PLANT VIEW REPORT GENERATOR

Version 2.1

REPORT GENERATOR

CONTENTS

Introduction

Report Generator (REPORT.EXE) provides you with a suite of tools to create report templates and to generate production report on database and/or on printer.

The same application has a double functionality: it can act as an Editor (edit mode) and as an Executor (run mode), allowing the designer to create report templates with a wide opportunity of choice among different settings in edit mode and to test or execute them immediately, simply switching to run mode.

Report Generator has access to a group of variables (so called "Tags" or "Items") representing the field values. This variables group is defined as Report Generator Address Space and is a subset of OPC Servers address space. The application has an integrated Data and DataLogger management system, that is it can manage data directly acquired from one or more OPC Servers, or store them in some "data accumulators", the DataLoggers, to execute statistical calculation on specified time periods.

The Report Generator provides two different kinds of document template:

- Standard Report (file with ".REP" extension), can include the values of specified variables and some statistical calculations at the moment of the report generation.
- Historical Report, (file with ".HIS" extension) allows to generate partial reports (time based or event based) , each one will cause the creation of a line in a specific document area, and a global final report, according to the designer settings. This kind of report can include several pages.

The reports activation can be on time, that is the report is triggered at a specified date and time, or on event, namely when a specified variable reaches a certain value (usually a digital value, 1 or 0).

System architecture

After installation, the fundamental application files will be present on the workstation. Some default folder have been defined:

- Database Folder, where configuration database (**ReportOPC.mdb**) is stored.
- Workspace Folder, where report template files (.rep and .his) and workspace files (.rvs) are stored.
- Archive Folder, where DataLogger files (.csv) are stored and where the production report results database, **PvReport.mdb** is created. Please refers to "Data Logger" Menu for details.

The *File/Properties* menu allows to configure these folders and some other application parameters.

Please find below a list of main application files. In brackets, you can find a reference to this manual sections where a detailed explanation of the specific subject is given.

❖ **Report.exe**, executable file for editing and runtime.

❖ **ReportOPC.mdb**, the Access database where all configuration data are stored. It includes the following tables:
- *RepAnag*   the list of Report Generator Address Space Tags, including Tag name, datatype, OPC server and group name, acquisition frequency, DataLogger associated. (*Dynamic/Browser Server menu*)
- *OPCServers*   the list of OPC server supplying data to the application
- *OPCGroup*   the list of OPC group and related update time
- *GroupTemplate* the list of predefined OPC group
- *OPCItems*   the list of OPC Tags, with OPC server and OPC group they belong to.
- *Shifts*   the list of user defined production shifts, used as time base for statistical calculation *(DataLogger/Shift menu)*
- *Messages*   the list of user defined string messages, corresponding to some variables values *(Dynamic/File Message menu)*
- *MSGGroups*   the list of user defined message groups *(Dynamic/File Message menu)*

❖ **PVReport.mdb**   If it has been selected to store report data to database, each time a report is generated a line is added to a table called like the corresponding report template file. If the table does not exist, it is automatically created.

NOTE:
The REPORT.EXE executable, as mentioned above, acts as an Editor, to create and configure report templates, and as an executor, acquiring data and generating reports.
After the installation, the Report Generator folder is created on the desktop and it contains the two shortcuts to the same Report.exe file: Report Editor and Report Runtime.

They allow the user to run the program in edit mode or run mode, depending only on the shortcut properties. If the shortcut properties are set as in fig.1 (corresponding to "reprun" shortcut), that is the command line contains the executable file complete path including a workspace name (see *File/LoadWorkspace* menu below) after the program name, the application will start in run mode.
If the command line contains the "/Edit" option as in fig.2 (corresponding to "repedit" shortcut), REPORT.EXE will start in edit mode.
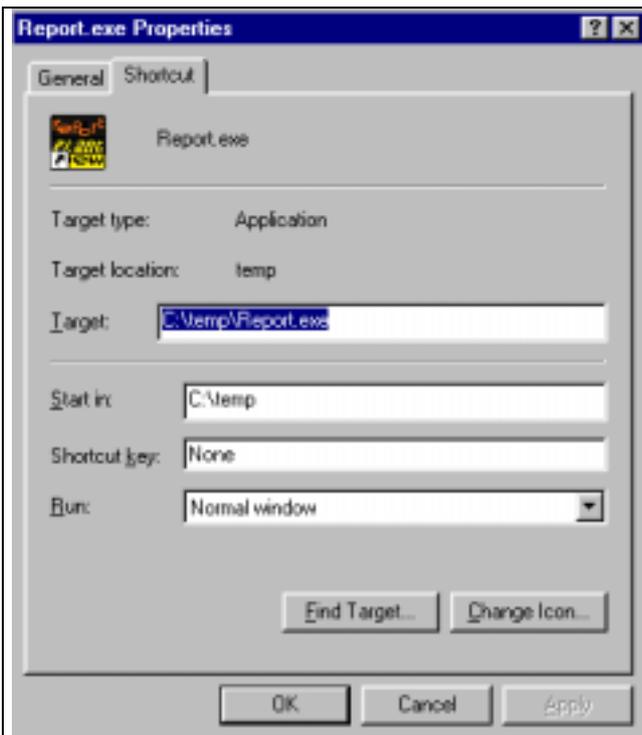

|	
fig.1 Example of properties setting to run REPORT.EXE in run mode.	*fig. 2: Example of properties setting to run REPORT.EXE in Edit mode.*
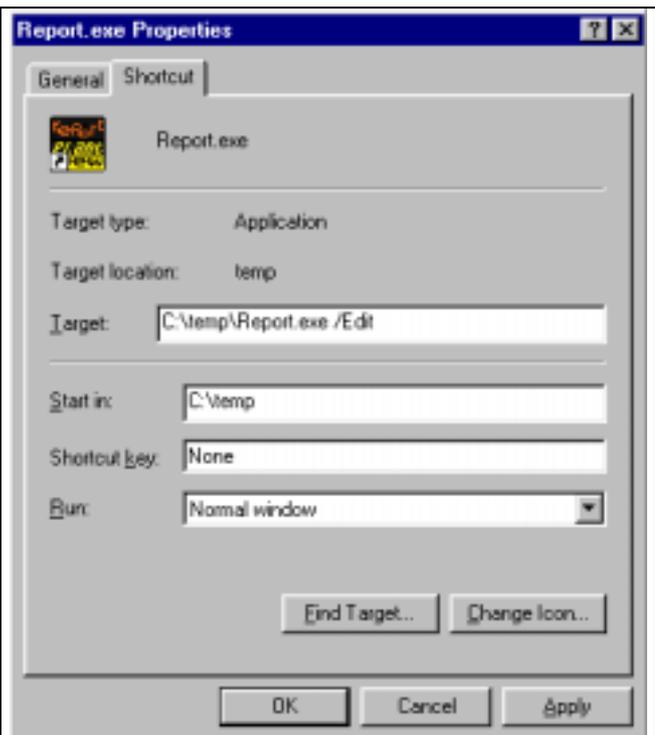
REPORT EDITOR

Report template design: the editing menus

To create a new report template or modifying an existing one, let start REPORT:EXE in Edit mode. The fig.3 windows will appear:
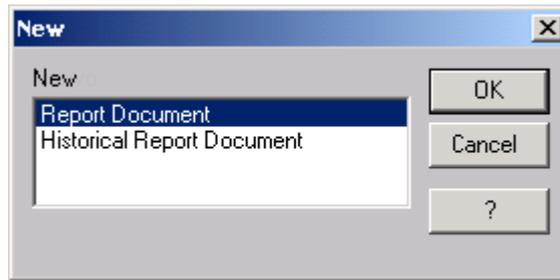

fig. 3: REPORT.EXE starting dialog

The "New" dialog box allows to select what kind of new document will be created, Standard or Historical. Choosing Report Document, a new empty document will be displayed in a new window, like in fig.4:
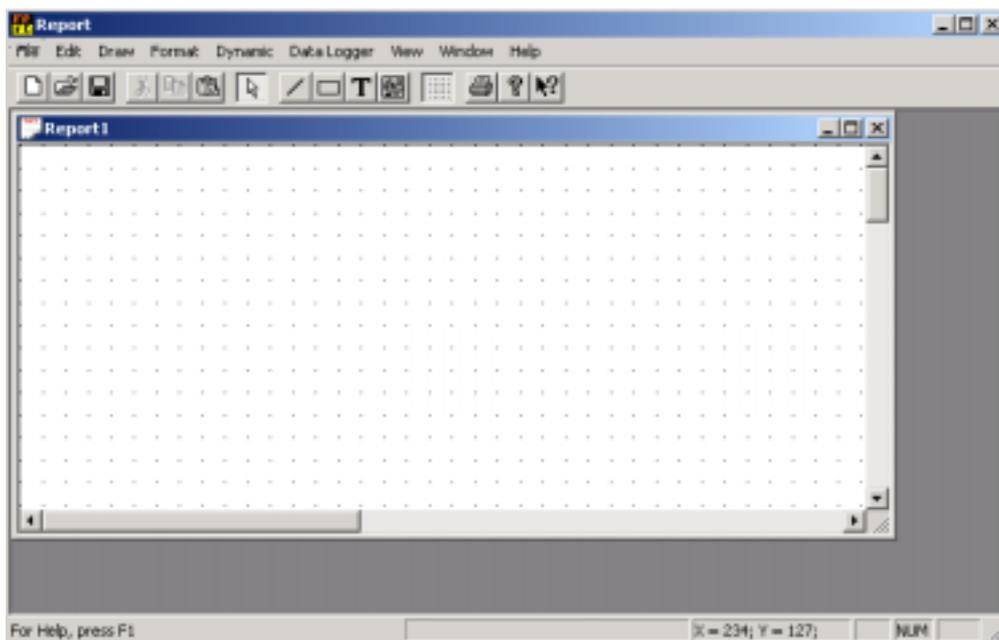

fig. 4: New report

The application main window contains some menus and a toolbar whose functions will be described in the following sections. Since the application is multidocument, more report template windows can be opened at once and can be grouped in a "Workspace", namely a group of reports active at the same time.

To compose a report template some static elements can be added to the empty area, such as an header, a footer, a legenda, some graphical objects and so on, using the "Draw" menu or the corresponding Toolbar buttons. These elements will appear unchanged in the final print, while the dynamic elements, such as numeric field or string field,

will be updated at runtime by the server with the actual values of the tags to which these elements have been associated. The dynamic behavior can be assigned to a text through the "Dynamic" menu functions.

Then a report activation condition, on time or on event, should be set, to define when the report will be generated. To test the new report template, press F5 (or select *Dynamic/Enter Run Mode* menu) to start the OPC servers and switch to run mode. To generate immediately a test report, select *Dynamic/Activate Report*.

