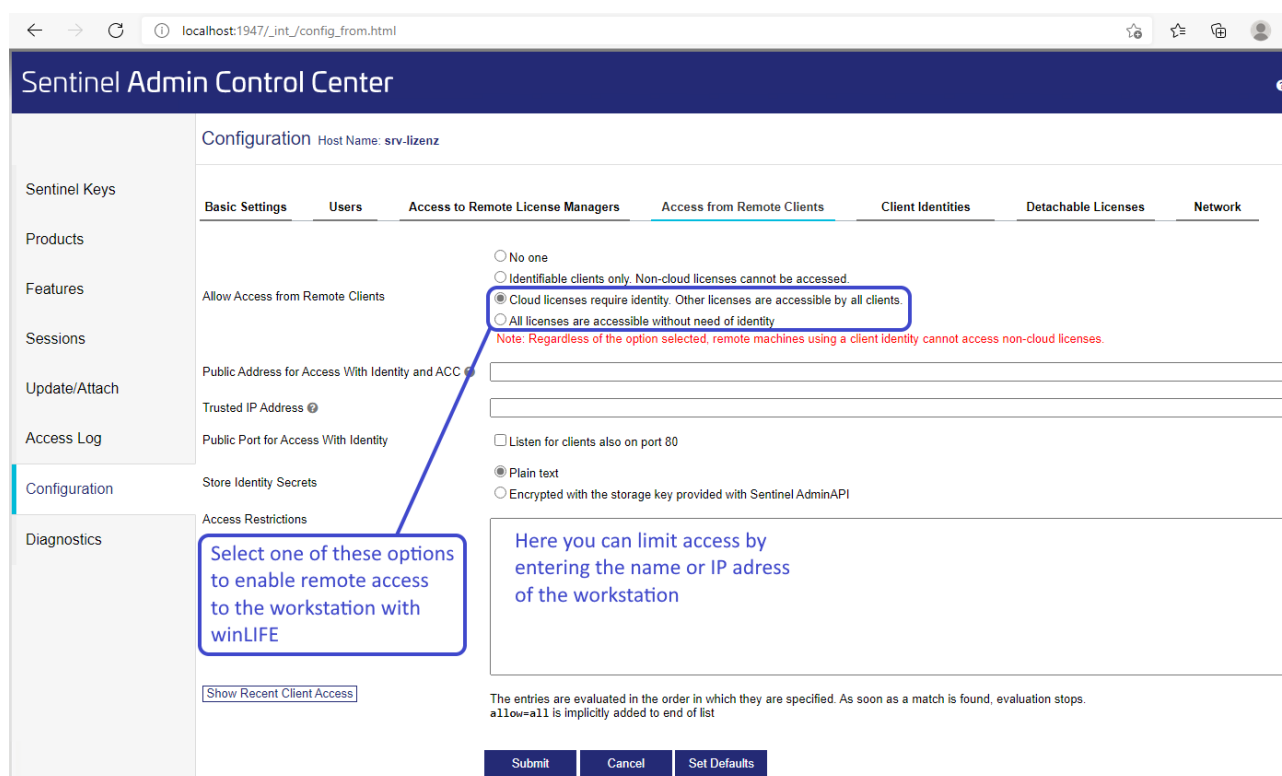
After the installation the dongle must be plugged in and the must be recognized and activated by the operating system. After that the little light on the dongle must light up. The computer, on which the dongle is installed, does not need not to be a server.

You can check the dongle and the licenses by entering the address <http://localhost:1947/>. The window will show you the corresponding information. On the bottom right side, a help-button is available.





To make winLIFE work on a workstation you need to get access from the workstation to the dongle. For that you have to set the parameters in the following way. Click on the register **Access from Remote Clients** under **Configuration**. Set the parameter for the remote – access and confirm by clicking on the button **Submit**. Now, the installation on the server is complete.

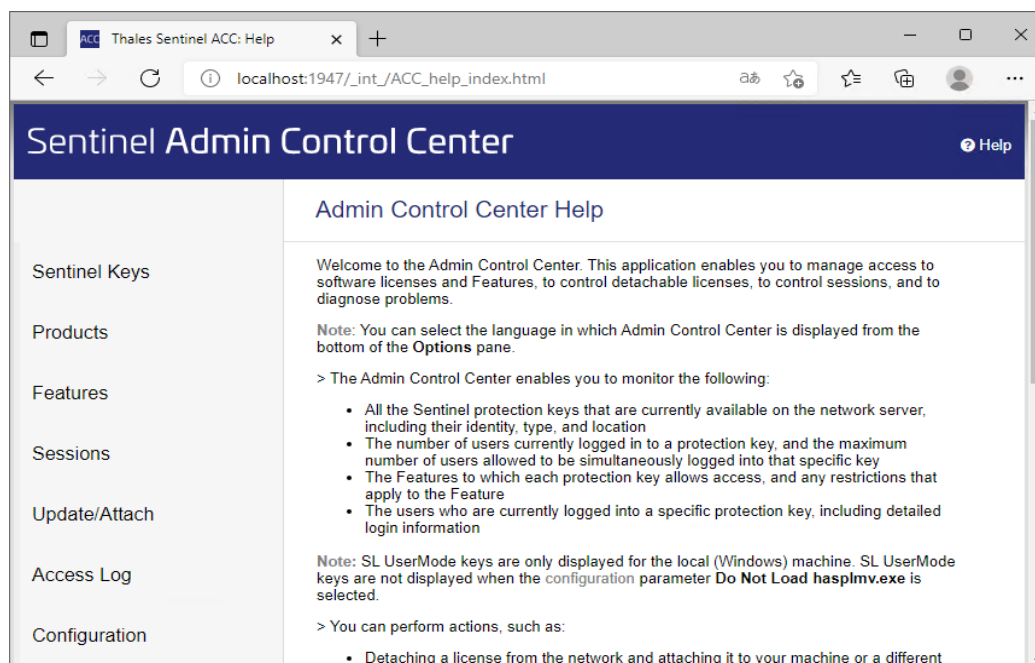


## 6.3.2. Configuration of the Workstation

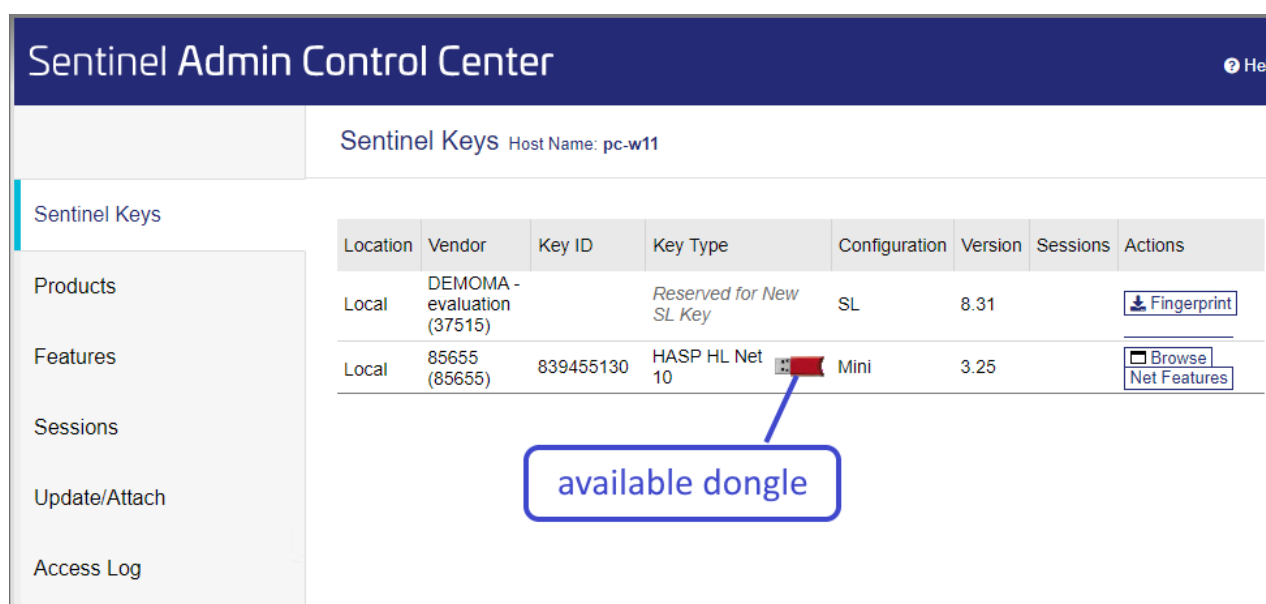
On your workstation winLIFE has to be installed in the same way as the stand-alone version. After a successful installation a link to the server dongle must be created. You can perform this as follows:

- Start the Internet-Explorer
- Enter the address: <http://localhost:1947>

The following window opens:

