ERN WINDING MACHINES PRODUCTION MONITORING

Description

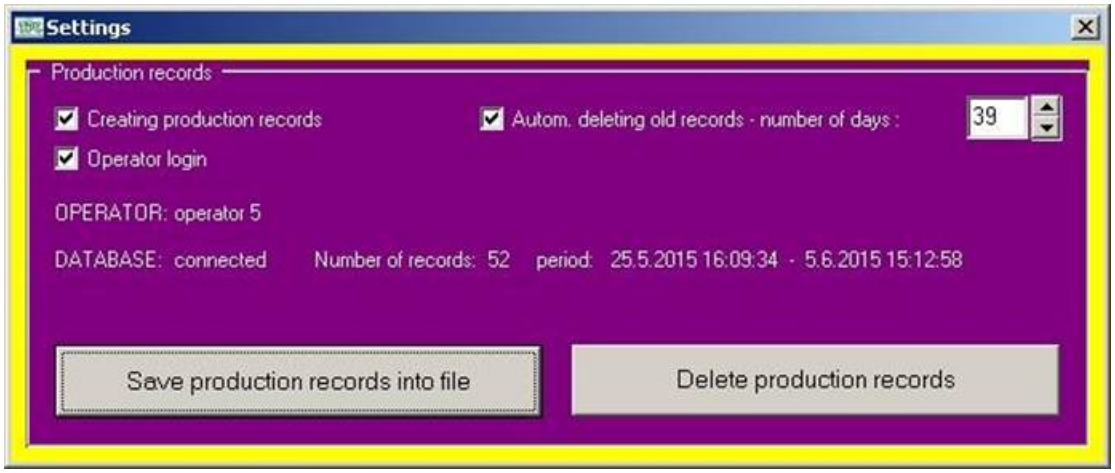
The T- version of winding machines are able to provide information on coils having been winded. Processed data is stored in a form of records in a database system. Production monitoring system is bound to utilizing of WINDOWS operating system data sources but it does not need any special database programmes installation.

A user can access to the stored records with the help of an autonomous programme MonitorERN that is capable to sort, view and process the records according the user's own criteria. At the user's disposal there are also functions for basic statistics calculations over the filtered records set (e. g. calculation of an average winding time, maximum and minimum winding time, number of pieces, etc.). With the help of the SQL the user can create commands and define functions of his own. Operation or query results can be copied into clipboard and pasted in other applications (e. g. MS Excel). The production monitoring database can be exported as an XML file and consecutively imported and processed by the user's own programmes.

The winding machine is supplied with the pre-installed database „D:\ERN monitoring\Data\erm.mdb" and the user does not need to install or to start any other programmes.

The production records storing is not enabled by default, it is necessary to enable it!

The window for setting the storage of production records in the database and the setting of operator login is called up in the winding machine operating program in MENU window by pressing the MONITORING + LOGIN button.
After entering the password, we get to the setting window:



When setting up, we recommend using a computer mouse, not a finger touch that cannot be aimed precisely!

In this setting window, it is necessary, as set in the picture, to check the items:

Create production records

Operator log-in

Automatic deletion of old records - set the number of days after which old records are automatically deleted

Buttons:

Save production records to a file - if a network connection to the database storing your production records did not get created, the database can be saved to a USB drive in an XML format and then transfer it to another computer for processing.

Delete production records - clears the whole the current production records database

After setting the items correctly, it is necessary to close the setting window in the upper right corner on the icon [x].

Production records structure

Coils winding cycles consist of the coil winding preparation phase (a previous coil taking away and preparation of a new one) and the phase of the coil winding alone. This process repeats and the moment of the coil winding ending is identical with that of the next coil winding preparation start.
The winding cycle of a single coil (red colour) is defined as follows:

..TFinish=TPrep … coil winding preparation … TStart … coil winding…. TFinish=TPrep..
< preparation time >< winding time >

where

TPrep – start of preparation
TStart – start of winding (start of the step 1)
TFinish – end of winding (end of the last step of winding)
preparation time (PT) = TStart - TPrep
winding time (WT) = TFinish - TStart
total time (TT) = preparation time + winding time