A sample report template is illustrated in fig.5. In red, the dynamic elements.
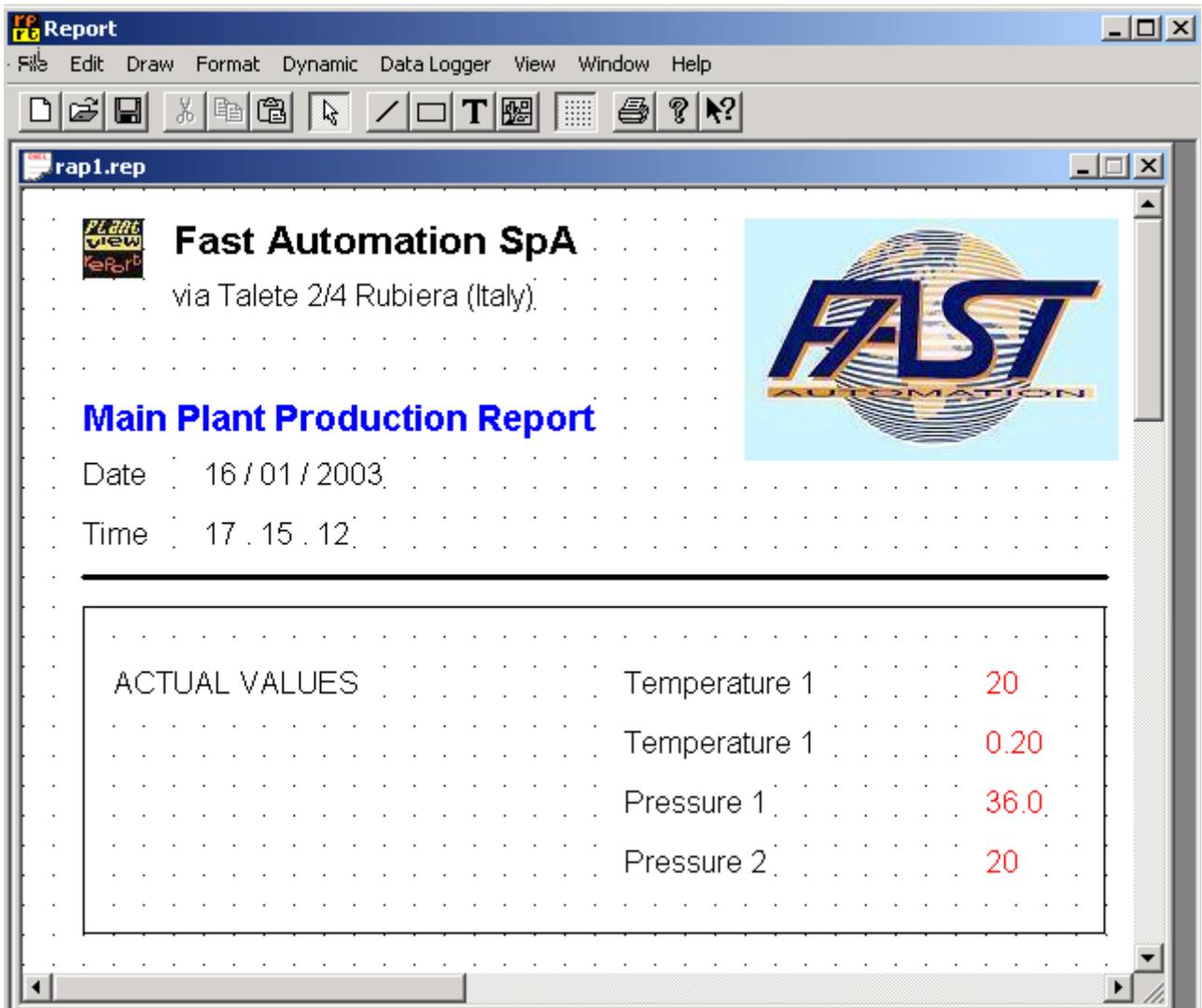

fig. 5 Report Example

The following section will be dedicated to a detailed menus explanation.

Editor menus and toolbar

This User manual section refers to menu items. When a menu item has a corresponding button in the toolbar, we will refer to it through fig.6 numbering.

fig. 6: Editor toolbar

The menu items described below will be present only when one or more report template window is opened. If there is no open document, only a reduced menu item subset will be available.

The"File" Menu

As in any Windows-like application, The "File" menu items allows to open, close and save document files.
As explained above, the Report Generator documents are the Standard or Historical reports, eventually collected in workspaces.

File - New (*fig. 6 - # 1*)   **Ctrl+N**
Shows the dialog box represented in fig.3, where the designer can select what kind of new report template to create. Choosing Report Document option, a new blank window will be loaded, with default name "ReportN" where "N" is a number in the 1-99 range (see fig.4). In this empty document texts and graphical elements will be inserted to setup the report template (see "Draw" menu).

Choosing Historical Report Document instead, make the dialog box in fig.7 appear:
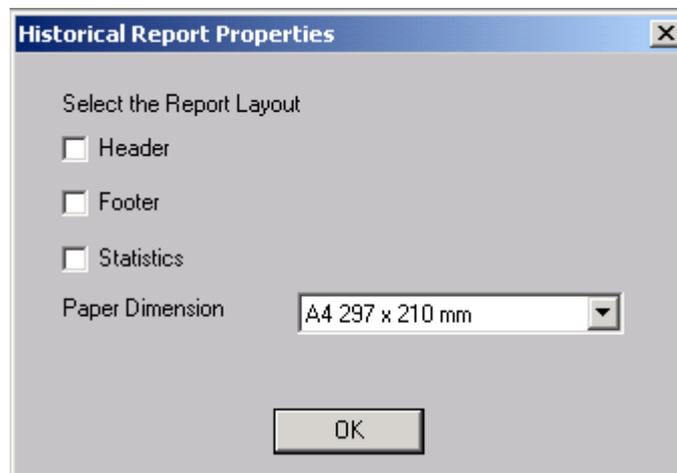
fig.7: choice of Historical report layout

A new Historical Report, unlike standard reports, is not a simple blank document, but can include one or more specific areas, according to the options selected in Historical Report Properties dialog box. Moreover, a combo box allows to select the sheets format, valid for screen representation and printing.
Selecting all the three option, a new window with the title "Historical Report 1" will be open, where the following areas can be distinguished (see fig.8)
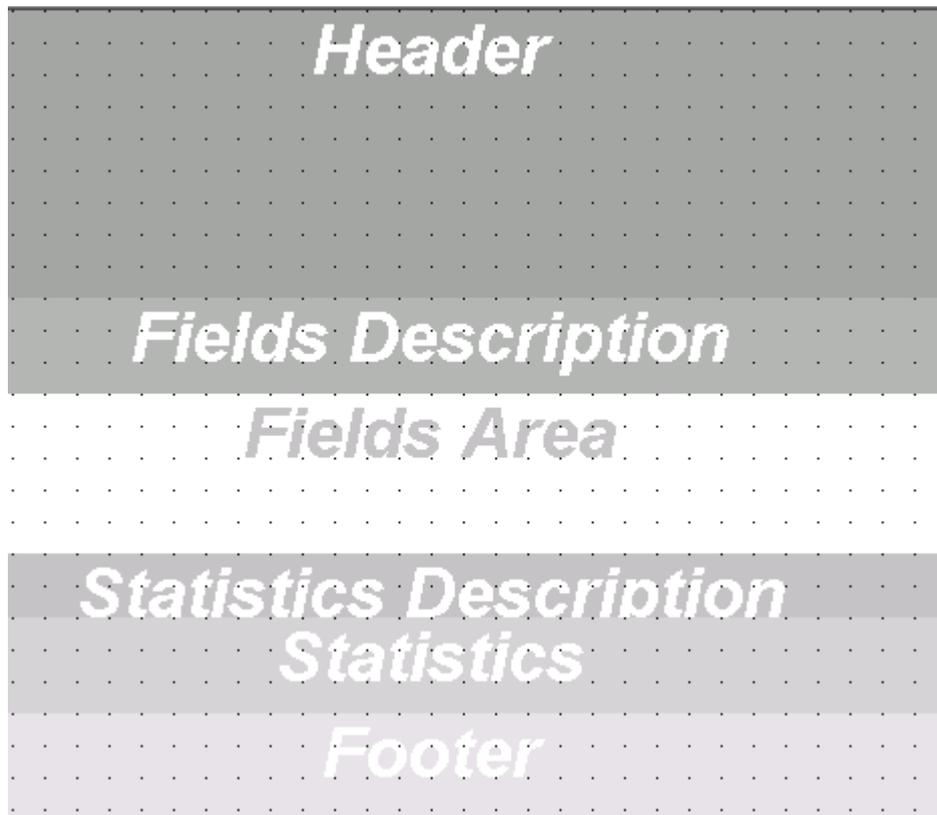
fig.8: Historical Report Layout

Header: place here the general heading elements, such as a title, the company or plant name, date and time placeholders, logos, etc.

Field description: insert here the column headers for data that the application will update in the Field Area, adding a line each time a partial report will be generated, i.e.

Date Time Temp1 Temp2 Press1 Press2

Field Area: place here the text fields that will be associated to a Tag or a DataLogger. These objects will have a dynamic behavior, that is their values will be updated by the OPC server when the report generation (partial or final) is triggered.

Statistic description: like in Field description area, insert here the column headers for data that the application will update in Statistic area

Statistic: nothing should be placed in this area by the designer: at the final report activation, the application itself will place here the results of statistic calculations according to Statistics settings (see "Dynamic" menu for further details)

Footer : place here some footer elements such as page numbering, report info and so on.

For a detailed description of graphical object insertion and dynamic behavior attribution please refers to "Draw menu" and "Dynamics menu" sections further on in this manual.

File - Open... *(fig. 6 - # 2)*   **Ctrl+O**
The Open command loads an existing report template after asking the user for the file name.

File - Close
Closes the active window and the related report template file. If it has been modified since the last time it was opened or saved, the user will be asked to save it before closing.

File - Save *(fig. 6 - # 3)*   **Ctrl+S**
Saves the current active document. If the template file has already a name, it will be saved with this name. If the file still has the default name, the user will be asked to give it a different name.

File - Save As...

Saves the current active document asking the user for a new name. This command can be used to copy a report template.

File - Load Workspace...

The application asks a workspace name (file with ".RWS" extension) and loads all the report templates saved in this workspace through the *File-Save Workspace...* menu

File - Save Workspace...

Saves in a workspace file (".RWS") the names of all currently opened report templates, creating a reports group that can be loaded at once through the *File - Load Workspace..* menu. Workspaces are useful to manage a reports group, i.e. to avoid opening the single report one by one.

The main purpose of using workspaces is to load automatically a report group while running REPORT.EXE in run mode, so that all those reports will be automatically active.