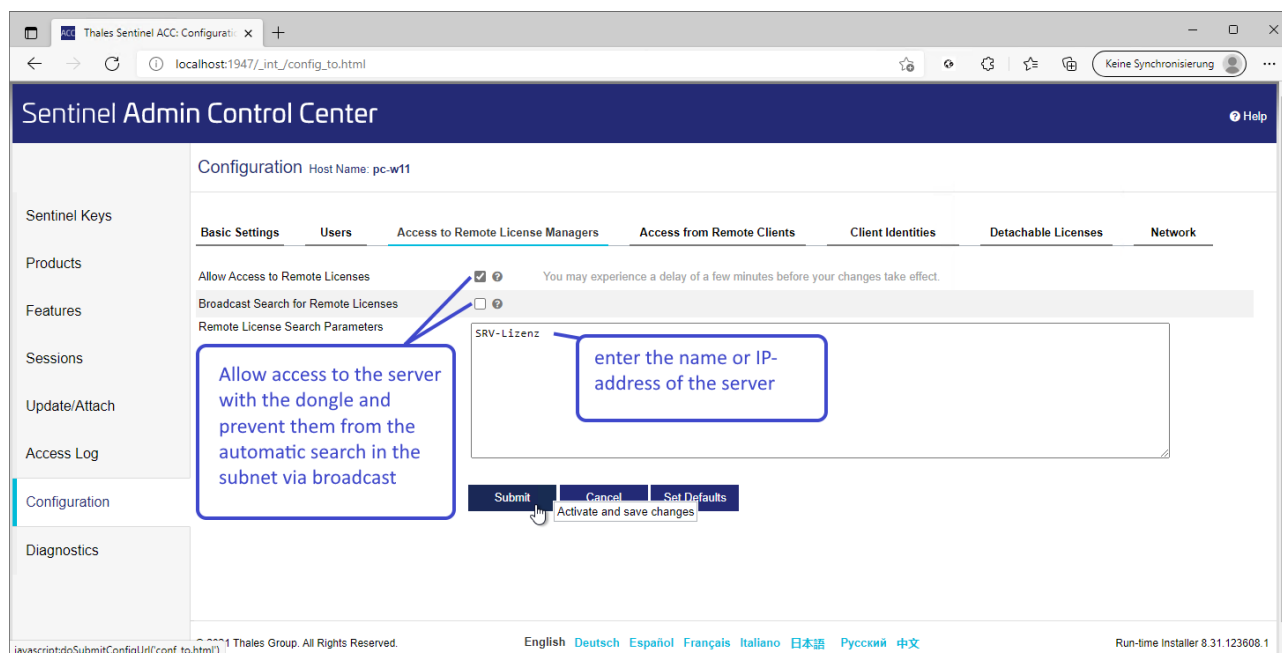


Click on **Sentinel Keys** and the following page appears if the dongle was found.



If the dongle is not shown, select **Configuration**. Select **Access to Remote License Managers** on the next page and the following page will appear.





Enter the parameter for the access to the server by means of the dongle and confirm your entry by clicking on **Submit**. If you need help, click on the button „Help“ and you will get some information concerning parameter.

Note: After the installation on your workstation as an administrator you can use winLIFE as an administrator. If you want to use winLIFE with another username on your workstation, you must register under this username on your workstation. Insert the winLIFE-CD and start winLIFE again. Then winLIFE will configure itself for this username.

## 7. Installing the FEMAP- Interface

If you use FEMAP, the interface programmes can be installed automatically. To do this select

### Interfaces

Femap: ... [Start setup](#)

FEMAP versions 11.0 onwards are supported.

If the FEMAP interface programmes do not run under VISTA, the following steps should be carried out:

1. Log yourself in as administrator.
2. On your desktop there is a FEMAP icon. Click on this with the right-hand mouse-click. Under Properties go to the label compatibility and you can select “execute program as administrator” there.
3. Start FEMAP and then close it immediately
4. As described in point 2 go to the compatibility mask and remove the check mark for “execute program as administrator”.

The FEMAP-API applications should run now. If this is not the case, open a DOS window as administrator (by entering Start in the cmd line) and enter *femap /regserver* in the FEMAP installation directory there, if necessary.

---

### 7.1. Installing other FE-Interfaces

Macros and interface programmes for Ansys and for I-DEAS can be found on the CD in the subdirectory Interface-FE.

## 8. Installation on a Terminal Server, Virtual Machines

In some scenarios it is advisable to place the winLIFE 2023 application centrally, above all, if an installation for several users in one network is necessary. In this case the installation on a terminal server or virtual machine is a suitable alternative.

Because the application winLIFE 2023 has been designed for use as a single-seat application, it is necessary to consider the particular terms and requirements of the IT-infrastructure when installing it on a terminal server or virtual machine. The application winLIFE 2023 can also be used in its full extent in this environment. The installation of the application is flexible enough to use the most varied strategies for making the application available.

Because the environment in which the application winLIFE 2023 can be installed is so variable and complex, a detailed description does not make any sense. Your system administrator can help you here.

## 9. Update

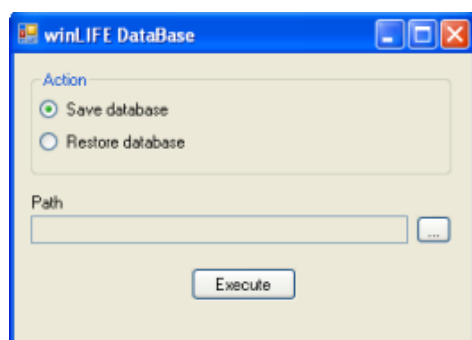
---

### 9.1. winLIFE-Version 3.0 and later versions

You have a functional winLIFE version 3.0 upwards and you want to install a winLIFE update. In this case we recommend saving your material database with the help of winLIFE first. To do this select menu item

Extras / Tools / Database save/restore

and the following menu will appear:



After saving, close your old winLIFE version and any other winLIFE programmes.

---

Note: Remove the dongle from your local computer or – in the case of a network dongle - make sure there is no access to it (e.g. pull out the network cable).

---

Afterwards start the winLIFE installation programme. During the installation process you will be required to name a target directory where the new installation should be saved. This directory is possibly but not necessarily the same as for the old winLIFE installation.

Your old winLIFE installation will be de-installed and deleted from the hard disk, even if the new target directory is different from the old one. It must be deleted to prevent a clash between the new and the old versions. Your material database and component database will be transferred from the old winLIFE version and new data will be added.

---

Note: winLIFE 2023 includes a material database according to the local concept and a database according to FKM. This data is installed with the program-CD, but you have to insert the dongle and enter the serial number and password first.

---

The data which you have already entered for materials and S-N curves will be transferred and new data will be added to this database.

Your old project data, load data, load collectives etc. will not be deleted and you will be able to access these after the installation.

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### 9.2. winLIFE-Version 2.3 and older

If your winLIFE Program is Version 2.3 or older, please contact us. We will support you with updating and, if necessary, converting your data.

# 10. Innovation

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## 10.1. Changes/Improvements winLIFE 2023 to winLIFE 2022

- When copying the projects, the FE data can optionally be copied as well
- When calculating with element stresses, a Max\_schad.ele is now written
- New LST format **winLIFE LST-File (Viewer)**
- FE interface non-linear with RecurDyn generates LST files optionally with plane or with 3D stresses
- Solver: Support of processor groups in multithreading
- **Classification matrix with independent loads** -> non-linear calculation (see last slide)
- **Structural Stress Concept**
  - Stress in distance **absolute/relative** of sheet thickness
  - Linear and quadratic extrapolation **absolute/relative** of sheet thickness
  - Structural stress concept without FE data
  - Structural stress concept with LST files and node selection
  - Structural stress concept non-linear with and without FE data
  - Structural stress concept with **Findley**
- Attributes of the LST files can be used imported and exported
- **Attribute sheet thickness:** for shell elements automatic recognition of sheet thickness from the geometry file
- Import of element stresses from LST files - HotSpot method
- **Shell elements:** hide/show **top/bottom stresses** and export to LST-file,
- Surface orientation added under element info in the Viewer
- **Animation** from-to..
- With the local concept, a distinction can now be made as to whether the surface roughness is taken into account according to **Siebel&Geier** or according to **FKM Nonlinear**
- Example 11 Newly created
- Convert LST file format old --> new
- **Autosave** function with option to set the time interval

### Features/Bugs

- Enhancement of the search function regarding both the ‚Load‘ S-N curves and the ‚Load FKM‘ dialogue, Display of the S-N curve numbers
- Temporary window "Calculate partial loads" in container projects no longer closes automatically after the calculation, but has been given a ‚close‘ button
- Speed optimisation through one-time reading of the FE stresses
- Optimised adding of LST files: considers shell stresses top side / bottom side from 2 (several) separate LST files and multi-adding
- Problem with very large node numbers fixed