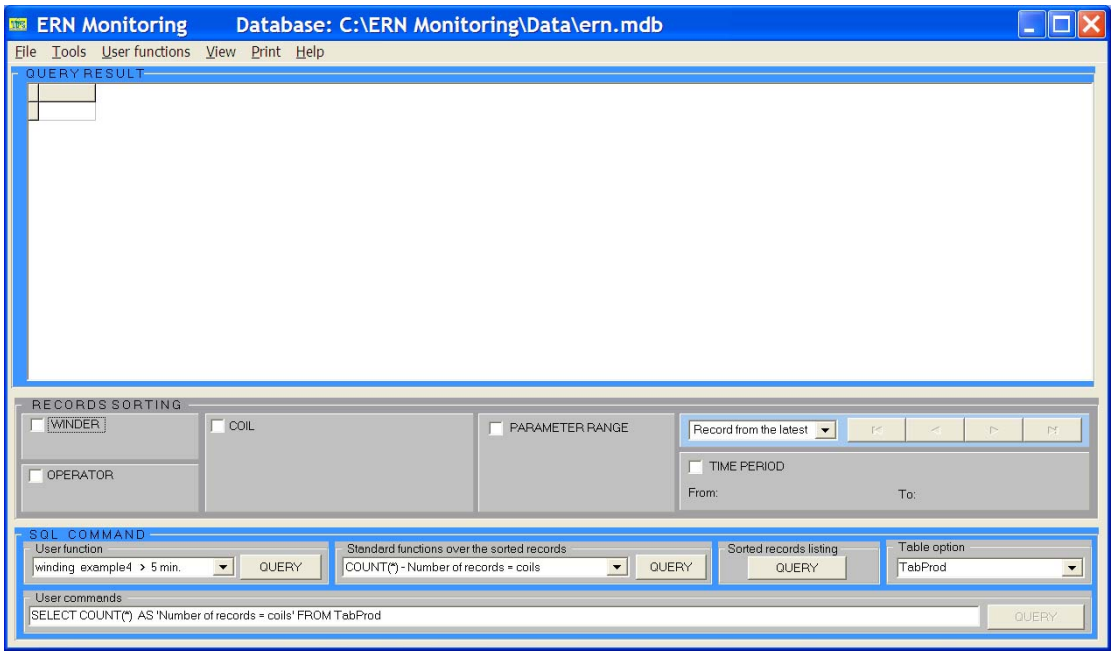
The record of the new coil winding is stored in the database at the TFinish moment. The record except for the mentioned above time data comprises fields:

Winder	– number of winding machine of 1–250 interval
Operator	– name or code of the operator
Coil	– user name of the coil
RNumb	– serial number of the given coil type (it is reset after the Winder/Operator/Coil change)
Note	– auxiliary information entered by the user, e. g. type of used wire, frame, etc.

Working with records in the MonitorERN programme

The MonitorERN programme is designed for a work with the records. The programme works with the records stored in the database without possibility of making some changes to them.

The programme main window at the first opening looks as follows:



In the upper part of the window there is a main menu bar and the window under it is divided into several sections.