NOTE: if a report template still has the default name "ReportN" it will not be included in the workspace.

File - Print... *(fig. 6 - # 13)*   **Ctrl+P**

Prints the currently active report.

File - Print Preview

Shows the current report template in a print preview window, like this
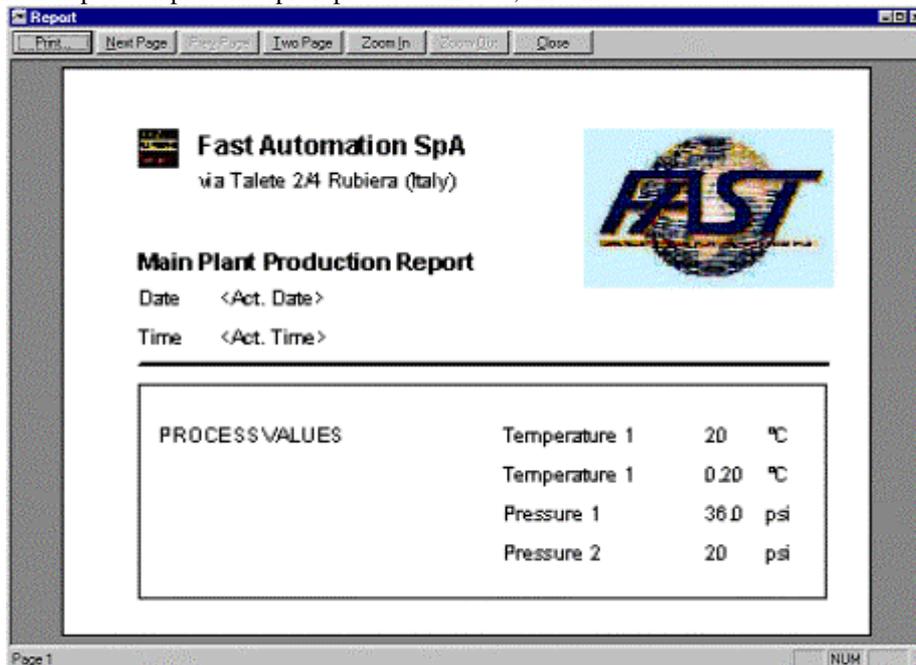
fig. 9: Print Preview window

To print, select "Print" button. To go back, select "Close" button

File - Print Setup...

Loads the Print Setup dialog box where the print options can be set.

File - Properties...

This menu item is password protected

This menu command makes the fig.10 dialog windows appear, where some general application parameters can be set:
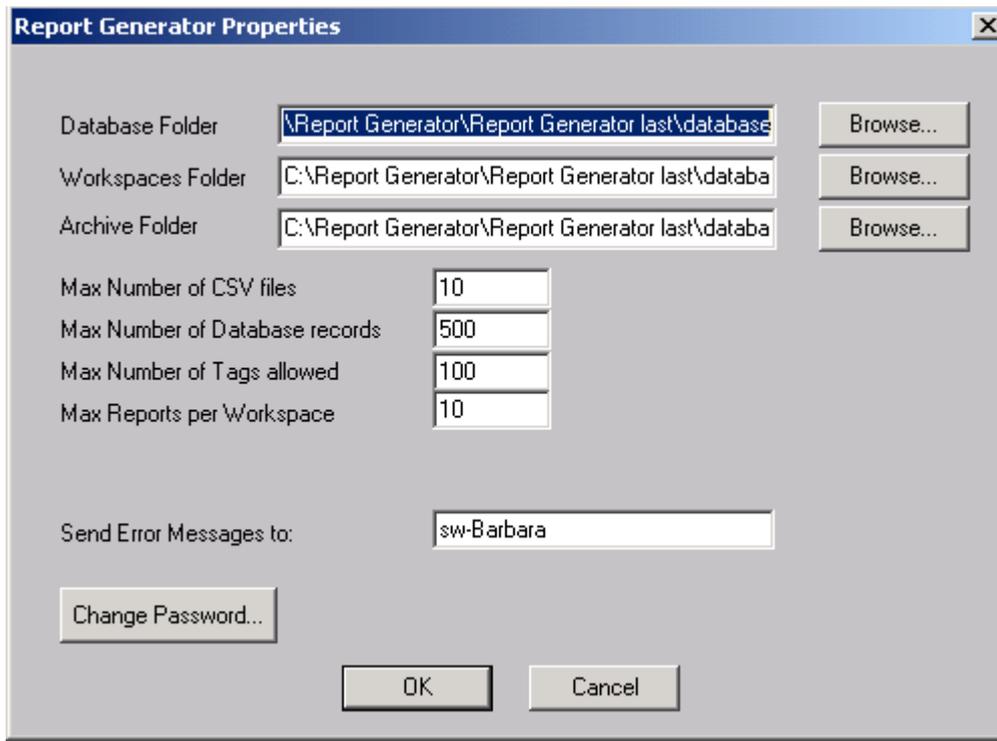
fig. 10: Report generator properties

Database Folder: the directory that contains the ReportOPC.mdb database, including general application info such as Report Generator Address Space Tags list, OPC server and OPC groups data, and the PVReport.mdb database, where generated report production data are stored.

Workspace Folder: the directory where the report template files (.rep and .his) and workspace files (.rws) are saved.

Archive Folder: the directory where the DataLogger accumulated values files are saved. These files are named as [DataLoggerName]_[Number].csv. The extension "csv" stands for Comma Separated Values and these files are text-like files, where each line contains date, time and value, separated by a comma. These files can be opened with spreadsheet programs like Microsoft Excel.

Max Number of CSV files: the maximum number of csv files for each DataLogger. For each DataLogger some [DataLoggerName]_[Number].csv files are created, starting from Number = 1 to Number = Max Number of CSV files. When all these files are filled, the numeration will restart from the beginning and the oldest files will be deleted.

Max Number of Database records: the maximum number of records stored in each table in PVReport.mdb database.

Max Number of Tags allowed: the maximum number of variables that can be included in the Report Generator Address Space

Max Reports per Workspace: the maximum number of reports that can be aggregated in the same workspace.

Send Error Messages to: if an OPC server has some connection or communication problems, the application will send an advise message to the network workstation whose name is specified here.

Change password: to access this menu voice (File – Properties) and the Tools - Database maintenance menu item, a password is required for safety reasons. After the installation, no password is set and there is free access to all menu voices. Using the Change Password command a password can be set and it will be required to access the specified menus. Once you set the password, do not forget it!

File - Recent File
The list containing more recently used files with ".REP" or ".HIS" extension. Choosing one file from the list, it will be loaded.

File - Exit

Closes all the open windows and ends session. If some report templates have been modified the user will be reminded to save them before closing.

The "Edit" Menu

Edit - Copy *(fig.6 - # 5)* **Ctrl+C**
Copies the selected objects to the clipboard.

Edit - Paste *(fig.6 - # 6)* **Ctrl+V**
Paste into the report area the objects currently present on the clipboard.

Edit - Cut *(fig.6 - # 4)* **Ctrl+X**
Copies the selected objects to the clipboard, removing them from the screen.

Edit - Bring to Front
Brings the selected objects in front with respect to all other report objects.

Edit - Send to Back
Sends the selected objects behind all other report objects.

The "Draw" Menu

The Draw menu includes commands to select graphic tools in order to add graphics objects or texts to the report.

Draw - Pointer *(fig. 6 - # 7)*
Choosing the pointer tool, we can select some existing objects in order to delete, move or modify them, or to assign them a dynamic behavior through the *Dynamic* menu commands.

To select an object, just click on it with the mouse left button. To make a multiple selection, keep the Shift key pressed and click on the objects to be selected. It is also possible to select a group of objects in a rectangular area, keeping the mouse left button down while dragging it along the rectangle diagonal: all the object completely included in this area will result selected.

If an object already has a dynamic behavior assigned, double clicking on it while the pointer tool is selected will make the dynamic properties setting dialog box appear (see *Dynamic* menu).

To resize an existing object such as a line, a rectangle or a picture, select it and drag the handles surrounding it.

Draw - Line *(fig. 6 - # 8)*
With the Line tool selected, some lines can be drawn in the report.

Draw - Rectangle *(fig. 6 - # 9)*
With the Rectangle tool selected a rectangle object can be drawn keeping the mouse left button down while dragging it along the rectangle diagonal.

Draw - Text *(fig. 6 - # 10)*
When the Text tool is selected, some texts can be included in the report. To write a text, just click on the report area and type it. To end typing, click anywhere outside the text or press the Enter key.
Please note: it is necessary to end typing before choosing any other menu command.
An existing text can be modified selecting the Text tool and clicking on the text area, at the position where it should be edited (a caret will appear): type the new character to be inserted or the **Backspace** key to delete one.

Draw - Picture... *(fig. 6 - # 11)*

This tool allows to insert a bitmap or jpeg image in the report. Selecting this menu command, a dialog box is shown where the designer can select the file containing the image.

Draw – Others

This option allows to insert some placeholders in the report area, as shown in fig.11, whose value will be automatically updated when the report generation is triggered. To insert them, just select the corresponding menu command and click on the report where the placeholder should be placed.
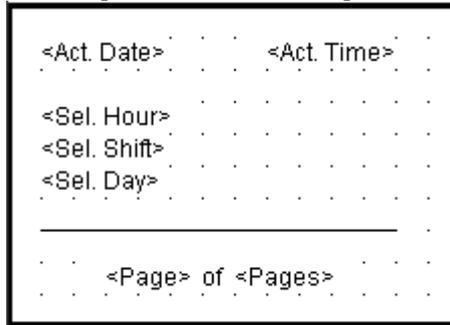

fig.11: Placeholders

Draw – Others – Date / Draw – Others – Time

These placeholders are automatically updated with the date and time when the report is generated.

Draw – Others – Selected Hour
Draw – Others – Selected Shift
Draw – Others – Selected Day

To be active, these placeholders need to be connected to a DataLogger through the **Draw – Others – Connect** menu command. If the DataLogger is related to a recent production Hour/Shift/Day, as set in DataLogger Input dialog box, this will be written when the report is generated at the corresponding placeholder position.
Let see an example: suppose to have in a report the following texts (in red, the placeholder and the DataLogger). The DataLogger statistics refers to shift 2, as set in DataLogger Input dialog.

fig.12: Placeholder and DataLogger

Now connect the placeholder to the DataLogger, selecting both object and choosing the **Draw – Others – Connect** menu command: a message like in fig.13 appears:


fig.13: Placeholder and DataLogger connection

At runtime, when the report is generated, the placeholder will be updated and fig.12 text will appear like this:

fig.14: Placeholder and DataLogger updating

Draw – Others – Page / Draw – Others – Pages (available for Historical Report only)
These placeholders are useful in multipages documents only (Historical reports). They will be respectively updated with current page and total pages number (see fig. 11 as an example).