- Number of classes of the classification matrix increased from 40 to 100
- Freezing of the legend "Result global min/max" for better comparison of results
- Detailed debug output for the calculation of the structural stress
- Displays and views are saved
- Acceleration when using different S-N curves
- Update: Decisive for the degree of utilisation is now only the equivalent degree of utilisation for multi-axial, proportional and synchronous stresses. See FKM section 4.6.3
- Drag and Drop when creating the **multiple load file**
- Extrapolation of the time with first and last time column of the multiple load file
- **Formula editor** applicable via directories
- Formula editor with modulo ,% operator

---

## 10.2. Changes/Improvements winLIFE 2022 compared to Build.version 4.4.0.00

- Calculation according to FKM guideline, 7th edition (year 2020) implemented
- Material database updated according to FKM, 7th edition
- When calculating the FKM (module FKM), you can select whether 2D or 3D stresses are used for the calculation
- Unused node sets can now be edited and exported in the result Viewer
- If load changes occur with an extrapolation > 10e9, the number of cycles is increased accordingly
- Interface Viewer - RecurDyn – Non-linear interface has been optimized. Non-linear load steps can be selected individually with start value, end value, step size
- Differentiation between the 2 ANSYS version in the Viewer when reading in deformations. Function changed respectively improved
- Adoption of the node attributes of the container project calculation into the service factor calculation
- It is now possible to select individual stress components for the calculation
- Generation of stress gradients possible with imported LST-files, additional stress gradient is implemented at the plate (shell) edges
- Dynamic modulation with 7 decimal places
- With the ZM, the equivalent stress hypothesis 'normal stress with relevant main stress' can only be selected for solid elements when forming the hysteresis loop
- A conventional node selection is again possible via the \* .kno file without having to go through the Viewer
- The element line setting is now saved in the Viewer after closing
- The command show / hide now also appears when opening the Viewer under result
- Saving the materials in the library is now possible with the FKM module even without the BASIC module
- ANSYS files with results of arithmetic operations can now be read
- Non-linear and linear ADINA files can be read in via the Viewer
- Speed optimization when calculating with non-linear LST files

- Under calculation parameters / rough analysis additional parameters max\_schad.kno for the number of nodes (in the max\_schad.kno file). The size of the max\_schad.kno file is to be defined independently (parameters of the rough analysis)
- Container projects: addition of the damage sum for the entire project can be done with one command
- User defined colour legend in the Viewer now available
- FKM edition 7: Decisive for the degree of utilization is only the comparative degree of utilization for multi-axis, proportional and synchronous stresses. See FKM Section 4.6.3. If edition 6 is used, this is not yet taken into account
- Revision of example 22 of the winLIFE help

#### Features/Bugs

- When closing the Viewer, a message appears indicating whether changes should be discarded.
- In Container projects, the correct view is shown under Load → View
- After 6 FKM calculations with the viewer, the display max number of viewer windows appeared.
- Crash fixed for calculation type FKM, when selecting nodes via the viewer if no node set has been selected
- Bug with the transfer of class boundaries in the container calculation. If the upper-class limit is 0 in the container calculation, this resulted in the class boundaries being added incorrectly in the operating factor project of the container
- improved reading of the lst file (no spaces at the end)
- The FAT class is only used for the SN-curve if an attribute is intended for it
- Nonlinear calculation with old lst files is now possible again
- In the FKM weld seam calculation with the Hot-Spot method, the result variables are displayed
- In the FKM weld seam calculation with linear extrapolation, the triad is now displayed
- winLIFE Random: Method menu, FE interface supports Perma's (post) files
- Module FKM: when not welded with LST files, winLIFE detects whether nodes or elements are in the LST file. --> Node /Elements selection
- Viewer: Element values/node values are now displayed in a display window (box) right next to the node /element
- ANSYS files, bug fixed, all elements are displayed again
- Fixed a bug in FE node selection with LST files for multiaxial projects since 4.4.0.4
- Node set definition possible when displaying values active
- Container project, bug when creating the operating factor project if the base project contains a formula file
- Calculation, welded FKM with the combination top/bottom stress was not calculated
- in the FKM verification, either the results of the upper stress or under stress were output in the protocol, even if another side is the most damaging side in the static and fatigue verification.
- Rename torque, stress path to classification stress path. And in the diagram, torque was renamed to load.
- Checkbox 3D stresses remains visible (displayed)
- Node set can be created in viewer, result mode
- in winLIFE Basis, Multiaxial: In the viewer, the utilization rate is displayed in colour non-inverted
- Save the vz5 file already in the dialog curve with the button OK
- Dialog box revised CDI (create LST file)

- Results of nodes/items are now displayed in the viewer in a small window next to the node and no longer in the bottom window bar
- FKM: The input option for top/bottom load has been removed because it repeatedly led to confusion
- With the static verification, the internal proof is carried out for both the lower stress and the upper stress. After that, the highest utilization level is displayed and used

---

## 10.3. Changes/Improvements Build.version 4.4.0.00 compared to 4.3.0.00

- Random, FE interface for broadband processes (Dirlik) and narrowband processes (Weber) implemented
- RANDOM optimization, revision of the RANDOM graphics (PSD / collective), incorporation of several probabilities of occurrence.
- Calculation method and interface for modal superposition implemented
- Adams FE interface, stress files with the ending asc and geometry data with 'dat' can be read. Adam's 'dac' files can be read in as a load
- 3D cutting plane calculation
- Optimization of the speed when adding the nodes in container projects with a large number of nodes
- FKM upper / lower load, the stress components (sx, sy, ... H1, H2 ....) are compared component by component. According to this, the arithmetically greatest stress is the upper load
- winLIFE FKM module: SN curves can be defined as an attribute
- Viewer in postprocessing mode can edit unused node sets
- Viewer: Multiple definition of the node sets possible
- The last graphic settings of the viewer are saved
- Extended non-linear interface. All stress curves are now written to a file
- Better definition of Component SN curve → Load FKM (edition 2012/2003)
- The calculation of the stress gradients on the symmetry surfaces can optionally be switched off
- Automatic icons for multiple views in the viewer
- Examples 44 and 45 new
- Splash screen built in for a faster start
- The version number of winLIFEFE.dll is output in the info dialog
- Famos files with the X-axis definition format version 2 can now be read
- Improvement of the partial load calculation - speed optimization
- The rough analysis can also be used within the menu item 'Calculate selected projects'
- Error output in the winLIFE batch process improved
- Load a specific user.config (Extras menu)
- menu item, local videos removed



#### Features/Bugs

- The import problem has been resolved for very large random values
- Size of the triad (weld coordinate system) improved for different perspectives
- Stability of the viewer increased
- Negative temperatures are possible as an attribute
- Different formatting in the viewer tree eliminated
- Fixed a crash when closing the maximized viewer window
- Corrected incorrect designations according to DIN in the material database

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## 10.4. Changes/Improvements Build.version 4.3.0.00 compared to 4.2.0.10

- definition and use of attributes per node via the Viewer
- optimization of the LST output after closing the FE-Import dialog
- preselection of the FE interface in the method dialog
- presentation of several load cases in the Viewer
- display of the upper / lower stress as the result type in the Viewer
- optimization of the viewer graphic
- automated generation of load files from a load collective
- projects can be reloaded, so it makes sense to work with 2 winLIFE tasks on one interface
- any column selection when creating CDI files (create LST files)
- Parameterizable extrapolation of structural stresses
- Import of the plate thickness from the FE-model
- FKM: calculations welded and not welded with the combinations upper / lower stress and amplitude / mean possible. Upper stress is always medium voltage + | amplitude |
- FKM: the third principal stress always has the surface roughness 1
- FKM: The maximum utilization of all individual utilization levels and the equivalent stress utilization ratio is always specified
- welded at FKM, the utilization ratios are sorted in ascending order in the neutral file
- classification matrix with intermediate points, even with coarse analysis
- automatic recognition of the hysteresis loop shape of the classification matrix
- additional load time output in the classification matrix for a better analysis of the calculation path
- better calculation of the predicted computing time (no more negative times)
- for a container project, \_sum.exp is automatically loaded in the viewer
- stress gradient can now also be used with One load exact and One load uniaxial
- Dongle query was improved to better detect 'BrokenSession'

- improvement in the torque-stress path graphics. Improved synchronicity of sub-graphics
- when opening the Load dialog, in the case of Famos / Daff files, the channel names are displayed instead of the index
- classification matrix simply now generates intermediate points in raw analysis
- classification matrix is clearly decomposed into quadrants
- 5000 container projects possible
- in the graph torque / stress all 4 graphics are synchronized
- Definition of CDI (\*.lst) files in winLIFE updated

