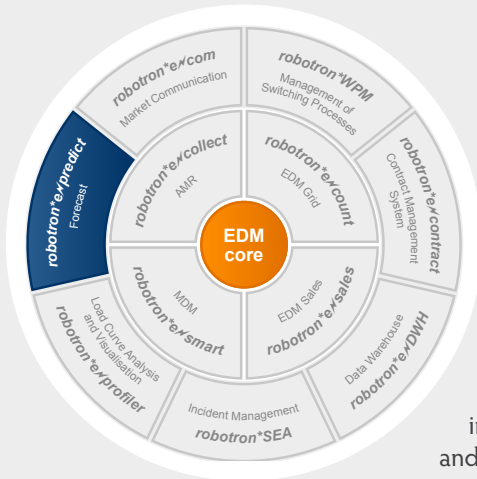


Forecasting Solution for Utilities



Professional forecasting by means of mathematical calculation engines

robotron*e *predict* provides a unique forecasting tool which reaches new standards due to its flexible in application, easy operation, high performance levels as well as highly qualitative forecasting results. The core of the system forms its specifically developed calculation engines and profile libraries. In order to optimally assess the individual requirements for determining forecasting results, special kernels with different mathematical calculation methods can be applied.



Robotron
Energy Market Suite

Integrated vs. standalone

The modern architecture of **robotron*e** *predict* serves as an integrated module for Robotron product suite as well as a standalone forecasting solution.

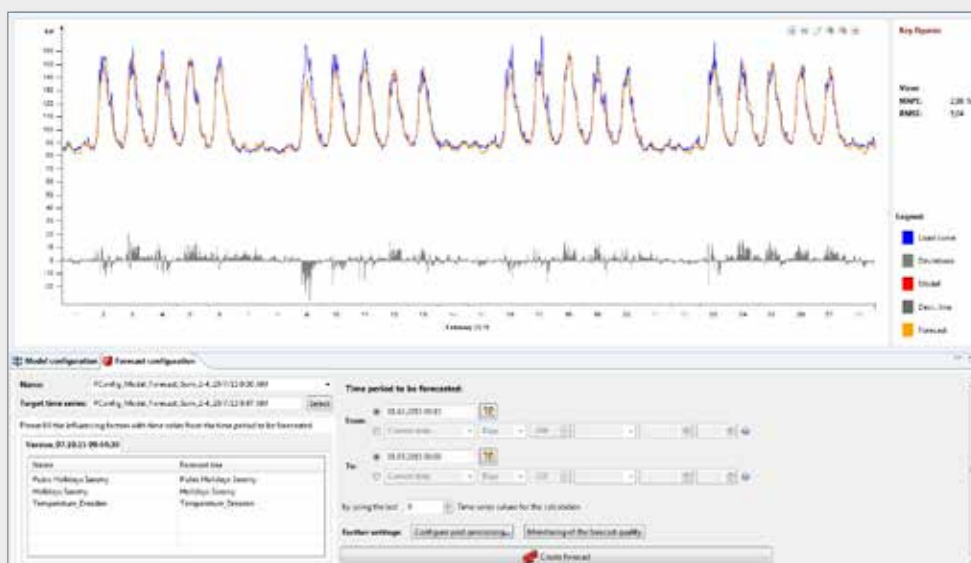
The standalone model operates independent from systems and therefore reaches a wider target group. As a result **robotron*e** *predict* can be operated in a fully automated manner through a forecast automat as part of the Energy Data Management (EDM) system **robotron*e** *count* for grid operators and **robotron*e** *sales* for sales and procurement. Besides, it is possible to run it as a local installation without an existing EDM system. In addition to optimal integration of a database the user will be able to analyze and forecast data flexibly and independent from the location.

robotron*e *predict* at a glance

As a standalone version, **robotron*e** *predict* is installed in 5 minutes and can be run immediately. The user interface has been designed in a clearly structured manner, so that users are able to quickly find their way around the system. The file system provides necessary data by integrating network drives or optionally via interfaces to a database or a Web service. In accordance with this flexibility centrally managed data can be used by various clients. Even historic consumption data provided ad hoc at the customers' site can be analyzed and forecasted.

The desired version will be installed and project-specifically implemented in the system environment and included in the business processes at the customer by Robotron employees in cooperation with the respective IT department.