Draw - Grid Settings...
Shows a dialog box where the designer can select if report objects should be aligned with the grid and the horizontal and vertical spacing between the grid lines.
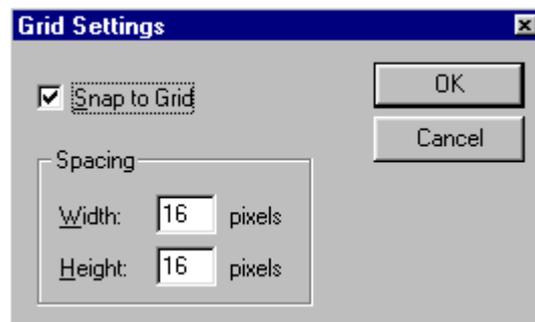

fig.15: Grid Settings dialog

Draw - Snap to Grid *(fig. 6 - # 11)*
If checked, forces report objects to be aligned with the shown grid. If not, the grid disappears and objects can be placed anywhere in the report window.

Draw - Sort Items...
As we will see later, if the report data should be saved in a database, each report will generate a database record whose fields assume the values of dynamic objects included in the report template. Usually, these fields will be inserted in the database in the same order they have on the screen. This is not always wanted.
With this menu command, we can tell the program to order the items by row or by column, considering the horizontal or vertical position of texts on the screen.
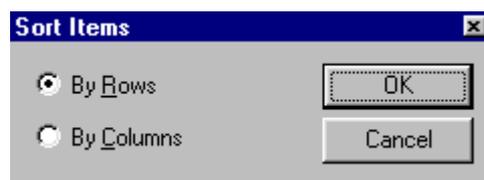

fig. 16: Sort Items dialog

Let illustrate it with an example: if we have a 3 X 3 dynamic items rectangle like this:

Itm_1	Itm_2	Itm_3
Itm_4	Itm_5	Itm_6
Itm_7	Itm_8	Itm_9

Ordering by rows, we will get the record

Itm_1 Itm_2 Itm_3 Itm_4 Itm_5 Itm_6 Itm_7 Itm_8 Itm_9

Ordering by columns, we will get the record

Itm_1   Itm_4   Itm_7   Itm_2   Itm_5   Itm_8   Itm_3   Itm_6   Itm_9

Since the item ordering is based on the space location of the text items, it is very important they are well aligned in rows and columns before executing the sort operation. For that reason it is strongly recommended to use the grid while editing the report template.

The "Format" Menu

These menu commands allow to set some object properties like text font and color, line size and style and so on. If one or more objects are selected, the properties will be applied to the selected objects only. If no object is selected, the chosen properties will become the default for future editing.

Format - Font...
Shows a dialog that allows to set the text font and color of the selected text/s.
Format – Text Alignment
Allows to set right or left alignment of selected text/s. Since at the creation the area the text occupies is equal to his extension, this option has no effect on static texts, it is useful instead for dynamics texts. The alignment will be effective when the text field will be updated by the OPC Server.
Format – Text Orientation
Allows to select text orientation, horizontal or vertical.
Format – Line Size and Style
Allows to set thickness and style (solid, dotted, dashed, etc.) for selected lines and selected rectangles border. The style is applicable only if line size is zero.
Format – Line Color
Allows to set selected lines and selected rectangles border color.

The "Dynamic" Menu and the "Tools" menu

This menu commands provide the most important functions of the application, allowing to transform a simple graphic and text page in a powerful dynamic object. Through this menu, static texts on the report template can be connected with the field and made dynamic.

First of all, browsing local or remote OPC servers address space (see Tools - Browse server menu), a group of variables can be selected: they will constitute the Report Generator Address Space, that is the Tags database.

Then, a specific dynamic behavior is assigned to report text objects, connecting them to the database Tags or DataLogger. At runtime the OPC servers will keep these dynamic objects updated with the related Tag actual value or with the result of a statistic calculation on accumulated data (DataLogger). Finally, at the time of report execution these values will be saved on database or printed.

Tools – Browse Server

Choosing this menu command the following window appears:
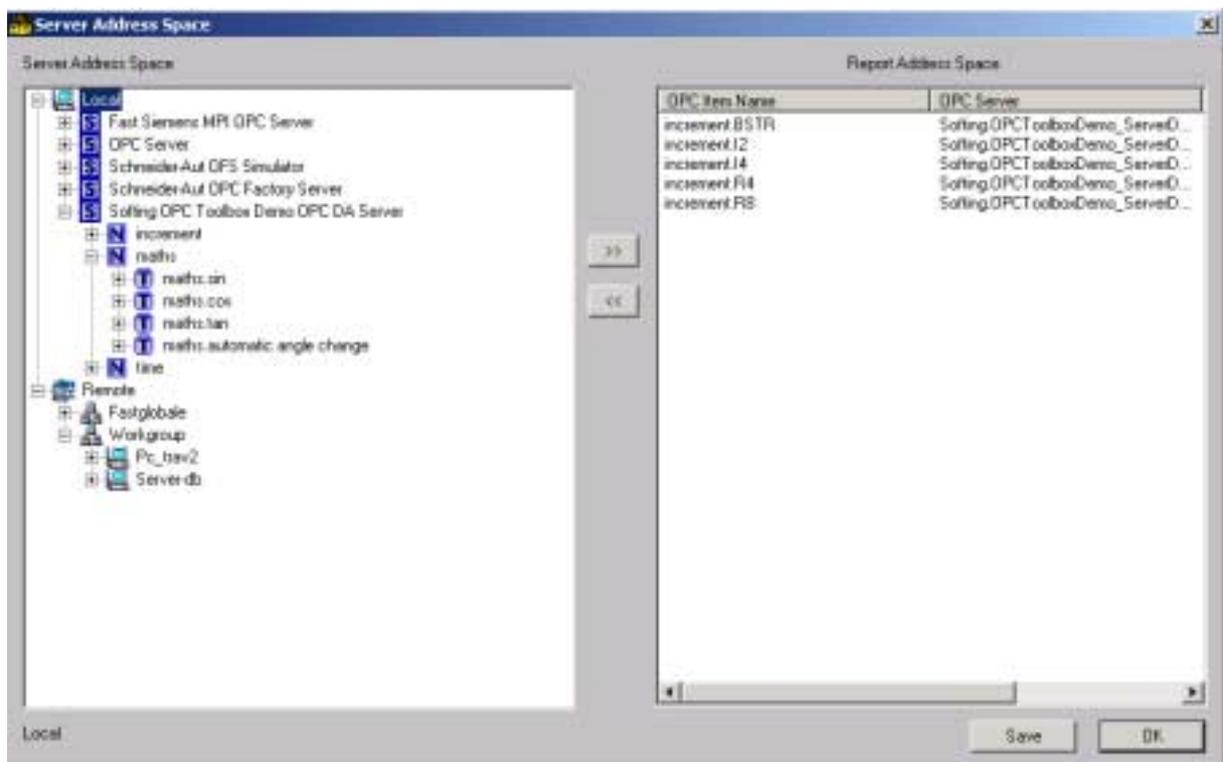
fig. 17: Browse Server dialog

In the left area, a tree view shows two main items, Local and Remote, that refer to local workstation (where the application is running) and to the list of workstation belonging to local area network. Selecting one of the listed workstations (local or remote), the tree view will show the list of OPC servers installed on it (if any).

The list can be expanded down to the single Tags included in the selected OPC server address space: they can be added to or removed from the Report Generator address space (right area) through the central arrow buttons.

NOTE: the data types supported by Report Generator, according to OPC specifications are:

VT_BSTR	String value
VT_BOOL	Boolean value

VT_I2	signed 16 bit value
VT_I4	signed 32 bit value
VT_R4	Float 32 bit value
VT_R8	Double 64 bit value

In the right area we will eventually get the list of the variables that will constitute the Tags database: it will be saved by the Save button in the RepAnag table of ReportOPC database.

Dynamic - Report Activation...
Choosing this menu command the dialog on fig.18 will be shown. Through this dialog we can set how to trigger the activation of the active window report. By *Activation* we mean to start sampling the values of Tags or DataLogger included in the report template and to send these values to a printer or store them in a database.
The activation can be triggered **by event**, that is when the value of a predefined variable changes, or **scheduled,** for instance every hour, shift, day and so on, or both
Let see in details:
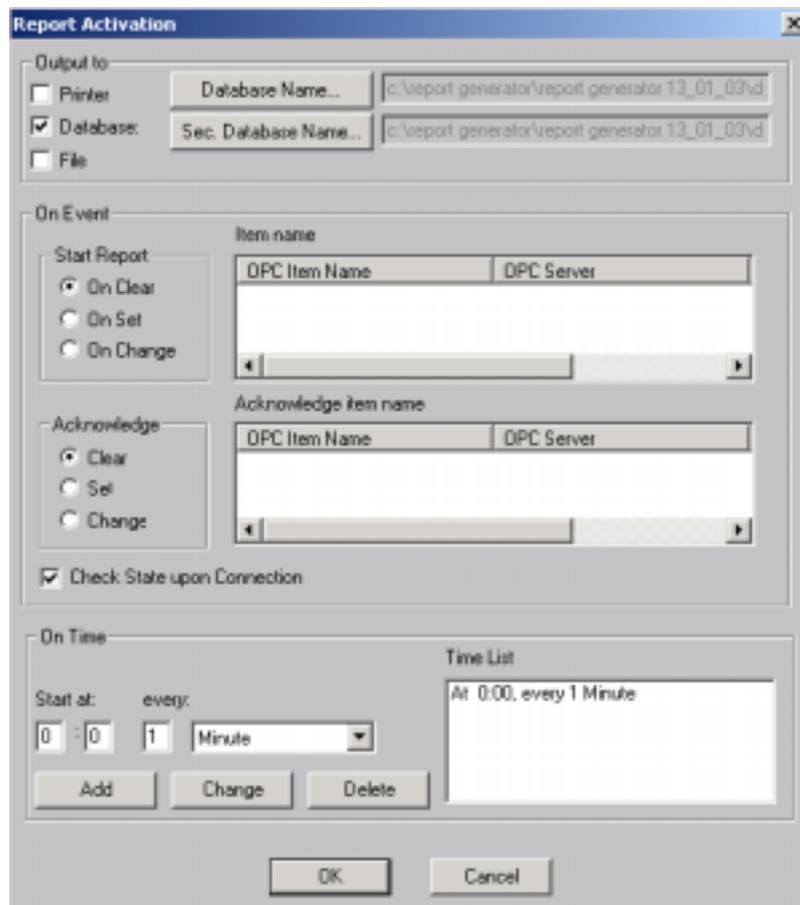
fig. 18: Report Activation dialog

Referring to fig.18 please find below a detailed explanation of Report Activation dialog items:
Output to
    Printer
    When the report is activated, the output is sent to the Windows default printer, as set by the *File/Print setup* menu.
    All static items (lines, rectangles, texts, etc.) will be printed as shown on screen in the report template.
    The dynamic items instead will be updated by their present value, that will replace the corresponding placeholder in the printed document.