#### Features/Bugs

- welded at FKM, the utilization rates are sorted according to the lowest degree of utilization in the neutral file, so that if 2 identical nodes occur, which is read in with the highest utilization rate second
- errors in FKM Calculations with stepped collective corrected
- for container projects, the sum file is loaded via the viewer.
- calculation of welded components without FAT class in the LST file possible
- wrong path in dynamic modulation associated with classification matrix
- error with parallelization of mirrored classification matrix fixed
- bug with geometry file in FE dialog
- container project, correct display of the load list
- bug fixed when mixing Lst files with and without stress gradient
- spheroidal graphite cast iron (GJS) as material at Hück/Haibach
- error in generation parameter for malleable cast iron fixed
- wrong path for dynamic modulation

---

## 10.5. Changes/Improvements Build.version 4.2.0.10 compared to 4.2.0.8

- Import and export files with node and element sets to choose from in the viewer to facilitate the selection of areas to be calculated
- Expansion of the FKM module: There are now similarly powerful selection options for nodes and elements available in the VERWER as in the winLIFE modules

#### Features/Bugs

- Fixed errors in the user changes of texts when labeling the graphic (addition SN \_ curve)
- Fixed bugs in FEMAP macro to generate welds in QuickCheck (Mark QuickCheck was removed)
- The FEMAP macro can now also produce element groups

## 10.6. Changes/Improvements Build.version 4.2.0.8 compared to 4.2.0.0

- Unit conversion for data import from FE:  
So far, it has always been assumed that the units in the Fe file are available for the stress MPa and the coordinates in mm. This has caused problems with FE programs where it was not true. Now you can specify a conversion factor for the stress and the coordinates. The file created for WinLIFE \*.LST is then generated with the units required by WinLIFE (MPa and mm). The original FE results file is not changed.
- Weld seam display for curved surfaces:  
For curved surfaces, the normal unit vector can no longer be completely in the curved surface. In the case of strongly curved surfaces, this can also have a negative effect on the result. The permissible deviation of the position of the normal unit vector now can be entered by the user. States that are not plausible are no more displayed in the result visualisation. With a large number of weld seams on curved surfaces, the visualization is improved, because incorrect results are hidden and thus the search for the hot spots is simplified.
- For LST files, the tripod can now also be displayed to identify the weld orientation.

### Features/Bugs

- Fixed error reading from FEA (the stresses were shown about 3% too low!)
- Missing links to winLIFE help were added
- In the menu of the FKM module, the display is now updated immediately when the load ratio is entered (e.g. alternating  $R = -1$ , swelling  $R = 0$ )
- During extrapolation, the rainflow limits are no longer rounded

## 10.7. Changes/Improvements Build.version 4.2.0.0 compared to 4.1.0.8

- FKM  
Taking into account the 3 related stress gradients of principal stresses
- FKM welded  
Consideration of the parallel welding seam stresses
- Multiple copies of FKM projects possible
- Mapping matrix
  - In the rough analysis with mapping matrix, the intermediate maxima are taken into account.
  - the torque stress path is used to represent the balance of the hysteresis.
  - When calculating with allocation matrix, hysteresis is automatically mirrored depending on the mapping matrix.
  - In the calculation with mapping matrix, the sign of the Hysteresis stress can be specified separately
  - Container Project possible
- Extension of the formula editor for differences-concatenated channels
- Modulation files
  - Status '0' now leads to no warning
  - Additional channels can be inserted

- Output decimal places can be specified
- Container Projects now are possible
- Support for UNC paths

#### Features/Bugs

- In the coarse analysis with mapping matrix all graphics are of the torque-/stress path are synchron.
- Multiple copying of partial load projects is now performed correctly
- In the user database is also stored in a basic project ADP.
- for FKM projects the surface roughness, D\_eff and safety factors remain intact if a winLIFE BASIC project is loaded

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## 10.8. Changes/Improvements Build.version 4.1.0.8 related to 4.1.7

- Import of FEA-result files is improved remarkably by the Viewer

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## 10.9. Changes/Improvements Build.version 4.1.0.4 compared to 4.1.0

#### Features/Bugs

- Erroneous ' fatal error of 3d stresses' when changing the reated plane of the Mohr's circle
- Faulty KDM calculation if  $deff < deffN$  (formula 3.2.8 was used if  $deff > 7.5$  and  $deff < deffN$ )
- Missing transformation matrix crash replaced by error message
- Error in FKM welding seam module for plate elements, shear stresses parallel to weld seam were always assumed to be too large

---

## 10.10. Changes/Improvements Build.version 4.1.0 compared to 4.0.3

#### New

- FKM for welded components
- LocalDB instead of an ACCESS-database
- Multichannel signal path
- Calculation log with the input data for the generation of the S-N curve according to FKM

- All settings can be saved in the S-N curve graph
- Unified and simplified installation 32/64 bit LocalDB / SQL Server
- Loading channels with formula editor
- Speed optimization importing FE stress (winlifFE) in FE-interface dialogue. Conversion only on demand.
- Debug output can be activated using classification matrix
- Dyn. Modulation
- Extension of VIEWER4WINLIFE (ABAQUS extension of the element)
- Speed optimization importing native FEA files ('winLIFE' internal files are no longer written anew)
- Saving of the crack propagation files in the user database
- Conversion of crack propagation material data in different units
- Conversion of QUICKCHECK- project files in biaxial winLIFE-project files

#### Features/Bugs

- The degrees of utilisation are added with the correct signs in the FKM-module
- No longer unnecessary warning announcement with the calculation of  $\Psi \cdot (D-d)/2 = t'$
- The reading of large stress files in FKM was accelerated by the factor 10
- The mistake that appeared with the representation of loads combined with a formula file was removed
- Constant loads, e.g. 1.0, can now be shown in the signal path
- Sporadic deactivation of the result menu was resolved

---

## 10.11. Changes/Improvements 4.0.3 compared to 4.0.2

#### New

- Inverted cutting plane in Viewer.
- Representation of the maximum shear stress in Viewer.
- 

#### Features/Bugs

- In the report only the first 2000 points were shown in the load diagramme and in the equivalent stress diagramme.
- When choosing a user-defined LST- file setting in the FE-dialogue the LST-file was not generated
- In case of the static proof the minimum total strain was assumed too large.
- in the case of a high degree of multiaxiality the static fatigue test was not met because of a fault
- Regarding load spectra with real numbers as number of cycles it could happen that the total number of cycles in the Rainflow matrix did not match to the summarized number of cycles. Therefore, the Rainflow matrix could not be shown.
- If a LST-file generated by winLIFE is loaded in the FE-dialogue and single nodes are selected, now a row will be written in the file "alle.kn" for each element type of a node.
- Incorrect value „number of steps" in the legend of the load graph of a load spectrum was corrected.

---

## 10.12. Changes/Improvements in winLIFE Version 4.0.2

- Viewer4winLIFE: Create, Edit, Delete node-sets and element-sets.
- Visualisation of perspective is possible in three different steps.
- Graphic failure showing faces is fixed.
- Seam weldings for hot spot concept and structural concept are found automatically if different faces are linked to different properties.

### Features/Bugs

- if there are several load cases with different related stress gradients for each node the maximum stress gradient is used to modify the local S-N-curve.
- $K_{s-}$  from FKM-guideline is limited to a minimum of 1. ( FKM formula chapter 4.3.2)
- In the QUICK CHECK module, the input mask for the stress components has been corrected.

In the uniaxial case the automatic calculation of the upper and lower limit is performed now in the same way as in the multiaxial case. This means that the lower limit now can be greater than 0.

- Correction of the value  $b_g$  for GS from 20000 to 2000.  $b_g$  is needed for the calculation of the support value according to FKM for the material GS (casted steel).

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## 10.13. Improvements in winLIFE Version 4.0.1

- Animation possibilities when showing Mohr's Circles, similar to when showing principal stress vectors.
- In the SQL-Server-Version 64 Bit individual users can be given different writing and reading rights.

### Features/Bugs

- Error correction: When reading in from Type OP2 (NASTRAN), RST (ANSYS) files, the order of the shear stresses was changed. This has been corrected.
- If the comparative unit stress in a uniaxial project is smaller than  $10e-7$ , then this is found and prevents greater damage.
- If the original form below the endurance limit is repeatedly used, then it can result in the limits in the rainflow being too large if classification is not done.
- In the sensitivity analysis the error has been corrected which lead to the program crashing.

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## 10.14. Improvements in winLIFE 4.0 2018

### New

- FKM for welded components.
- LocalDB instead of an ACCESS-database.
- Multi-channel signal path.
- Calculation log with a S-N curve generation parameters.

- The settings can be saved in the S-N graph.
- Standard installation (only one version for 32 and 64 Bit).
- Loading channels are workable by means of a formula editor.
- Debug output can be activated with the help of a classification matrix to analyse the process.
- Dyn. modulation enables for example the calculation of the ignition torques based on a static motor torque.
- Speed optimization by importing FE from FE-original files 'winlifeFE' (internal files are no longer written each time).
- Saving of the data in the CRACKGROWTH analysis.
- Conversion of the der CRACKGROWTH parameter in different unit systems.
- Conversion of FKM QUICKCHECK-projects in equal bi-axial winLIFE-project-files.