Reference data

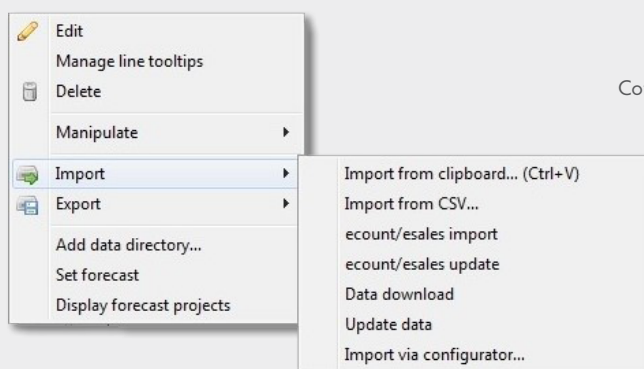
The reference data management of **robotron**e* predict** facilitates storage of different key data that cannot be recorded as time series but have an important effect on advanced data analyses for forecasting purposes. This way, public holiday regions as well as tariffs and associated profiles can be generated and assigned directly to the modeling window (public holidays), lines or customers (public holidays, tariffs) via drag & drop. Furthermore, users are able to generate periodic profiles (e.g. school holidays, variable shift schedules) as well as list profiles (e.g. opening hours, day durations) and assign them to visualized time series for better illustration. The integrated CSV import is a useful tool to enter public holidays and list profiles and in addition allows for generating larger time periods in one step only.

Directories

The program allows for the management of a random number of data directories in which time series data are stored. Data can be accessed at any time as long as the respective directory is available.

Import/export

Depending on the data basis, different options are provided for import of time series to be viewed. The simplest option is to transfer data directly from an opened CSV or Microsoft Excel file using copy and paste. Furthermore, import of CSV files via drag & drop is possible. If a predefined configuration has been stored by means of the integrated import configurator, any other data formats supported by the system (XLS/ XLSX, TXT, LPEX, EBLX) can be imported this way. Data can be loaded from the above listed formats by means of a standard CSV import or the import configurator by opening directories directly from the program. This configurator leaves space for variances with configuration of customer-specific formats.



Context menu import



Once configurations have been stored, they enable a fully automated time-controlled import.

MSCONS, CSV and Microsoft Excel formats are supported when exporting data. Export can be activated manually by using a context menu on the line or on the metering point. However, it is also possible to execute export in an automated manner through intervals using time control. Furthermore, there is the option of graphic analysis to provide individual values as well as complete data of one or more time series via copy & paste for other programs for a certain period of time or to directly save them as a CSV file.

Influencing factors

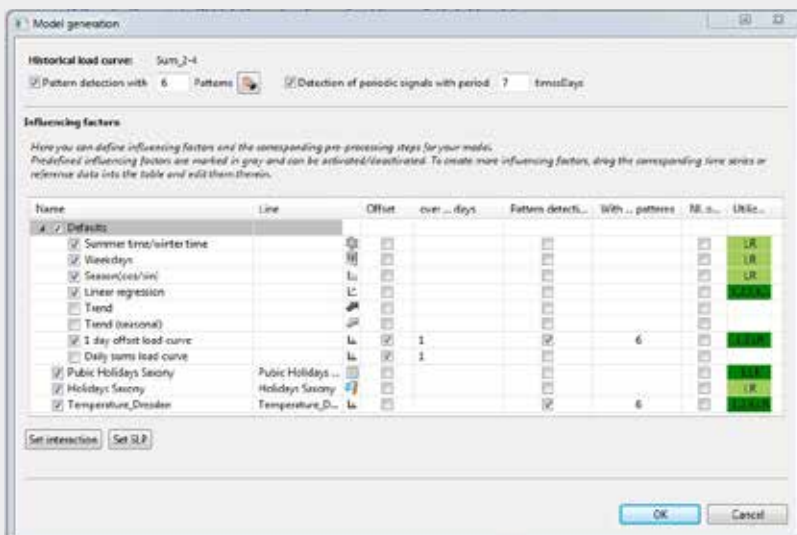
Apart from data-specific pattern recognition and recognition of periodic signals the system independently suggests various influencing factors. Based on experience values, these factors have been chosen as default for a number of application cases. They can be deactivated at any time for the model calculation.

Further influencing factors, such as public holiday calendar, vacation, shift schedules etc., can be created and used independently by the user (see reference data). Even all influence possibilities like weather or temperature data that occur as time series in the system can be integrated as influencing factor into model generation by using drag & drop. Additionally, interactions can be created between factors, which might have an impact on the forecast quality.

Model generation

The program offers a number of setting options to optimize model quality and computing time. The user can choose a suitable period of time by means of a preview function. If necessary settings have been made the model calculation can be started. The result will be displayed within very short computing time.

Further possibilities for optimization are suggested by the system after model generation by using a log. The analysis of key figures allows for the exclusion of non-suitable periods within the modeling period.