Database

When the report is activated, the present value of all dynamic items is updated and saved in a new record in the database file specified in the text boxes, as shown in the upper right area in Report activation dialog (see next section)

In details, each new report will create a new database record, whose fields will be named according to what specified as Database Field Name for each dynamic object (see *Dynamic* menu for detailed explanation). These fields will be added to database in the same order as they are inserted in the report template, unless the *Draw - Sort Items...* menu has been used.

Database Name
Sec. Database Name

Clicking these buttons we can select the main and backup path where report database will be stored.

The primary file will be used till the folder it resides on is not full and till it exists. Otherwise the secondary file is used. Often, a net folder is used for the primary file and a local folder for the secondary file.

File

Selecting this option, the report can be saved in a file that can be opened by the viewer.

On Event

Here we decide how the report activation takes place on the basis of an event coming from the field.

Start Report (On Clear, On Set, On Change)
Item Name

These fields work together. If Item Name contains a Digital Input (DI), the report will be triggered when the value of this Item:
- switches from 1 to 0   (*On Clear*)
- switches from 0 to 1   (*On Set*)
- switches from 1 to 0 or vice versa   (*On Change*)

If *Item Name* is not set, the report will not be activated by the value of any field variable.

Acknowledge item name
Acknowledge (Clear, Set, Change)

Once the report is completed, that is all the variables have been sampled and the print it and/or the record in the database has been generated, REPORT.EXE will set the Digital Output specified in *Acknowledge Item Name* to one of the three values specified in *Acknowledge*:
- *Clear*   - set to 0
- *Set*   - set to 1
- *Change*   - read the *Acknowledge item name* value from field and set the opposite value.

This way, the PLC will be advised the report has been completed and it can proceed. If *Acknowledge item name* is not set, the acknowledge operation will not be executed.

Check State upon Connection

If *Check State upon Connection* is selected and if when switching to run mode the Digital Input that activate the report is already in activation state (i.e. its value is 1 and the activation in *On Set*), a report will be immediately generated, without waiting for the transition (in this case, from 0 to 1).

This is valid when the activation is *On Set* and *On Clear.* When the activation is *On Change* instead, a report will be generated any case.

This option can be useful in case of report activation triggered by the PLC when the workstation is off. Switching on the computer and starting REPORT.EXE, the report will be generated immediately.

On Time

Here we can set how the periodic activation of the report takes place on the basis of events coming from the timer of Windows
  Start At:

every:
In these fields we can setup the scheduling for report activation on time. Let see some example to better understand:

The report will be activated every hour, starting from 10:30.

The report will be activated at 5:00 every first day of the month.

Both **on time** and **on event** activation can be set for the same report.

Time List
        Add
        Change
        Delete

Once a timer based event has been defined through *Start at:*, *Every:*, and the drop down list commands, it can be added to the *Time List* clicking on Add button. This way we can define more time events to activate the report. To remove an event from the time list, select it by clicking with the mouse and press the *Delete* button. To modify an existing event, click on it to retrieve its parameters (the *Start at:*, *Every:*, and the drop down list will be updated), modify them and press the *Change* button.

Dynamic - Enter Run Mode /Exit Run Mode   **F5**
Allows switch between Edit mode and run mode. Switching to run mode all the OPC servers included in Report generator Address Space will be automatically activated, transmitting Tags present values including activation DI in case of activation on event. The dynamic items values will be updated on screen and, if the report generation event is triggered, you can immediately see the result. To exit run mode and go back to Edit mode, press F5 or select this menu command again.

Dynamic – Activate Report
This menu item is active in run mode only. When selected, it immediately triggers the report activation, in order to test the report settings.

Dynamic – Activate Partial Report
This menu item is active in run mode only and for Historical report only. Like previous menu item, it allows to immediately activate a partial report generation

Dynamic - Numeric Field...
Any text in a report template can become a *Numeric Field*, getting a dynamic behavior. Select the text and then select this menu item. The fig.19 dialog will appear:
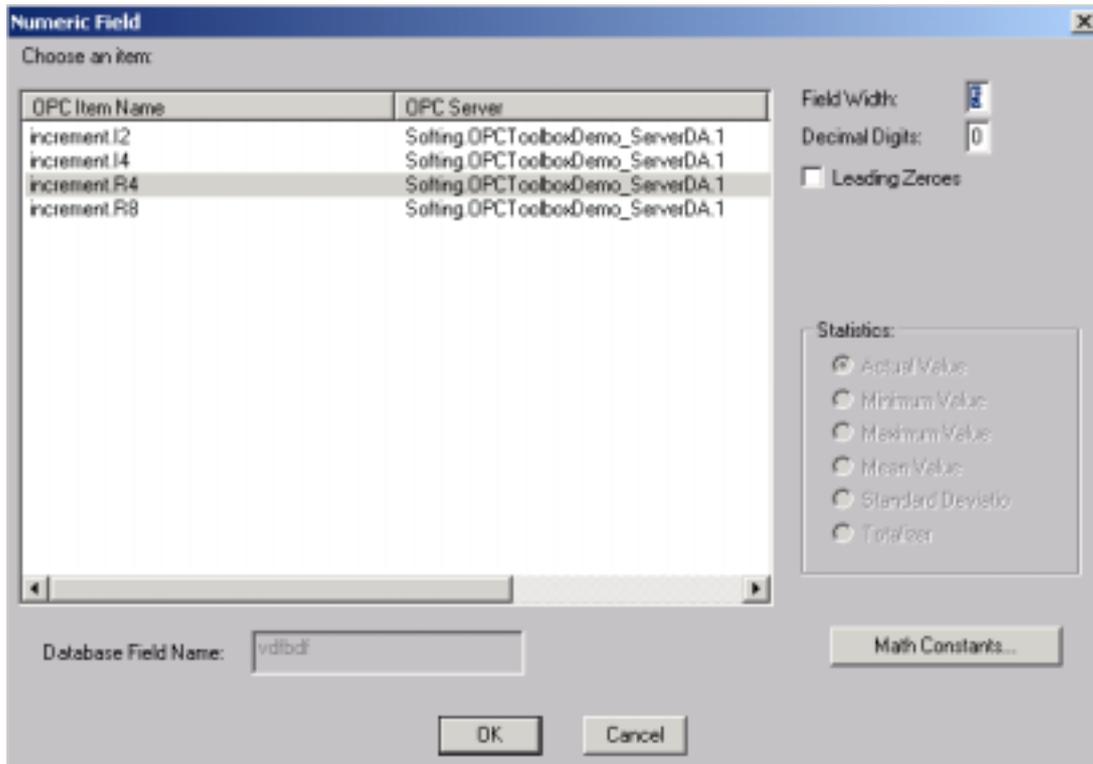
fig. 19: Numeric Field dialog

Let see in details the *Numeric Field* dialog fields:

Choose an item
Here the numeric Tags of Report Generator address space are listed. Choosing one it will be associated to the selected text, that runtime will show the value updated by the related OPC server. If no tag is selected, the text will remain static.

Field Width
The minimum space occupied by the number, decimal separator included. If the digits that compose the number are less than the field width, some blank spaces will be added, to the left or to the right of the number according to text alignment, to reach the required length. If the number is wider than Field Width, it will not be cut off.

Decimal Digits
The analogical data are exchanged with field as signed 16 bits integer. However some values to be significant need to be shown with decimal digits. The number of decimal digits corresponds to the power of 10 the original number read from the field is divided by.

Leading Zeros
See *Field Width* above. The blank filling space, if preceding the number, will be converted to zero characters.

Sample
An example of how the 123 number will be shown.

Database field name
In this field the designer should input the name of the database column where the value of the variable will be saved if *Report activation on database* has been selected.

Statistics

This options are available for Historical Reports only. As shown in fig. 20, we can select if the text will be updated with the actual value of the associated Tag or a statistical calculation selected among the available ones.
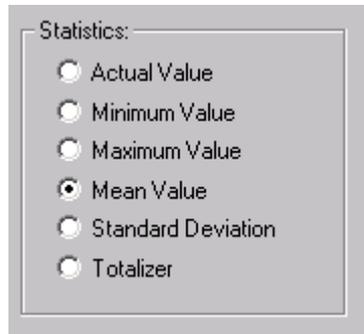

fig. 20: Statistics

Math constants

Once a Tag or one of its statistical elaboration has been chosen, its value can be substituted by the mathematical expression (Ax + B)/C, where x is the original value and A,B and C are numerical constants to be defined in the fig.21 dialog.
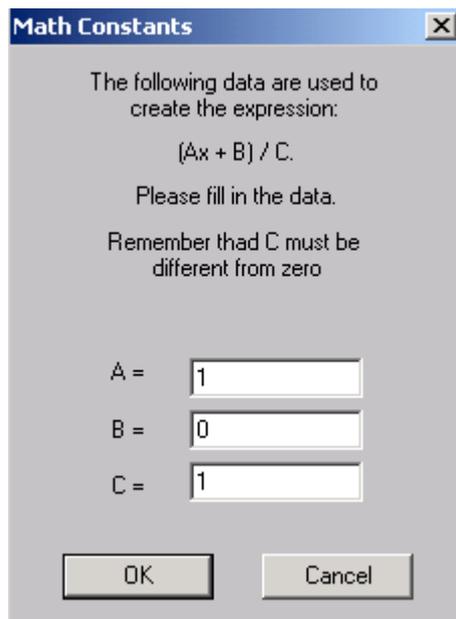
fig. 21: Math constants

At run Time, when the report generation is triggered, the text set as *Numeric Field* will be replaced by the value coming from the OPC server or a statistical elaboration if required. This value will be then printed or saved on database. It does not matter what is typed in the text field when it is created, neither its length. The only significant parameter are the font and the text position inside the report template area if *report on printer* option is selected.

If the report is only saved to database, neither the font nor the position matter, but only Database Field Name is important, since it allows to establish what is the database column where the values corresponding to this tag are saved.

Dynamic - String Input...