#### Features/Bugs

- In the FKM-module, degrees of utilisation are added up with the correct signs.
- Unnecessary warning message when calculating PSI was adjusted ' $(D-d)/2 = t$ '.
- The reading in of large stress files in FKM was accelerated by factor 10.
- The error, which occurred with the representation of loads linked with the formula file, was adjusted.
- For the graphic representation of constant loads an appropriate scale will be selected now.
- The occasional, unintended deactivation of the result menu was fixed.

### 10.14.1. Improvements in winLIFE Version 4.0.3

#### News

- Inverted cutting plane in the Viewer.
- Representation of the maximum shear stress in the Viewer.

#### Features/Bugs

- In the report, only the first 2000 points were shown in the loading diagram and in the equivalence stress diagram.
- While selecting a user-defined LST-file setting in the FE-dialogue the LST-file was not created.
- Using static proof, the minimum total strain was assumed to be too big.
- The result was that the static strength proof was not provided in case of a large degree of multiaxiality.
- Regarding load spectra with real numbers as a number of cycles it could happen that the total number of cycles in the Rainflow matrix did not match with the summarized number of cycles. As a result, the Rainflow matrix could not be represented.
- If you load a LST-file generated by winLIFE in the FE-dialogue and select single nodes, a row will be written for each element type in the alle.kn .
- Incorrect value "number of steps" in the legend of the load graph of a load spectrum was corrected.

### 10.14.2. Improvements in winLIFE Version 4.0.2

#### New

- Viewer4winLIFE: Create, Edit, Delete node-sets and element-sets.
- Visualisation of perspective is possible in three different steps.
- Graphic failure showing faces is fixed.
- Seam weldings for hot spot concept and structural concept are found automatically if different faces are linked to different properties.

#### Features/Bugs

- If there are several load cases with different related stress gradients for each node the maximum stress gradient is used to modify the local S-N-curve.
- $K_s$  from FKM-guideline is limited to a minimum of 1. ( FKM formula chapter 4.3.2)
- In the QUICK CHECK module, the input mask for the stress components has been corrected.
- In the uniaxial case the automatic calculation of the upper and lower limit is performed now in the same way as in the multiaxial case. This means that the lower limit now can be greater than 0.

- Correction of the value bg for GS from 20000 to 2000. bg is needed for the calculation of the support value according to FKM for the material GS (casted steel).

### 10.14.3. Improvements in winLIFE Version 4.0.1

#### New

- Animation possibilities when showing Mohr's Circles, similar to when showing principal stress vectors.
- In the SQL-Server-Version 64 Bit individual users can be given different writing and reading rights.

#### Features/Bugs

- Error correction: When reading in from Type OP2 (NASTRAN), RST (ANSYS) files, the order of the shear stresses was changed. This has been corrected.
- If the comparative unit stress in a uniaxial project is smaller than  $10e-7$ , then this is found and prevents greater damage.
- If the original form below the endurance limit is repeatedly used, then it can result in the limits in the rainflow being too large if classification is not done.
- In the sensitivity analysis the error has been corrected which lead to the program crashing.

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## 10.15. Improvements in winLIFE Version 4.0.0 to 3.3

### 10.15.1. Changes/improvements in 4.0.0 compared to 3.8.0

#### New

- Torque-stress-path, Visualisation of single ranges
- Automatic Creation of Relation Martix
- Selection of any node for the calculation of the service factor in a container project
- Number of the maximum of possible load-cases is expanded to 1000
- Explicite selection of structural stress concept to simplify the user interface
- Normal stress hypothesis considering 2 or 3 principal stresses can be selcted
- Calculation several uniaxial cases using FEA-data these are always renewed
- The use of GEH in the multiaxial load case is now possible with negative sign
- While the calculation of several projects in the case of uniaxial FEA case the FEA-import file is read before each calculation again.
- The Der Vierwer4winLIFE was expanded

#### Features/Bugs

- A wrong selection of equivalent stresses to perform a service factor in a container-project is avoided ( Findley, Socie, Fatemie Socie)
- The memory overflow using equivalent stresses according to Socie to perform a service factor is solved

### 10.15.2. Changes/improvements in 3.8.0 compared to 3.7.2

#### New

- Load all winLIFE examples at Start or via menu Extras|Load examples.
- Quickcheck Calculation possible with a 'pure' FKM S-N curve or in professional mode.
- Use of relative paths relating to the work directory if possible and makes sense.



- Order of open projects can be changed with "Drag and Drop".

#### New Graphics

- The Mohr's circle can be shown in various reference levels.
- Parameters of the S-N curve are now shown directly in the S-N graph.
- Graphics can now be copied via the context menu (right mouse button) into the clipboard or saved as png/emf-file.
- Haigh-Diagram no longer shows each support point in the ASME line.
- Grid is now activated in default settings of graph.
- Axis label improved for logarithmic viewing of S-N curve.

#### New Other

- Change from an ASME S-N curve to another S-N curve possible.
- Warning by unusual factor dw/tw in calculation parameter dialogue.
- Warning in calculation parameter dialogue by discrepancy between shear stress hypothesis and loading of S-N curve.
- When importing strain measurements LST file now created with several channels.
- In collective generator values can now also be entered in scientific format.
- Under 'Extras| Tools FE Data | create LST File now possible to create plate elements with upper and lower side.
- Calculation with assignment matrix now considers local maximum and minimum within the hysteresis.
- In dialogue "calculate several projects" QuickCheck and FKM projects no longer selected by mistake.
- Factor dw/tw can now be entered in ASME dialogue.

#### Features/Bugs

- In calculation of equivalent amplitude for container calculations S-N curve with two corner load cycles considered correctly.
- In the winLIFE title list project type "endurance limit" differentiated in "QuickCheck" and "FKM guideline".
- Error by manual sensibility analysis corrected; Mean-Stress sensibility-> ZDW
- Error in calculation of min/max values of Y-Axis in graphs corrected.
- Surfaceprocess is properly taken into account when ductilityfactor in FKM module.

### 10.15.3. Changes/improvements in 3.7.2.3 compared to 3.7.2.2

#### Features / Bugs

- By non-linear calculation multicore deactivated
- Invalid object reference when creating the sum rainflow file corrected.

### 10.15.4. Changes/improvements in 3.7.2.2 compared to 3.7.2.1

#### Features / Bugs

- In container project an equivalent amplitude always given, even when damage sum and therefore sum load cycles is 0.
- Old multiaxial plate and solid Lst files can now be added.

### 10.15.5. Changes/improvements in 3.7.2.1 compared to 3.7.2

#### Features / Bugs

- In QuickCheck with welded seam, weld number now used to improve allocation of identical elements.
- Problem with 'Zar1' demand for dynamic factors (transmission calculation) solved.
- Calculation with allocation matrix can now be carried out with optimization.

### 10.15.6. Changes/improvements in 3.7.2 compared to 3.7.1

- Static FKM verification
- FKM fatigue check
- Preview of graphics in window when creating the collective
- Columns of individual load files can be merged within winLIFE
- Protocol on generating S-N curve
- FKM Material database updated to 2012 edition
- Weighted addition of utilization rate according to FKM guideline
- Support factor for local concept
- Non-linear calculation possible with static FE data using assignment matrix
- List of results produced during the calculation of a container project
- Multiple selection and entry from excel possible for superimposing
- Default path of open file improved
- Node number is provided after manual node selection when calculating the utilisation factor
- Addition of damage sums with exponents and/or with negative multiplier
- Result of addition of damage sums shown in the Viewer
- Keys can be switched on or off
- Logarithmic viewing for random graphic (Y-axis) also possible
- Different standard views for the rainflow matrix
- Opening the work directory in the explorer with double click on the entry in the status bar
- Formats FAMOS and DAFF(TurboLab) can now also be read in as load files
- For uniaxial import of stresses, the stress tensor of the solid elements can also be used
- Consideration of the marginalised layer stiffening in the FKM generator
- Calculation 'Button' created in the dialogue LST-file
- LST-file with stress gradient

#### Bugs/Features

- Cyclic S-N curve with uniform axis
- Addition of uniaxial plate elements in the LST-file has been corrected
- Changes of exponents between -0,15 and -0,1 when calculating from St to GL (see attachment 5 GL2010)
- Error when creating the service factor for certain nodes corrected
- LST-create warning issued if one or more surface values cannot be read in
- Error remedied for importing component S-N curve in old projects
- Error remedied in time at level count generator (when activating save button, columns and lines switched)
- Equivalent amplitudes in container project also provided in calculation of welds, on giving the normal vector (DATA\_W8)
- Description of the thickness factor corrected in the help
- X-axis of the cyclic S-N curve dialogue standardised
- Extrapolation over  $10^9$  load cycles improved
- Accessibility of the winLIFE example videos
- S-N curve dialogue shown correctly, even when Dpi settings are changed
- CSV file in QuickCheck contains all KMS file information.
- QuickCheck for welds: the weld numbers are now used to simplify the assignment of identical elements.
- Problem solved in 'Zar1' request for dynamic factors (transmission calculation).
- In the calculation with assignment matrix, calculation now optimised.