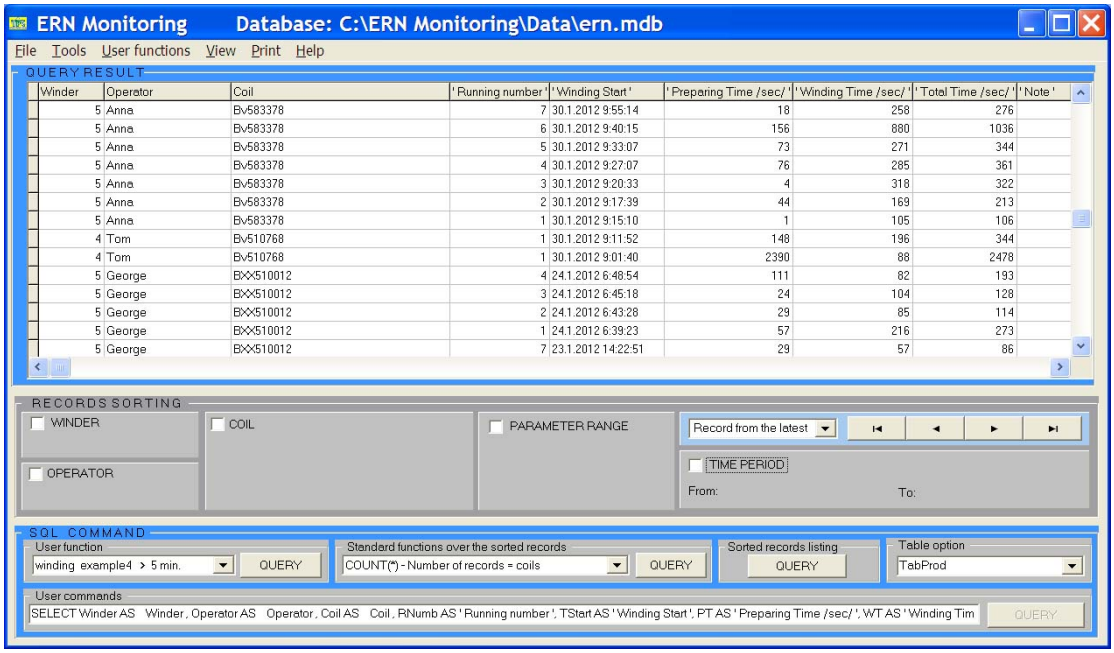
QUERY RESULT – list of records meeting conditions of a query or function
RECORDS SORTING – place for conditions setting for sorting records needed for the next work
SQL COMMAND – place for a particular database query when over the selected record set requested operation is carried out and result is displayed

Working with database

Database opening
In the menu option "File/Open database" open requested database file „ern.mdb" that is usually located in the „\ERN Monitoring\Data\" directory on the C: or D: discs (according to the installation).

All records listing
– set no record sorting condition and click on the QUERY button

If there are some records stored in the database, they are all listed as a query result:



If there is no record on the list the database does not contain any record.

Sorted records listing

As usual there is no need to browse all the records but only some part of them. For the selection it is necessary to set some selection conditions in the section RECORDS SORTING.

E. g. if you only want to see the records on the „BXX510012“ coil the list of these records you can get as follows:

– activate the sorting by the COIL parameter – click on the cheching box „COIL“
– a pull-down menu of all coil names is displayed
– select the requested coil name „BXX510012”
– click on the QUERY button

– in the record list there are only the records devoted to the „BXX510012” coil.

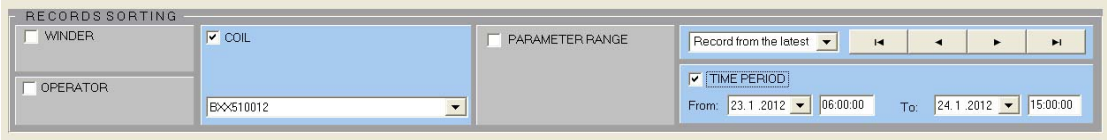
Sorting by the Winder and Operator parameters works in a similar way.

If there are several sorting conditions activated simultaneously the records that meet all the set conditions are listed.

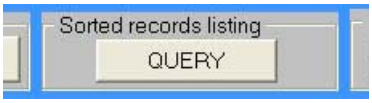
Sorted records listing – time conditions

If you want to get the list of all the coils „BXX510012” having been winded between 23 and 24 of January:

– let the condition for the coil „BXX510012” activated like before
– add the time condition:



– click on the QUERY button



– in the record list there are only the records devoted to the „BXX510012” coil from the requested time interval.

Sorted records listing – range of values

Sometime (e. g. when calculating average time) it is necessary to exclude atypical records which may exist as a result of e. g. failures, operator change, consultations, etc.).

You have to set a tolerable range of values of some parameter.
If you only want to work with the records where the total time of winding (TT) is in the time interval from 3:30 to 5:00 minutes the following condition is to be set:

In such a way the range of the PT, WT, TT parameters and the serial number Rnumb can be defined (by the coil serial number range e. g. you can define to view only the first fifty records of the selected coil).