Any text in a report template can become a *String Input*, getting a dynamic behavior. Select the text and then select this menu item. The fig.22 dialog will appear:
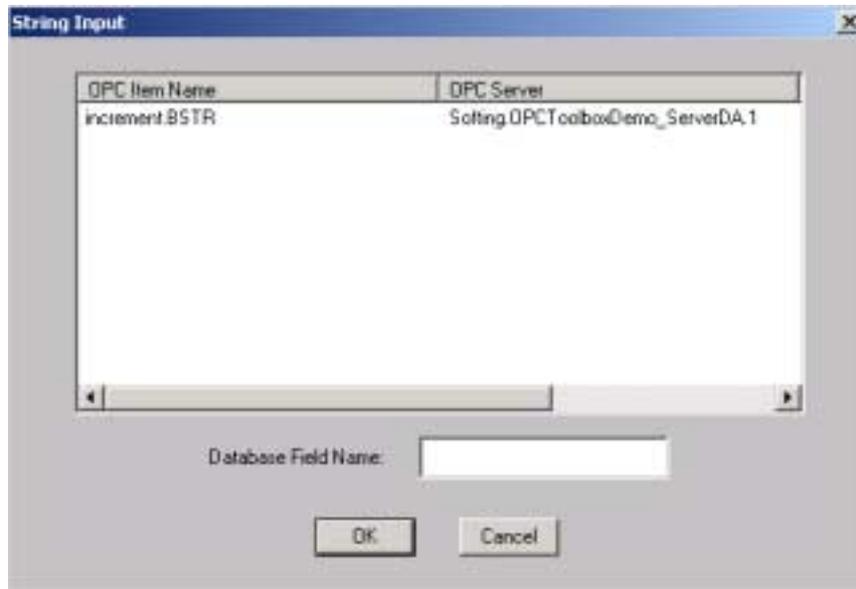

fig. 22: String Input dialog

Let see in details the *String Input* dialog fields:

OPC Item Name
Here the string-type Tags of Report Generator address space are listed. Choosing one it will be associated to the selected text, that runtime will show the string value updated by the related OPC server. If no tag is selected, the text will remain static.

Database field name
In this field the designer should input the name of the database column where the value of the variable will be saved if *Report activation on database* has been selected.

At run Time, when the report generation is triggered, the text set as *String Input* will be replaced by the alphanumeric value coming from the OPC server. This value will be then printed or saved on database. It does not matter what is typed in the text field when it is created, neither its length. The only significant parameter are the font and the text position inside the report template area if *report on printer* option is selected.
If the report is only saved to database, neither the font nor the position matter, but only Database Field Name is important, since it allows to establish what is the database column where the values corresponding to this tag are saved.

Dynamic - File Message...
Any text in a report template can become a *File Message*, getting a dynamic behavior. A File message is a text that will be replaced with a different text message according the numeric value of the associated tag. Just select the text and select this menu command. The fig. 23 dialog will appear:
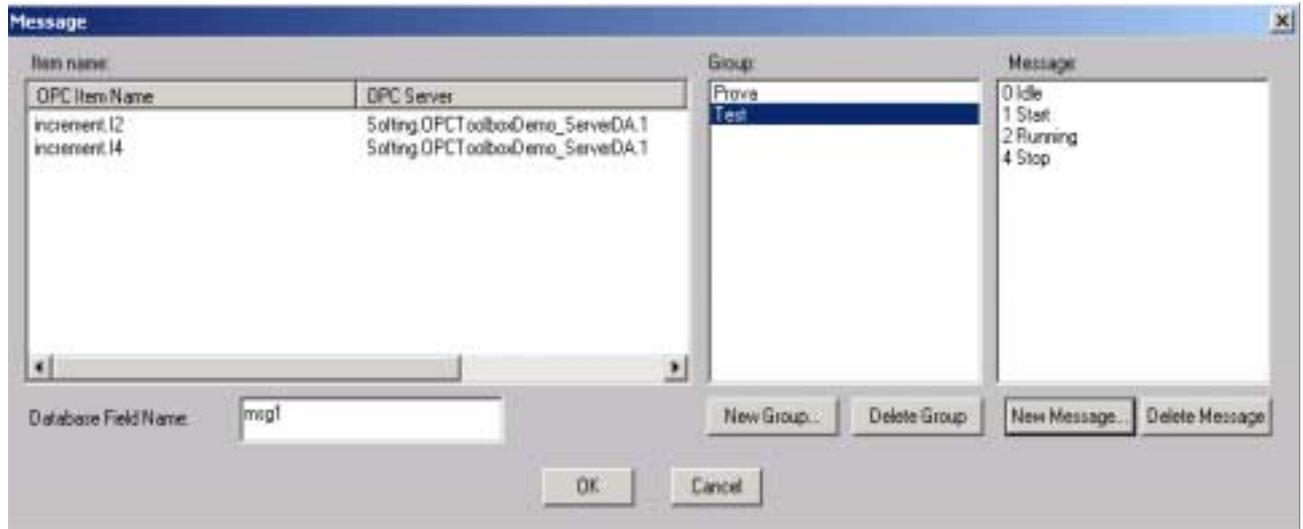
fig. 23: Message dialog

Let see in details the *File Message* dialog fields:

Item Name
Here the numeric Tags of Report Generator address space are listed. Choosing one tag, at run time the selected text will show a message whose text is related to the numeric value of the tag. The correspondence between numeric values and messages is set selecting the Group and Messages as described below. If no tag is selected, the text will remain static.

Group
List of available messages (strings) groups. It is possible to choose among the listed groups the one including the messages we want to associate to the selected text. You can create a new group pressing the New Group button. You can delete an existing group clicking on it and pressing the Delete Group button.

Message
List of messages belonging to the selected group, including tag numeric value and corresponding text message. Like in the group case, new messages can be added or existing messages can be deleted using New Message and Delete Message buttons.

Database field name
In this field the designer should input the name of the database column where the message will be saved if *Report activation on database* has been selected.

Group and messages defined here will be saved on ReportOPC database, in Messages and MSGGroup tables.

At run Time, when the report generation is triggered, the text set as *Field Message* will be replaced by the alphanumeric value coming from the OPC server. This value will be then printed or saved on database. It does not matter what is typed in the text field when it is created, neither its length. The only significant parameter are the font and the text position inside the report template area if *report on printer* option is selected.
If the report is only saved to database, neither the font nor the position matter, but only Database Field Name is important, since it allows to establish what is the database column where the values corresponding to this tag are saved.

Dynamic – DataLogger Input
This menu command allows to associate to a text field a DataLogger, that is a data accumulator among the ones defined through the *DataLogger/New* menu. For a detailed explanation on this dynamic object, please refers to the following manual section, *The DataLogger menu.*

Selecting a text and choosing this menu command, the following dialog appears:
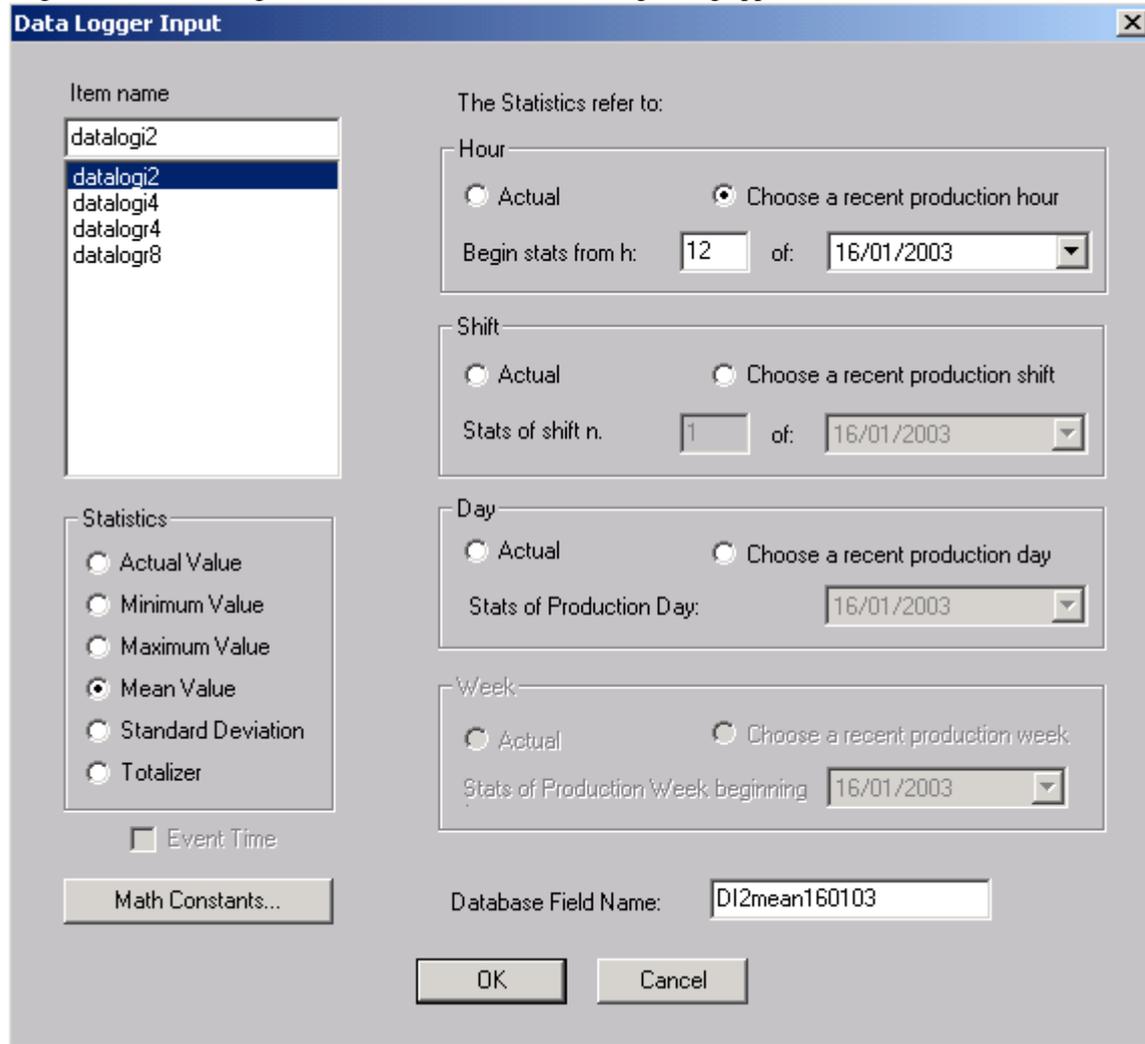
Fig. 24   DataLogger Input dialog

In **Item Name** field a DataLogger name should be inserted, selecting in the list below. The value shown in the report will be the result of a statistical elaboration chosen among the ones listed in the "Statistics" frame. The calculation will be based on values stored in the DataLogger and refers to the period indicated in the right blocks of the dialog.

In the example of fig.24, the text will assume a value based on "datalogi2" DataLogger stored data, resulting in the calculation of the mean value of data referring to one hour period starting from 12 o'clock of January, 16th 2003.

The statistics refer to
The right-side frames allow to select a time period of one hour, one day or one working shift (to define a working shift, please refer to "DataLogger/Shift" menu). You can select present period (last hour, day or shift) or a period starting from a specific moment (Choose a recent production hour/shift/day…)

Database field name
As for other dynamics object, in this field the designer should input the name of the database column where the DataLogger value will be saved if *Report activation on database* has been selected.