### 10.15.7. Changes/improvements in 3.7.1 compared to 3.7.0

- Fixed an error in the service factor multi core calculation of a container project.
- Default value for component class (FAT) is set to 1000.

## 10.15.8. Changes/improvements in 3.7.0 compared to 3.6.3.0

- S-N curve generator according to the newest 6th edition of the FKM guidelines 2012 in particular the following:

Changes in the material descriptions

Improvements in the S-N curve generator dialogue

Type of welding: new "Case B"

Safety factor according to the new FKM guidelines

Selection help for  $D_{effN}$  (effective diameter) and adm (constants when determining technological size factor  $K_d$ ) taking into account the material groups according to the new FKM guidelines

The anisotropy factor can be determined according to the new FKM guidelines.

- Parallel version (MULTI CORE) achieves substantially shortened calculation time, depending on the number of cores around factor 2.9 (4 cores) to 4.2 (8 cores).
- winLIFE-Basic optimised with FE data and therefore much quicker
- Results of the durability can be shown in viewer4winLIFE
- After partial load calculations it is possible to calculate the service factor for any required node in the container project
- Fewer output files for a partial load calculation within the container project (export files)
- Random load - new module (available at the moment at no extra cost)
- A container project can now be cleaned by "File->Cleanup container project". All files created during the calculation are deleted.
- ASME-S-N curves
- Haigh FKM Diagram: Improved analysis by shifting a load with the mouse wheel
- Haigh FKM Diagram: S-N curve with various number of cycles to permanent endurance stresses is taken into account
- Container project in Batch
- Re-start von container projects

### Bugs/Features

- Within a container project the load list was changed by error when the import files were opened. (Error corrected).
- When generating an S-N curve according to GL, a sheet thickness of less than 25 mm did not lead to a higher durability. (Error corrected).
- When generating an S-N curve "not welded" according to FKM the missing factor  $k_s$  was accepted.
- Container project error correction:

In the container project: Load -> Import from files -> e.g. "partial load 1" the error occurs if no changes are made and the window is closed by clicking OK. The load list changes although no changes are made in the window. This can be seen under

Load -> View

After calculating the container project, it is now possible to calculate the service factor for each node.

### Problem:

When calculating the container project, projects (or project files) are created for each individual partial load calculation. The export files .exp and .neu are also written. If there are many part-projects, these files can become very large.

#### Solution:

When creating the partial load projects, the settings of the interface import program in ANSYS are made. This prevents the neutral file from being created.

Also, the damage equivalent amplitude is set to “no”. Therefore, a different format is taken for creating the export file. The amount of data is halved.

- For a uniaxial project with finite elements a file for the stress gradient must be chosen when selecting the FE. If the user does not select a file, then this cannot be taken into account, even if it is defined in the LST-file.
- Batch continues to run even when there are errors in the project calculation.
- Interface-Import-Program for new projects is now put on the program last used.
- Viewing error in the project tree has been corrected.
- When viewing the S-N curve with a load, Y-Min is set correctly after a pre-zoom.
- When viewing the collective, this is now sorted according to the order of the modified amplitude.
- When viewing the S-N curve with a load, Y-Min is set to 10% of the maximum load if the maximum load lies under the durability.

### 10.15.9. Changes/improvements in 3.6.3.0 compared to 3.6.2.0

- A new University-version was created. The number of limitations was reduced compared with earlier versions. The 10 students licenses are linked to a network dongle, the lecturers version is linked to a separate single-user USB dongle.

#### Bugs/Features

- In the case of extrapolation, a rainflow matrix with very high numbers of countings ( $>10E9$ ) an error occurred. This bug is fixed.
- In the case of Multicalculation the damage sum now is shown correctly.
- Because it leads to an error it is now no more possible to start containerprojects via multicalculation

### 10.15.10. Changes/improvements in 3.6.2.0 compared to 3.6.1.0

#### Bugs/Features

- When calculation the service factor with the container project it could happen that rainflow countings with different class limits were added, and thus the service factor was wrong.
- Was the original project of the container project calculated with a different number of cycles than 1 as this number of cycles was erroneously transferred to the operating factor of project
- A change of the calculation result multiply factor in the load form is now recognized
- Fixed error message when opening the SN curve dialogue

### 10.15.11. Changes/improvements in 3.6.1.0 compared to 3.6.0.0

- **Viewer4winLIFE** The results of the fatigue life calculation can be shown graphically in winLIFE in the FE model
- In the S-N curve generator for GL-Wind and GL-Ship the S-N curve ( $R_m$ ) with  $10^4$  load alternation is limited based on the detail category of  $2 \cdot 10^6$
- When the equivalent amplitude is written into the protocol, the number of the load cycle sum is also shown
- Import-Strain measurements: Files with tabs as column division are now supported
- Non-linear analysis to 20000 nodes possible
- Calculation with FE Element stresses possible

## Bugs/Features

- Known error messages when loading projects from older winLIFE-Versions are corrected
- Projects from the batch processing are now no longer entered into the project list
- When creating the operating ratio project, the material model is now no longer changed for the local concept
- Class limits are now transmitted into the container project when creating the operating
- Errors in the validation of the crack propagation calculation parameters  $a_0$  and  $a_x$  have been corrected
- View error when zooming in on Haigh FKM diagrams has been corrected
- Safety factor is no longer set to 1 when re-opening the SN-curve generator (calculation method GL)
- For the local concept the offset yield strength is now also taken over from the material data base and adjusted according to the ratio when generating the material SN-curve
- The order of tabs in the local concept with the SN-curve dialogue and for the calculation parameters of the crack propagation have been improved
- Format of the rainflow file have been standardised
- After creating the operating ratio, the results are entered into the container project and the calculation status is set to valid
- Unified file format the rainflow matrix
- Error in the calculation of non-linear solids stress adjusted

## 10.15.12. Changes/improvements in 3.6.0 compared to 3.5.0

### Changes/improvements in 3.6.0.0 compared to 3.5.3.0

- Crack propagation concept for the fatigue life calculation is integrated. All loads can be calculated in Mode I.
- Additional information about the error limits in the fatigue life calculation is now shown in the project tree.
- It is now possible to copy a QuickCheck project into a normal project. The menu item can be found under "File/Copy to normal project".
- The main nodes in the project tree structure are now shown in colour, according to the status of the project.
  - Background colour bright red: Project cannot be calculated.
  - Background colour yellow: Project can be calculated.
  - Background colour green: Project has a valid result.
- If several copies have been made, a number is shown in the title of the changed dialogue so that the user knows which project copy he is working on. It is only possible to make multiple copies of projects which have a valid fatigue life calculation.
- The winLIFE training sessions (AVI files) are now available with the installation. They are linked to the application with the registry. The following entries are used:
  - "Registry -> Current USER" -> "Software\\STZ-Verkehr\\winLIFE 3.0\\winLIFE\_Tutorial\_DE\\Path" = installation path German
  - "Registry -> Current USER" -> "Software\\STZ-Verkehr\\winLIFE 3.0\\winLIFE\_Tutorial\_EN\\Path" = installation path English
- The import program now also includes FEMAP\_CSV in the project characteristics for the FE interface. If these settings are selected, a CSV file is created with the neutral file.
- When converting a project into a container project, the name of the file which contains the loads, is also saved. In the project tree the name is shown under Project/load level.
- When calculating partial loads of a container project, the calculation is no longer interrupted if one partial load project cannot be calculated. In the CSV file this project is shown with "-> error". The correct partial load projects are marked "-> ok". The calculation of the damage sum is only carried out with the partial load projects which are ok. In addition, after the calculation of the first partial load, the time taken so far for the calculation of all partial loads is shown as well as the estimated total time.
- The result graphics can now also be saved as vector graphics (EMF Enhanced MetaFile Format). Menu/File. Exceptions: damage sum and protocol.
- The revolution collective can be saved as a CSV file using the context menu with the right-hand mouse button.
- Additional menu item under "Extras\\Settings\\S-N curve transformation Szdw (alt)". If this menu item is activated, the fatigue life calculation is carried out with the S-N curve parameter "push/pull w.". If this menu item is not activated, then the fatigue life accumulation is carried out with the S-N curve parameter "endurance (\*)".
- **Reading in FE result files with a header where the meaning of the columns is set. These new data structure enables to read in FEA-data in any order.** The requirement is that all data are located in a grid of columns as ASCII-data. This data structure shall enable the user to read in any files from the user.