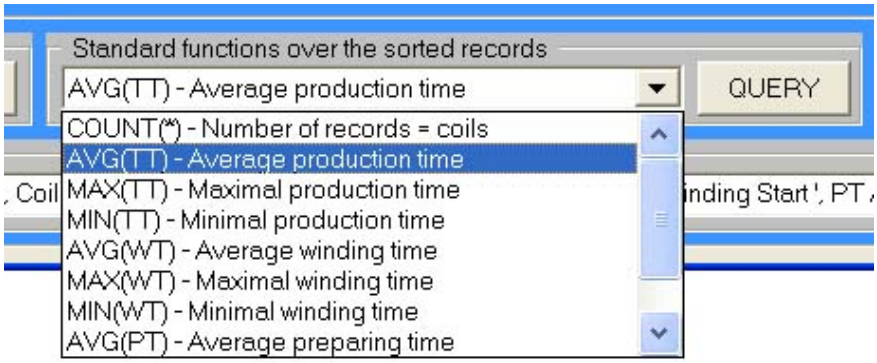
SQL Command

In database systems the records are stored in tables. A single database can contain more tables with a different content. Since there exist many database systems by various software companies as a unification tool the SQL was developed which is applicable to all modern database systems. With help of the SQL in the MonitorERN application a user can make his particular queries. Every query conducted is translated into the SQL and displayed in the "User commands" line box.

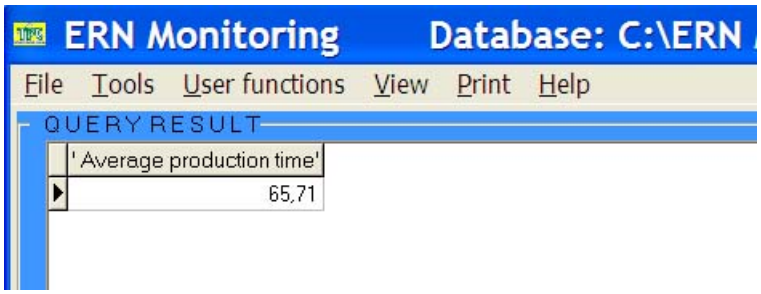
QUERIES:

Sorted records listing – displayed all records meeting set conditions

Standard functions over the sorted records – over the set of records meeting user-defined sorting conditions a function selected by the user from the list is carried out after clicking on the QUERY button:



The query result is displayed as follows:

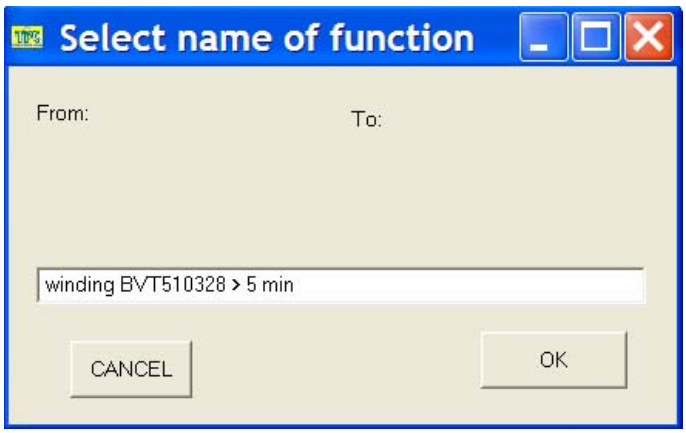


User commands – a user with a knowledge of the SQL can create or modify commands displayed in this line box. User commands performing is usually disabled, it can be enabled in the menu option „View/ Use user commands". If the user

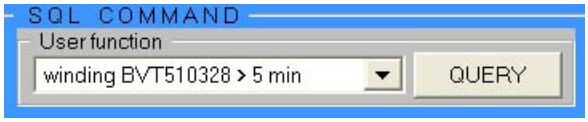
commands option is enabled (checked) the user can edit the SQL command and then make the query.