The "Data Logger" Menu

The Report Generator application, besides permitting direct access to OPC servers tags, allows to create some data accumulators, the DataLoggers, linked to these tags.

To create a DataLogger, it is required to give it a name, to connect it to a tag belonging to the Report Generator address space and to define an acquisition frequency, that is the frequency used to saved the value of the associated tag in a specific file, named [DataLogger name]_[progressive_number].csv. Each one of these files can contain up to a maximum number of acquisitions, where date, time and the tag value are recorded. When this size limit is reached, a new file is created, with the progressive number increased by one. The stored data will be used for statistical calculation whose results can be inserted in a report, associating a DataLogger to a DataLogger Input dynamic object, through which the kind of statistical elaboration and the time basis period is set.

DataLogger – New
Selecting this menu command the following dialog will appear:
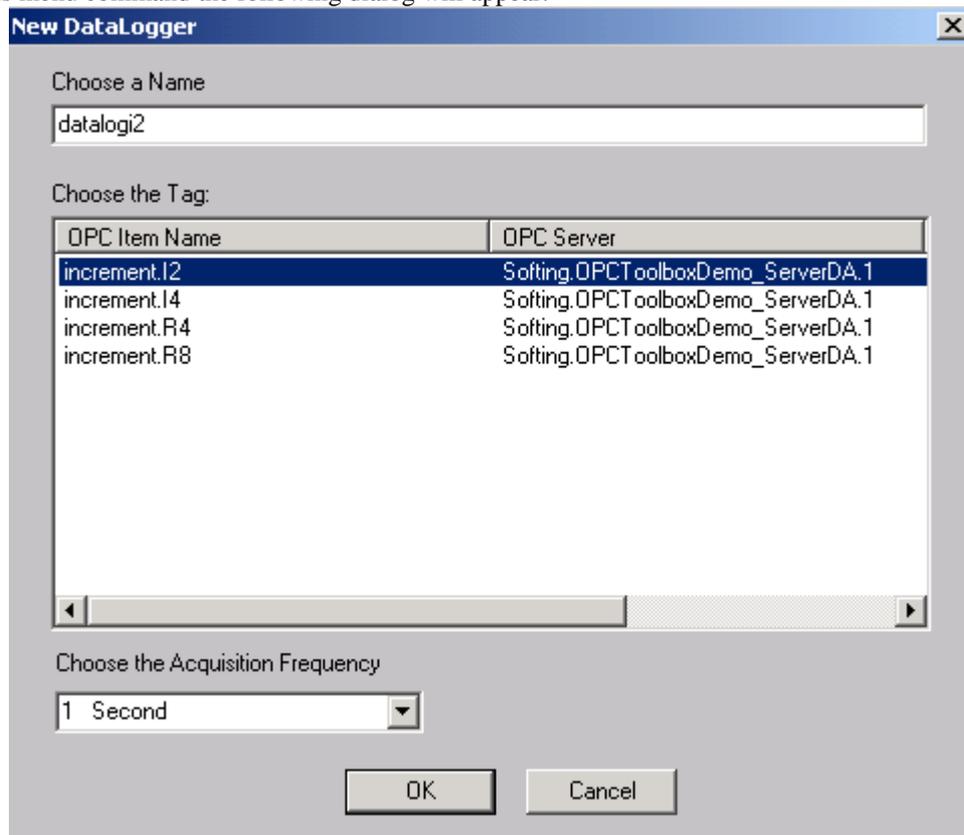
Fig. 25: New DataLogger dialog

It allows to create a new DataLogger, assigning it a name, to type in the "**Choose a Name**" box, linking it to a tag selecting one in the "**Choose the Tag"** list and selecting how often this tag value will be saved, through the "**Choose the Acquisition Frequency"** drop down list.

Once created, the DataLogger will appear in the available DataLoggers list, visible through the *DataLogger/Show* menu command.

DataLogger – Show
Choosing this menu command the fig.26 window appears:
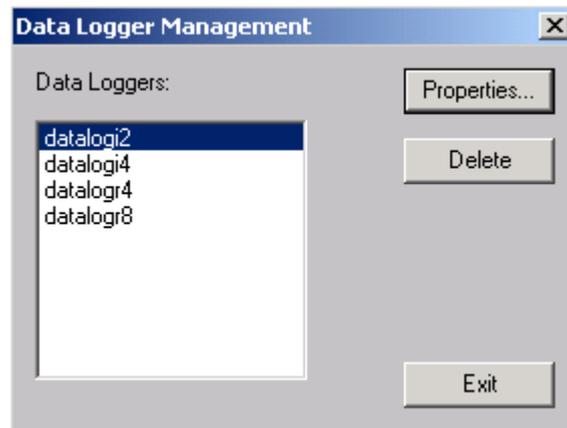
Fig. 26: DataLogger management dialog

Here the existing DataLoggers are listed. From this dialog it is possible to modify the selected DataLogger properties pressing the "Properties" button, that opens the fig. 25 dialog. It also possible to delete a DataLogger, selecting it and pressing the "Delete" button.

DataLogger – Shift

Since the time period to be considered for statistical elaboration can be a working shift, this menu command allows to define shifts and their duration, for up to 8 different shifts, using fig. 27 dialog:
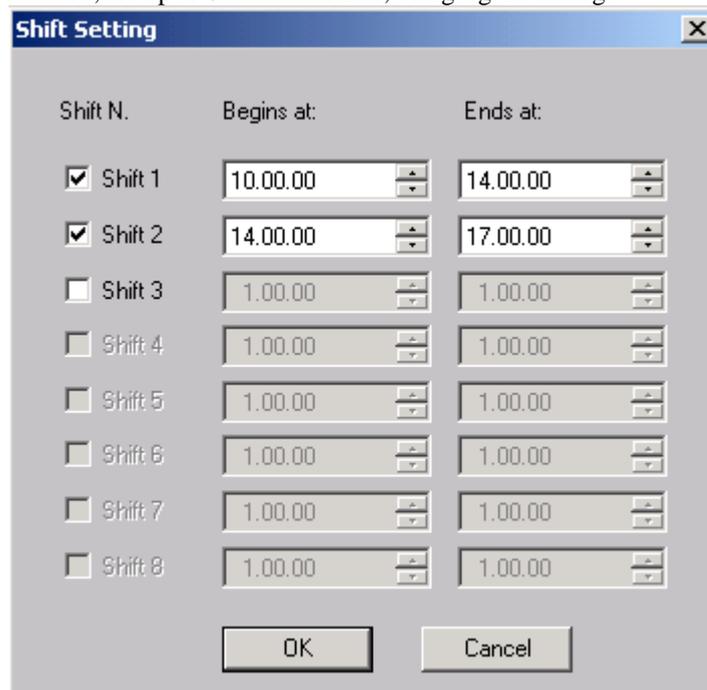

Fig. 27 Shifts setting dialog

The shifts defined here can be selected as time basis for statistical calculation related to a DataLogger in the DataLogger Input dialog (fig.24)

Viewing report files: the Report Viewer

The "Tools" Menu

This section includes some utilities for checking the report structure and for viewing the existing report.

Tools – Report Viewer

WARNING: THE REPORT VIEWER IS ACTIVE ONLY WHEN THERE ARE NO REPORT TEMPLATE FILES (.REP OR .HIS) OPENED.

If the report activation has been set with **Output to Database** or **Output to File**, the generated reports have been stored in electronic form in the workstation. The Report Generator application integrates a tool that provide easy access to these reports.

If **Output to File** option has been selected, report files have been created at the moment of activation and are saved as [ReportTemplateName_DateTime].fin files. The Report Viewer allows the user to open the file, view it on the screen and print it. This is true for both Standard reports and Historical reports.

If only **Output to Database** option has been selected, no report files has been created, but the data have been saved on database. The user can anyway retrieve a Standard report through the Report Viewer menu: a new document will be created based on the used report template and the available data. The user will be asked to choose a date and time among a list, corresponding to database stored data. The resulting report will be visualized on the screen and it will be possible to print it.
NOTE: This last option is valid for Standard reports only!!!

Some other useful tools – License Activation

Tools – Browse Server
This menu command is described in the previous "Making the report dynamic: field Tags and Dataloggers, report activation" section

Tools – Verify Historical report (for Historical Report only)
As described in File/New/Historical Report section, an Historical Report has predefined section where specific objects can be placed. If some of them are placed in wrong areas errors can raise.
This menu command allows to verify the coherence between report objects and the areas they are inserted in, as listed below:

Areas	Allowed objects
HEADER	Texts, graphics objects, placeholders
FIELDSDESC	Texts
FIELDS	Dynamic object and placeholders
STATSDESC	Texts
STATS	
FOOTER	Texts, graphics objects, placeholders

At the end of the text a window will show a short report with test results.

Tools – Database Maintenance

The access to this tool is password protected.
The purpose of this tool is to keep the PVReport database clean, removing tables of data that are no more in use. A list of PVReport database tables containing acquired data is shown, with the corresponding report template files.

If the data contained in one of these tables are no more of interest or the corresponding report template is no more in use, the database table can be deleted.

All the acquired data will be lost, but the associated report template file will not be deleted and can be used in the future.

To delete the Report templates (.rep) or the Historic Report template (.his) and the executed report (.fin) files please use Windows Explorer.

Tools – License Activation

After installation, the Report Generator application runs in demo mode.

In demo mode, when Report Generator is running, some warning windows will periodically appear on the screen, advising that the Report Generator copy has NOT been activated, so it is NOT licensed and NOT free to be used until registration occurs. When the evaluation time (5 days) has expired, the application will be automatically closed. The Report Editor can still be used, but it will not be possible to switch to Run mode.

A single Report Generator copy is licensed to be installed in a workstation only. Changing computer or changing some of its components will make the licence to be invalid and a new activation should be asked to Fast Automation.

Selecting this menu voice, the **Enable Full version** dialog box will appear as shown below, showing the workstation specific System key.

Please communicate the **System Key** number to Fast Automation and Fast Automation will send you back the Enable key code, to be typed in the **Enable Key** field. Then press ok and the program will be automatically activated.

System Key	
1963026623	OK
	Cancel
Enable Key	
0	

Standard Windows menus

The "View" Menu

View - Toolbar
View - Status Bar
Shows (if checked) or hides the Toolbar and the Status Bar.

The "Window" Menu

Window - New Window
Window - Cascade
Window - Tile
Window - Arrange Icons
Standard Windows applications menu, to arrange opened windows.

The "Help" Menu

Help - Help
Shows this manual

Help - About Report... *(fig. 6 - # 14)*
Show the dialog with application and version info.