Meaning of the individual parameters:

"winLIFE\_version" indicates a file with winLIFE header data

"Number\_of\_headlines" shows the number of header lines.

"Kind\_of\_delimiter" shows the separator characters. At the moment only the blank space " " is used.

"Number\_of\_columns" shows the number of columns in the value range. This value must be the same as the actual number of columns available.

The following abbreviations can be used in the area "Meaning\_of\_parameters":

num	= number of node
sx	= sigma x normal stress components in x direction
sxu	= sigma x normal stress components in x direction plate elements floor
sy	= sigma y normal stress components in y direction
syu	= sigma y normal stress components in y direction plate elements floor
sz	= sigma z normal stress components in z direction
txy	= tau xy shear stress components of the stress tensor xy
txyu	= tau xy shear stress components of the stress tensor xy plate elements floor
tyz	= tau yz shear stress components of the stress tensor yz
txz	= tau xz shear stress components of the stress tensor xz
h1	= principal stress 1
h2	= principal stress 2
h3	= principal stress 3
h1u	= principal stress 1 bottom
h2u	= principal stress 2 bottom
nx	= components of the normal unit vector in x direction
ny	= components of the normal unit vector in y direction
nz	= components of the normal unit vector in z direction
ok	= surface nodes
sg	= stress gradients
temp	= temperature
ra	= surface roughness
xk	= node coordinate x
yk	= node coordinate y
zk	= node coordinate z
tc	= type of content
	0 = no FE Element
	1 = plate element
	2 = Volume element
	4 = Volume
	5 = Stab
	6 = Rod
	7 = plate
	8 = bar
	9 = beam
Fat	= weld class
wno	= number of welds
non	= column not used

#### Example of a file with a winLIFE header.

```
=====
winLIFE_version 3.6.0
Number_of_headlines 6
Kind_of_delimiter ''
Number_of_columns 13
Meaning_of_parameters_begin num tc sx sy sz txy tyz txz sg temp nx ny nz Meaning_of_parameters_end
=====
1 8 1.00000e+00 -1.50000e+01 0.00000e+00 -1.94040e+04 -7.12245e+04 -5.86521e+04 7.12245 200.0 6 7 8
2 8 2.00000e+00 -1.50000e+01 0.00000e+00 1.25775e+05 -7.91306e+02 5.69079e+04 7.91306 300.0 7 8 6
3 8 3.00000e+00 2.50000e+01 0.00000e+00 1.47657e+03 1.22963e+04 -2.77712e+04 1.22963 400.0 8 6 7
=====
```

#### Bugs/Features

- In the level crossing count diagram, the x-axis switch between "logarithmic - linear" now works properly.

- In the menu "Extras/Settings/Decimal point" it is now possible to select either "point or comma". This is used for program exports (except for FEMAP and ANSYS Export).
- In the menu "Extras/Settings/Warning for large protocol files", the information can now be suppressed if a protocol file is going to be larger than approx. 7 MByte.
- Changes to the graph settings within a project with valid calculation no longer leads to an invalid calculation.
- The data of the range pair mean count are now given as csv file. The data can be imported with the usual file or csv file.
- When the loading view ("View") is selected, a csv file is created if the project type is gear or bearing. This contains the class, the "torque from", the "torque to" and the positive and negative revolutions collective.
- If several projects are loaded when the program is started, it sometimes occurred that the last project in the tree structure could not be seen. This error has been corrected.
- In a QuickCheck Project the export files were not shown correctly.
- In project tree structure, when changing from a QuickCheck project to a non-linear FE Project, the calculation menu was not visible.
- A container project can now be converted to a normal project. The function can be found under "File/convert container project to normal project".
- In demonstration mode, the text "Demo Version" is now shown in the background.
- In batch mode, a classification is carried out for a gear box project with FME loading before the fatigue life calculation is done.
- The S-N curve generator now has the additional setting "Normative/Tensile test" on the Variable yield strength  $R_e$ .

### Changes/Improvements 3.5.3.0 compared to 3.5.2.0

- You can now using drag and drop for copying projects to the project window.

### Bugs/Features

- To calculate the number of countings in the rainflow matrix correctly the type of variable was changed from integer to double. Resulting from this now there are up to max.  $2e15$  countings possible)

### Changes/Improvements 3.5.2.0 compared to 3.5.1.0

- The dialogue to create LST files has been extended to include the rotation plane, so that the program for converting Ansys -> winLIFE has been integrated into winLIFE.
- Container project with 2000 projects possible
- The results of the partial loads are no longer shown as a percent in the container projects. It is therefore possible to calculate several nodes and projects.
- Time taken for the container calculation has been halved
- For the flexible FE-interface, the surface ID does not have to be entered.

### Bugs/Features

- When generating a welded S-N curve, the safety factor 0.1 is used, although a different safety factor (j) is shown in the S-N curve mask.
- This error was relatively easy to recognize since the endurance limit afterwards was a factor 10 higher.
- When the load file was split, it sometimes happened that the number of columns was not recognized correctly because the commentary line was used.
- When creating the service factor, the export file (exp) of the container is no longer written over.
- In Quick-Check the NEUTRAL-FILE is created if the FEMAP-interface is selected.
- It is now possible to read in the level crossing counting created with winEVA 3.0

### Changes/Improvements 3.5.1.0 compared to 3.5.0.0



- In the equivalent stress hypothesis “Maximum Stress Theory” using the method ‘multiple load uniaxial - force’ two new options to select the sign are available: It can be selected the ‘from nominal max main stress’ (=max amount of principal stress) or ‘from max. main stress’ (=max principal stress’. In default cases the selection sign “from max. main stress” should be selected.
- In a container project the new load files are only chosen if they do not differ to the name of the original file names.

#### Bugs/Features

- The counting method ‘start grading not at 0’, was not implemented correctly. If the maximum value in the loading history was 0 then it did not work. It is fixed now.
- The generation method according to GL did not consider the roughness of the surface. It is fixed now.
- A fault in creating a container project has been fixed. (Loading files including empty signs are possible now).
- If a container project was created where the number of loadings was smaller than the number of partial loadings, then the number of repetitions was calculated wrong. Is fixed now.
- After superposition the wrong load file was used for fatigue calculation.

## 10.15.13. Changes/Improvements 3.5.0 compared to 3.4.0

### Changes/Improvements in 3.5.0.0 compared to 3.4.3.0

- **The possibility of container projects**
- In the dialogue FE Selection, it is now possible to use FE files. The settings are taken from the dialogue "Extras/tools/create LST".
- In the SN-curve dialogue for non-welded components the calculation method has been extended to include GL (Germanischer Lloyd).
- In the SN-curve dialogue the settings and the calculation of the safety factor has been changed
- Rm can be used for the SN-curve transformation independently from Rm\* (upper limit) and therefore be calculated according to GL
- Rainflow matrix can be shown as mean value / amplitude matrix. Menu item "Extras/settings/Rainflow matrix <from ... to>
- The damage sum above the cutting plane can be shown.
- In the export files the degree of utilization is given instead of the safety.
- The working directory of the current project is shown in the status line. The project type can be found in the title line of the project.
- Extras - the menu is shown more clearly.
- In multiple load files, the time channel can be entered.
- When shutting down winLIFE or when closing an altered project, the dialogue which appears with "Save yes no" has been extended to include "cancel".
- Zooming in and out with the mouse wheel in the rainflow matrix can now be done where the mouse pointer is, within the 3D view.
- In the English version all entities in the project tree are shown in English.
- In the fatigue analysis the mean stress and the amplitude are also shown.
- In the fatigue analysis you can decide how the compression threshold zone should be treated.

#### Remedied Bugs/Features

- If the load file is missing when the load is shown, then the import load dialogue will appear immediately
- The file names for the load can contain several gaps.
- The exposure time collectives created by winEVA3.0 can be read in again.
- When zooming the Rainflow graphic, you can no longer zoom over the class limit.
- SN-Curve after the calculation will be shown in the graphic as an original S N-Curve.
- In the batch mode of winLIFE, special characters eg. "Ü" can be used in the file names.
- Load files with over 100 columns can now be read in.

### Changes/Improvements in 3.4.3.0 compared to 3.4.2.0



- **Start Grading not at 0** is used as the default setting. The procedure of grading regarding the residuum was improved.

#### Corrected Bugs/Features

- In the case of adding the damage sum of single projects the export file created depends on the selected interface. In the case of interface = ANSYS an export file (\*.exp) is created, for all other interfaces a neutral file (\*.nuu) is created.

#### Changes/Improvements 3.4.2.0 compared to 3.4.1.0

- In the File open dialouge only the new path is added to the file name (\*.trm, \*.rai ...) and no more path and file name of the wlf-file to be opened.
- ☺ In the menu item Create LST file (Extras\Tools\Create LST File) you can create a LST file and/or a file containing the realated stress gradient.