Runtime window model generation



Applying the model to the forecasting period

The system offers various forecasting options. The focus lies on separately licensed mathematical methods of non-linear regression and an artificial neuronal network. By default the system includes an optimization via linear regression for preprocessing purposes as well as forecast editing using the ARIMA approach.

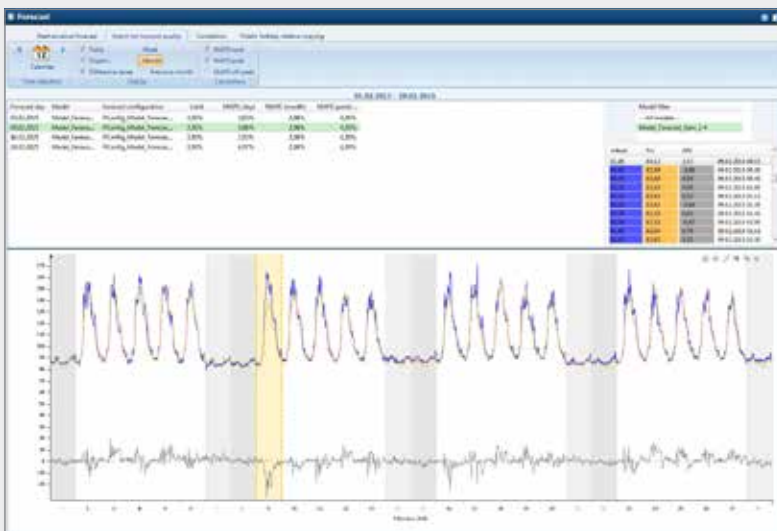
After model generation forecast creation is merely a matter of seconds. It is activated after setting the time period to be forecasted. Optionally forecast quality to be monitored as well as enabling or disabling of the recalculation using the ARIMA approach can be chosen. The forecast is generated for a defined calculation period.

Final inspection

Forecasts result in time series and can be immediately or later compared with historical data by means of different tools. As a result the user is provided with the analysis of different stochastic figures (e.g. RMSE, MAPE and PMAE in a daily, weekly or monthly pattern) as well as a comparison mode to compare with historical data of up to four years. The available results can be further analyzed with separate graphic visualization features.

On the basis of historical values for the forecasted period the user is able to carry out a qualified check of forecast deviations with the so-called watch list. It simplifies optimization of the forecast model and at the same time can be used for comparison purposes of different models for one and the same forecast.

The correlation analysis evaluates relations between time series. A cloud diagram visually represents values of two time series in a correlation. A bar chart represents the correlation of two time series depending on a temporal offset.



Forecast configuration



Public holiday
relative copying

Automated forecasts

The system includes a scheduler service which controls recurring operations and executes them automatically. This time control allows for the execution of a number of forecast jobs as well as for automated data import and export of forecast results.

Long-term forecast

Besides mathematical methods that are mainly used for short and medium-term forecasts, **robotron**e**predict** provides a long-term forecast by means of public holiday-relative copying. It allows for historical load curves to be rolled out to the future using a public holiday region without previous model generation. Energy quantities can be copied from historical values or applied according to individual requirements. The user can make a percentage setting for each time segment used to include time periods with subject to differential weighting. In addition, exclusion days can be defined to further refine forecasting results.

Graphic features

The analysis of time series through different graphic tools is another strength of **robotron**e**predict**. The following visualizing features are integrated:



Analysis (load curve visualization)

Analysis

The load curve visualization is based on yearlong experience of Robotron customers with the application of the successful multi-line display as part of **robotron**e**count** and **e*sales**. This also includes experience with the application of the specifically developed load curve analysis tool **robotron**e**profiler** and resulting requirements. One of the special features is the option to simultaneously visualize and analyze any number of lines. For a better overview the user is able to see up to six different y-axes. The integrated comparison mode provides a view to line contents in different time periods.





This way, for instance, the consumption behavior for comparable months can be monitored across several years.

A statistic function provides a manual or automated calculation of various key figures such as energy, power minimum-maximum etc. for freely selectable time periods, which can be included in the comparison. Besides the list display key figures can be shown as separate visualization.

Day type comparison/profiles

The day type analysis examines the load curve for courses of days of the same type using mathematical methods. All days determined within a certain course tolerance defined by the user are marked with the same color. The resulting graphic distribution helps experienced users to draw conclusions concerning seasonal and other regularly occurring events. In this way forecasting experts are able to determine time periods that are particularly favorable for modeling a mathematical forecast.

Languages

robotrone* / predict** is available in German, English, French, Russian and Turkish as well as with various country-specific settings for number formats.



Display options

Assistance

A number of application video films on different topics enable users to work with the easy-to-handle and innovative user interface.



Help video



Concentrated and secure -
Robotron faces challenges



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