User functions – a user can save his own functions and utilize them after on. The SQL command entered in the user command line is stored like a function, consequently the last query as well. Users with no knowledge of the SQL can save the last query with the more complex sorting conditions so as not to set them repeatedly. User with some knowledge of the SQL can create his own query, test it and then to save it as a function.

The user function can be added through the menu option „User commands/Add function“. The name of the function can be entered in the window displayed:



You have now added the user function for the coils Priklad4 listing where the winding time exceeded a standard time interval. You can see it immediately in the list of user functions and use it.

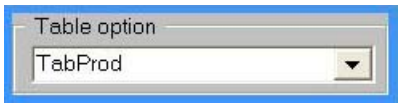


The user functions do not take into consideration conditions set in the section „Records sorting“ because they are meant exactly for user's own conditions setting!

User function can be deleted by selecting it in the list of the functions and deleting through the menu option „User commands/Delete function“.

TABLES

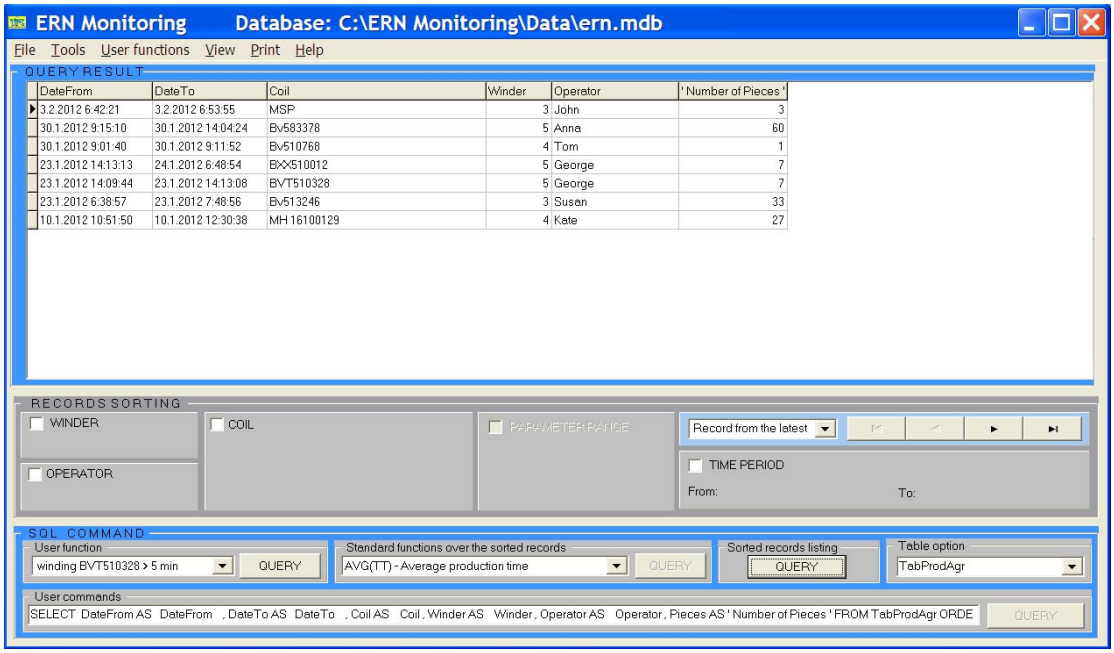
So far we have worked with primal records of the winded coils stored in the TabProd table:



Yet there is a great amount of the primal records. Nevertheless after processing them aggregate tables are created providing not detailed but cumulate survey information.

TabProdAgr Table

The table present coils production in a synoptical way



A new record in this table is created if the Coil, Winder or Operator has changed. Every record contains overall amount of winded pieces of the given coil type and time interval when they have been winded.

In comparison with the work over the primal records of the primal tables there exist some differences:

– time conditions of the records sorting are limited to date setting

– range of values setting has no sense in this table and it is disabled
– similarly the standard functions over the sorted records are disabled
– user functions are enabled; user can create functions for the work over records of this table

MonitorERN Programme Menu

File:

Open – opening of the database file „ern.mdb“ located on any disc or network. You can open backup files or via network database files located on the ERN C winding machines.