#### Changes/Improvements 3.4.1.0 compared to 3.4.0.0

- Modified von Mises Hypothesis was extended with the sign of the max. stress amount in cutting plane in the case of multiple load uniaxial force

#### Corrected Bugs/Features

- In the case of **Amplitudentransformation user defined** the settings of torsion and shear are now correct implemented (the Haigh diagram is symmetric to the y-axis).
- In the case of calculations with the option **Start grading not at 0** an endless loop could appear. This is fixed now.

## 10.15.14. Changes/Improvements in 3.4.0 compared to 3.3.0

#### Changes/Improvements in 3.4.0.0 compared to 3.3.6.1

- ☺ The stress gradient can be used for notch stress concept with FE-Data.
- ☺ For the amplitude transformation the modified loads are shown together with the S-N curve.
- With the factor  $\sqrt{1 + \text{findley\_k} * \text{findley\_k}}$  the corner point of the endurance limit is multiplied and when showing the results for the damage accumulations calculation the modified S-N curve is shown together with the transformed loading.
- ☺ The winLIFE export files are conform to ANSYS.
- ☺ The pre-sign for the mod. GE-hypothesis can be selected according to either the algebraic or amount largest principal stress.
- ☺ When opening a project, all internal paths of the internal winLIFE files are automatically reset.
- ☺ Load-Time-Functions can be automatically split into negative or positive areas.
- ☺ Load time data can be squared before using it.
- ☺ Selecting one of several licenses -> it is no longer necessary to re-enter the password when changing licenses.
- Rainflow classification can begin with the first value if required. In this way constant pre-loads can be classed.
- The second slope and corner load application number of the S-N curve is only listed in the protocol if it was used.
- The settings are now saved in the dialogue "Load distribution".
- In the dialogue "FE Data" the node selection is blocked when selecting the normal vector.
- When adding the damage sums, a default result file is written and given the general extension ".csv".
- The irregularity factor is shown in the rain flow graphic.
- In the project window/project tree "Project Info" a project can now be selected using the right mouse key.
- When selecting the loading "uniaxial exakt - load collective" in the dialogue "Method" it is now possible to also select "use FE interface".

- ☺ A comfortable ANSYS-interface is available which can also be used for ANSYS Workbench.

#### Corrected Bugs/Features

- Under certain circumstances the neutral file created by winLIFE cannot be read into FEMAP.
- In Version 3.3.6.1 the settings „largest node“ and „stress limit“ were not activated in the FE-Data dialogue. This has now been activated.
- The changes to the areas in the graphics principal stress ratio/angle/vector is now completely realized.
- When reading in loadings the program blocked if there was no line end in the last line.
- The damage sums are now shown correctly in the rainflow diagram, even when the number of cycles (repeats) is > 1.
- When creating a new project, the multiplier for the damage sums will be initialised at 1.
- In the Mohr's Circle the grid disappeared with the keyboard entry.
- The user is now informed if an error occurs when opening the node file.
- In the dialogue "calculation of the stress gradient", the entry field for values S1A and S2A has been extended from 1000 to 10000.

#### Changes/Improvements in 3.3.6.1 compared to 3.3.6.0

- Error messages occurring during the fatigue life calculation in batch mode, are now shown correctly.

#### Changes/Improvements in 3.3.6 compared to 3.3.5

- Calculating several projects is now carried out in batch mode. Therefore, if any errors occur these are not shown until all the calculations have been done.

#### Changes/Improvements in 3.3.5 compared to 3.3.4

- For varying time series, the shortest one will always be used.
- Sensitivity analysis also for load collectives.

#### Bugs/Features

- Ansys view formats changed again.
- Number of comment lines limited to 2 in the neutral file

#### Changes/Improvements in 3.3.4 compared to 3.3.3

- The dialogue multi-copier has been extended. Now a file can be selected in which the load files are listed with a target time. This data is used
- For creating new projects. The load files must have at least two columns, whereby the first column is always a time slot. The resulting
- Multiplier results from the target time / total time (time slot). This multiplier is used for the damage sum of several projects.
- Under Tools there is a new menu item "2 LST add files".

#### Bugs/Features

- For the classification there is a new parameter "do not start classification with 0"
- In the dialogue load import, the path repeat is now on the left with the file name. In addition, there is a column for the forces load
- Selection only positive or only negative values.

#### Changes/Improvements in 3.3.3 compared to 3.3.2

- The operating ratio is always calculated with a 97.5 % S-N curve created with TN
- The simple failure probability is always calculated with a 50% S-N curve, which is created with TN. This result is also available in the project tree under results.
- If no classing was carried out before a calculation, then this is automatically done before the calculation.
- The diagrams of the sensitivity analysis have been improved by adding the COI diagram

#### Bugs/Features

- Importing old S-N curves is possible again
- The results of the addition of the damage sum is re-added to the damage sum
- Under certain circumstances it has occurred that two calculation parameters (number of cycles, Zyklenanzahl, do not take into account tensile strength) were not transferred.
- When sorting the damage sums, the node with the largest damage is given first
- For the statistical evaluation the changed values are transferred to the project and incorporated in the calculation.

#### Changes/Improvements in 3.3.2 compared to 3.3.1

- The correction to the FKM material data which was due to be carried out in the next version of FKM guidelines, has already been taken into account.
- Normal stress hypothesis / STM
- Shear stress hypothesis with selectable sign
- Normal stress hypothesis uniaxial selected according to the amount or algebraic 1st principal stress
- D\_eff is always 7,5 -> for newly loaded FKM S-N curves (see FKM guidelines)

#### Bugs/Features

- When generating according to FKM, the temperature influence for materials GGG, GT and GG was too big. The formula has been corrected.
- When converting the damage sum in the neutral file, the damage number of the maximum cutting plane was always used if this was available in the export file.
- The number of comment lines in the neutral file is limited to 2
- There was an error when copying from non-calculated projects without FE-interface
- If Findley was calculated with cutting planes perpendicular to the surface, the setting remained even if it was deactivated.

#### Changes/Improvements 3.3.1 compared to 3.3.0

- The selection of FE-data for non-linear FE analysis has been optimised
- Empty FE files are ignored for the calculation
- Smaller changes in the surface regarding the non-linear FE calculation
- Calculation of the operating ratio always for the 2.5% SN curve
- Additional parameter number of cycles for the sensitivity analysis
- In the dialogue "add damage sum of all projects" you can use "copy" and "paste" to import or export data via the clipboard into the column Multiplier with Select or Multiselect

#### Bugs/Features

- In the damage sum dialogue, the percentage view can show false values if various nodes were used
- Maximum 4 comment lines in the FEMAP neutral file
- When making changes to the class parameter, the classification becomes invalid
- When making changes to the load parameter, the classification becomes invalid

# 11. Files and directories

The following files are included or are created while using winLIFE:

filename	state	contents directory
*.BPZ	1	range pair count
*.BPK	1	Batch protocol file
winLIFE.err	1	fault file for dongle access \WINLIFE
*.CHM	0	help \WINLIFE a. \WINLIFE\WRKSTFF
*.GID	0	Help to configurations-file \WINLIFE
*.DLL	0	program-library \WINLIFE
*.TRM	1	Transformation matrix for multiaxial calculation \any directory
*.PRI	1	principal stress history \Multiaxial Projekt directory
*.VGL	1	equivalent stress history \Multiaxial Projekt directory
*.EXE	0	program
*.FME	1	loading history
*.KFP	2	dyn. Factor of Gear wheel on Bearings \WINLIFE\EXAMPLE a. any directory
*.KHP	2	dyn. Factor of Gear wheel on Bearings \WINLIFE\EXAMPLE a. any directory
*.KNO	1	selected nodes list \WINLIFE\EXAMPLE a. any directory
*.LIS	1	Temperature file
*.LSS	1	stress gradient file
*.LSC	0	all filenames for all nodes of a transient calculation
*.LST	0	FE import data
*.MDB	1	local component material data base
*.MES	1	load spectrum \WINLIFE\EXAMPLE a. any directory
*.MOD	0	NASTRAN model \WINLIFE\NASTRAN
*.NEU	1	winLIFE result file (neutral file) any directory
*.PTK	1	protocol
*.RAI	1	Rainflow-Matrix
*.SIG	1	selected stresses
*.SUM	1	sum of damage and parameter
*.UDK	1	[int] Length Stay Count (Gear w./Bearings)
*.VZ3	1	Length Stay Count (Gear wheel/Bearings)
*.WLF	1	actual settings
*.WLD	0	normal vectors, FAT-class, number of the welding
<b>state:</b>	0 = file must not be changed by the user	
	1 = file is created during a session and needed for later use	
	2 = can be changed by the user	