OpenPowerNet

Release Notes Version 1.6.1

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1 Introduction

1.1 Overview

The purpose of this document is to describe the changes and the status of OpenPowerNet version 1.6.1. The document contains:

- o List of delivered files on DVD,
- o Description of the main functionality,
- o Any restrictions known,
- o List of corresponding documentation and
- o Known issues.

1.2 Configuration

See document Installation Instruction version 1.6.1 for required third-party software versions.

1.3 Acronyms and abbreviations

The following abbreviations are used within this document.

Abbreviation	Description
2AC	2 Phase AC
AC	Alternating Current
ATM	Advance Train Module
DC	Direct Current
DVD	Digital Versatile Disk
GUI	Graphical User Interface
ODBC	Open Database Connectivity
PSC	Power Supply Calculation

2 List of files on DVD delivery

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OPN_InstallationInstruction_1.6.1.pdf
OPN_ReleaseNotes_1.6.1.pdf
OPN_UserManual_1.6.0.pdf
OpenPowerNet\my.ini
OpenPowerNet\createUser.bat
OpenPowerNet\OpenPowerNet-1.6.1.zip
OpenTrack\OpenTrack.V_1.8.3.2016-08-30.zip
ThirdPartyPrograms\ required by OpenPowerNet, see Installation Instructions
update\
```

3 Main functionality

OpenPowerNet version 1.6.1 has the following main functionality:

- Calculation of AC, 2AC and DC power supply system,
- Calculation of magnetic coupling of conductors is done internally,
- AC / 2AC power supply models:
  - Transformer,
  - Converter,
  - Auto transformer,
  - Booster transformer,
- DC power supply models:
  - Rectifier/Inverter,
- Energy storage for stabilisation of line voltage and energy saving,
- Voltage limiting device model to limit the touch voltage,
- Calculation of tractive effort with retroactive effect to the railway operation simulator OpenTrack,
- Calculation regenerative braking,
- Consideration of tractive and braking current limitation,
- Consideration of power factor at vehicle pantograph,
- Calculation of electrical engines with single or multiple propulsion systems,
- Division of power consumption for multiple Train Operating Companies,
- Evaluation of engine energy storage,
- Consideration of coasting behaviour of the courses,
- Consideration of changing train mass at station stops,
- Calculation of short circuit currents,
- Quick evaluation of network structure using constant current engine model,
- Visualisation of results using prepared Excel-Files and
- Visualisation of results using the automated analysis of the Analysis Tool generating Excel and PDF files for:
  - Minimum pantograph voltage,
  - Maximum touch voltage,
  - Maximum leakage current,
  - Substation:
    - Feeder current versus time and as TRLPC[1],
    - Busbar voltage versus time,
    - Power (P,Q,S) versus time and as TRLPC for input, output and total (per substation and total of all substations of a network),
    - Power factor versus time,
  - Magnetic Field as flux density (B-field) and field strength (H-field),

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[1] The **T**ime-**R**ated **L**oad **P**eriods **C**urve (TRLPC) shows the maximum or minimum of a set of varying window-size averages where the window time duration is defined by the x-axis value.

- o Conductor and connector current versus time and as TRLPC[1],
- o Voltage versus time and as TRLPC[1],
- o Energy overview,
- o Vehicle specific charts,
- o Vehicle specific overview

4 Changes since version 1.6.0

- General:
  - o Analysis performance improvements.
  - o Minor bugfixes in GUI.
  - o Update of Sentinel HASP runtime environment, see installation instructions.
- Analysis:
  - o Excel 2007 and 2010 will be used in a compatibility mode as some of the latest additions were not possible with these versions. Please upgrade to Excel 2013 or 2016 for best results! This applies particularly to creation of data labels for chart series (more chart series items) and the copyright label (no possibility to disable word wrapping).
  - o Create infrastructure items like stations and infeed positions in single chart series. This leads to less series (limit of 255 per chart) and speeds up output creation. Additionally it is now easier to move the labels around.
    - Note: In Excel compatibility mode (Excel 2007 or 2010) labels have to be created the old-fashioned way, one chart series per marker. This will lead to more chart series objects in the output files than with newer Excel versions, but less than in version 1.6.0.
  - o Output for vehicles, charts: Use line and track ID for legend entry of chainage items (colored lines on y-max) if enabled in preset.
  - o Output for vehicles, charts: Center labels for chainage between axis minimum and maximum so that they are visible for multiple subcharts for limited x-axis.
  - o Output for vehicles, charts: Set default maximum scale of speed axis to 50 km/h at least.
  - o Chart output: Now drawing major and minor tick marks for the chart axes. The previous behaviour (major tick marks only) may be enabled by setting Settings/Excel/PageSetup/@tickMarks to false in preset.
  - o Set Arial font for Excel footer like for the rest of the file.
  - o Set default font for the workbook to prevent scaling issues, especially with Windows 10 version 1607 and default Calibri font.
  - o Set minimum size of markers to 2 to prevent Excel abort.
  - o Presets: Fixed usage of marker size setting, which was taken from the attribute @weight instead of MarkerStyle/@size. Updated the default presets accordingly (all Item elements with @style=marker). Default marker size is 3 (if not given in preset).
  - o Presets: Adjusted parsing order so that general settings from custom preset file (e.g. @defaultTimeScaleMax) are used correctly even with an otherwise empty file.
  - o Bugfix #717, output for magnetic field and inline conductor currents:
    - The position of sections with length of 1 m gets rounded to the "from" slice in Selection Editor, which would lead to incorrect inclusion of the conductors from the previous section.

- o Fixed marker color for Excel compatibility mode.
- o Fixed legend entry for chainage change markers (if enabled in preset).
- o Fixed an error where output creation was aborted if vehicle chart selection contained y-values with mixed autoScale setting in preset.
- o Display a warning if the maximum number of 255 series per Excel chart is reached and continue to create the remaining output.

5 Known restrictions

OpenPowerNet is tested with OpenTrack version 1.8.3 (2016-08-30) and should only be used with this version.

OpenPowerNet is a single user application. It is not tested to use the same database for multiple users at the same time.

6 Version of corresponding documentation

The following table lists the version of the documents related to OpenPowerNet 1.6.1.

Document	Version
Installation Instruction	1.6.1
User Manual	1.6.0

7 Known issues

The following table contains all known but unsolved issues.

ID	Summary	Status
371	When using larger time steps other than 1s, OpenTrack sends the requests not for all courses in the same time raster but OpenPowerNet is designed to calculate always in the same time raster. Workaround 1: Use always 1s simulation time steps. Workaround 2: Set all times within OpenTrack in the raster according to the selected simulation time step, e.g. for 3s time step only time hh:mm:00, hh:mm:03, hh:mm:06 ….. The simulation will be terminated by OpenPowerNet in case of OpenTrack requests outside of the time raster.	Can't be solved.
458	The information of split, merged and connected courses is not available in OpenPowerNet. Therefore the engine energy storage of an engine will be reset to the initial values even if the new course is connected with the previous course and the two courses represent the same physical train.	Open
582	Creation of magnetic field image needs the desired character set to be used for output set as system locale as Matlab plot functions do not handle unicode characters.	Open
op1502	Number of chart series in Excel is limited to 255 only. Therefore the number of charts in ALL Engine Chart Types is very limited and may be exceeded by the selection.	Open

	Workaround: To reduce the number of chart series the selected infrastructure items shall be reduced as much as possible.	