Settings – after password entering the form for the programme settings and table/ records management settings is displayed (see ***Settings***)

Tools:

Copy result to clipboard – query result is copied into the clipboard and pasted in other document, e. g. Microsoft Excel spreadsheet.

Time period backup – records of a selected period are saved in the XML file. The records can be left or deleted in the original database file.

Append backup – records from a backup XML file can be appended to the database file. When appending, duplicate records – if existing – are deleted. Through this function the records on the coil production from the individual ERN C winding machine can be added to the central database.

Database backup – all the records form the database file are backed up and the XML file is created.

Database recovery – database recovery from the XML file. The records existing before recovery will be deleted.

Update aggregate tables – all the records are went through, data in the aggregate tables is updated. Use the function after records change, e. g. after backup with records deletion or after database recovery.

User functions:

Add function – user function is added (see ***User functions***)

Delete function – user function is deleted (see ***User functions***)

View:

Detailed listing – enabled/disabled detailed listing

Enable user commands – enabled/disabled ***User commands***

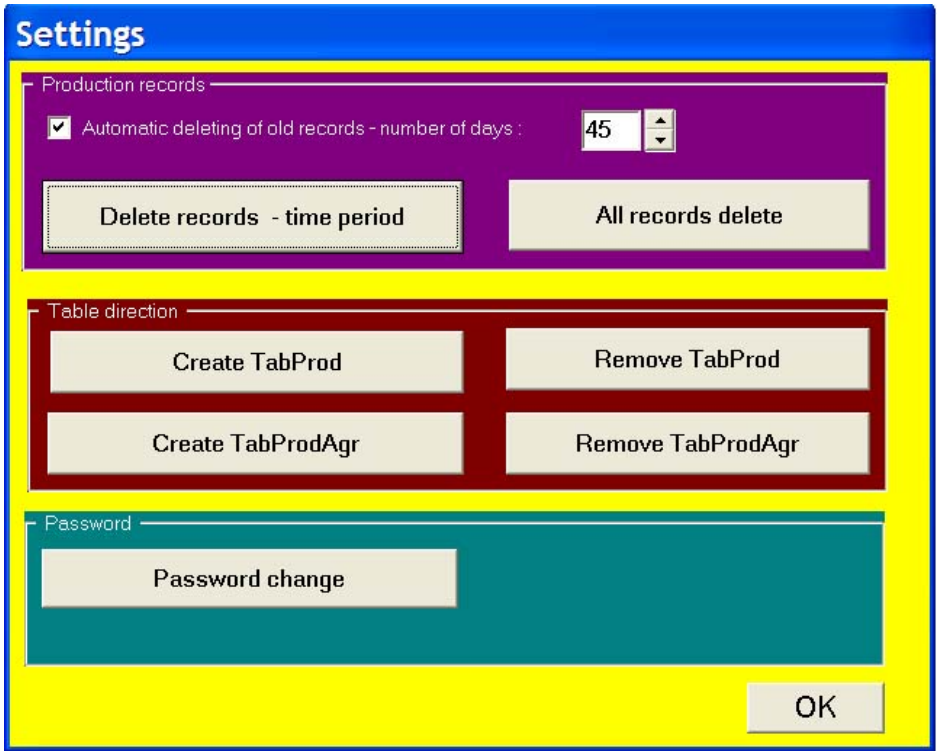
Info – display data on the programme version

Print:
– result printing

Help:
– the programme manual is displayed

Programme settings

You can get to the programme settings through the menu option Open/Settings after password entering (the password at the first opening: 1234).



In a section Production Records deletion of the records can be set up – automatic or manual. After the manual deletion of the records it is recommended to use the function Tools/Update aggregate tables.

In a section Tables Management tables can be deleted or created. Tables deletion is only recommended (in contrast with All records deletion) after the programme re-installation if it does not work correctly. After the Tables deletion it is necessary to Create tables repeatedly otherwise the programme wil not work (there is no table for records storing)!

In a section Password the password is set. It is recommended to change the password for the programme settings after the first opening.