REPORT GENERATOR - Run mode

In the design phase, the Report Generator program is run in Edit mode and it is possible to pass from Edit to run mode and vice versa pressing F5 key or using the *Dynamic/Enter Run mode*, *Dynamic/Exit Run mode* menu. This way it is possible to test the functionalities during the design phase. In particular, to activate the generation of a Report at any time during the run mode, it is possible to use the *Dynamic/Activate Report* and *Dynamic /Activate Partial Report* menu (this last option is valid for Historical Report only).

The installation for the final user of REPORT.EXE should be set so that the program enters run mode automatically when started, opening the report templates that should be activated, with no possibility to go back to edit mode. This way, any possible damage to existing reports caused by a not very expert user can be avoided.
To do that, set up the shortcut properties as shown in fig.28:
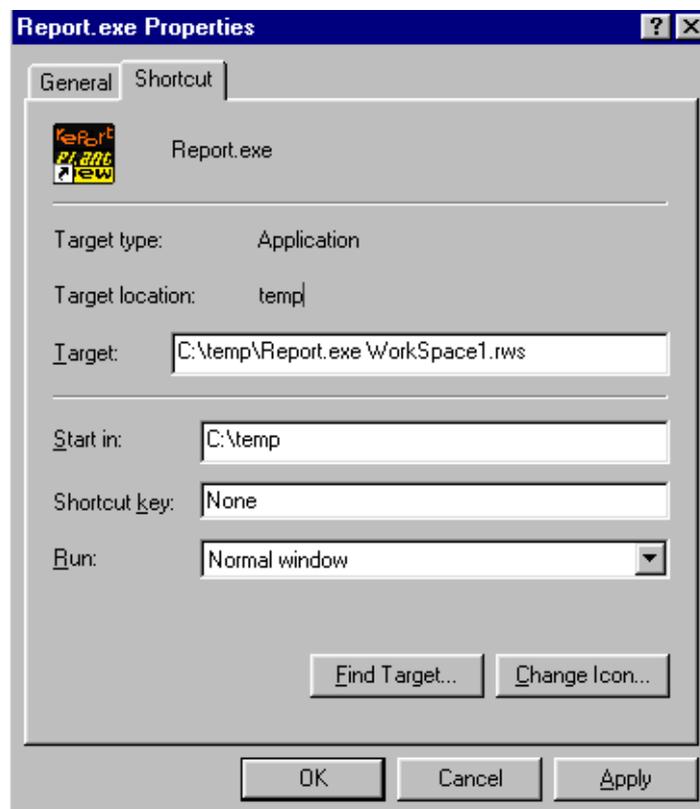
*fig. 28: Example of properties setting to execute REPORT.EXE
in run mode with files*

Set as target value the complete address of report.exe file and add to the command line a workspace name. When started, the program will automatically open all the report files belonging to that workspace and enter run mode. In fig. 28 example, the "Workspace1.rws" workspace will be opened, all reports included in this workspace will become active and all OPC servers included in Report Generator address space will be activated.

NOTE: the command line parameter where the workspace name to be opened is specified <u>must not</u> be preceded by a slash ("/") symbol.

Once the application enter run mode this way, we can not switch to edit mode, but only exit from the program.

Examples – Tutorial

Tutorial

The fundamental steps to create and execute a report are the following:

1.   OPC Servers address space browsing

First of all, from the Report Generator folder on the desktop, double click on the Report Editor icon to run the program in editing mode. A dialog box will appear, asking to create a new Standard Report Template or and Historical Report Template. Press Cancel and select the **Tools – Browse server** menu. The program will look for OPC server registered on the local workstation and on other workstations of the local area network.

Select a local or remote server and through the tree view browse its address space, selecting the tags to insert into the program database (see "Making the report dynamic: field Tags and Dataloggers, report activation" section of this manual for further details).
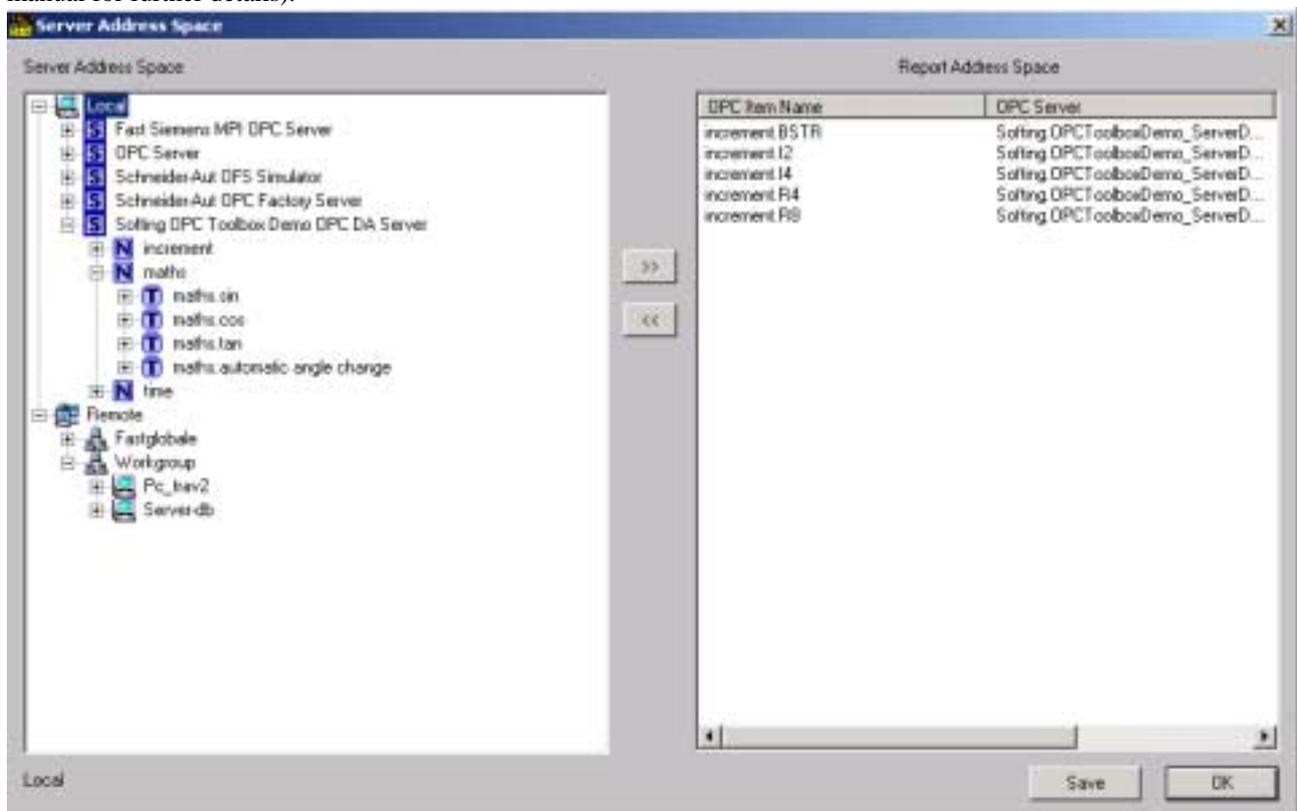
Fig. 29 OPC Server browsing

The tags inserted in Report Address Space will be the ones whose values will be kept updated by the OPC server during the program execution.

When you have finished to add tags to the program address space, press the Save command and wait for an answer message. The press Ok to exit.

2.   DataLogger creation

Select the Datalogger - New menu to create the data loggers. A data logger is an accumulator that will store the value of the associated tag in some specific files (.csv format) at the indicated frequency. As an example, in fig. 30 the datalogger "Datalogger1" will store every 10 seconds the value of "increment.I2" tag . These stored values will be used for statistical calculation (mean value, max, min, total, etc.)
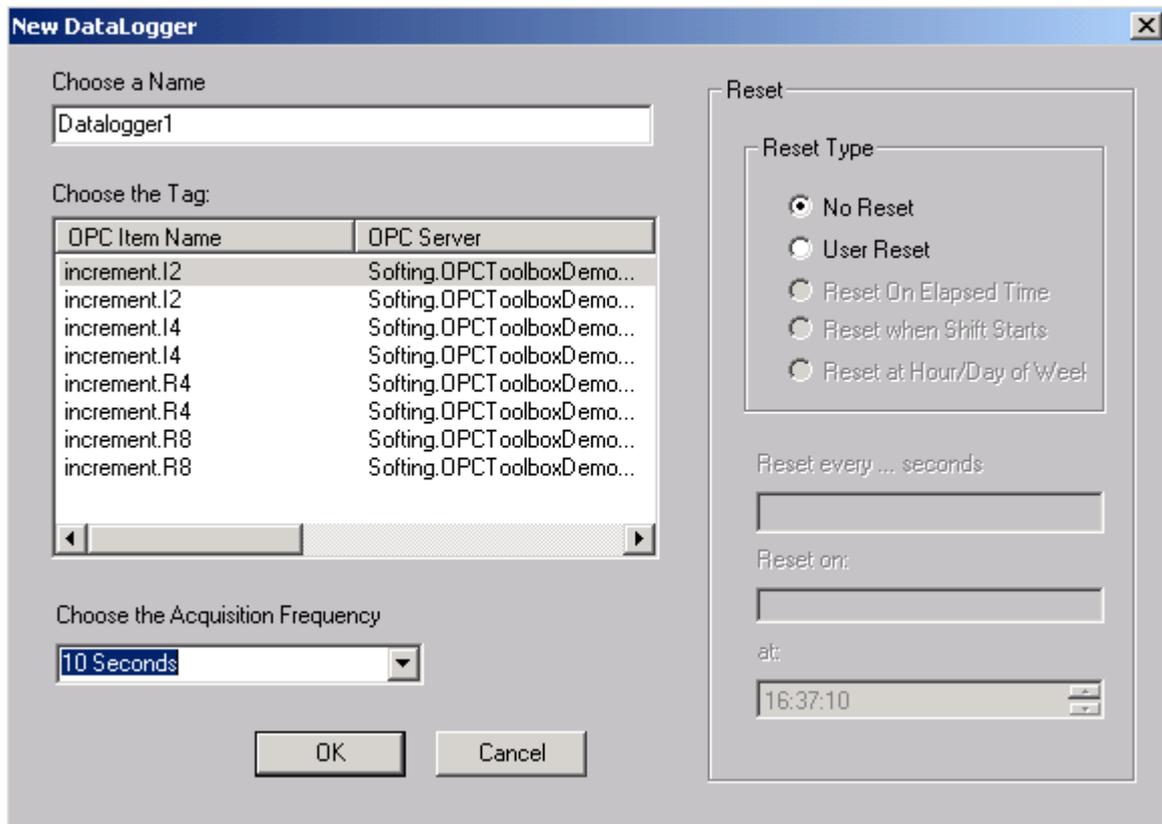
Fig. 30 New data logger

3. Report template creation

Now choose the File – New menu to create a new report template (see File – New menu in "Report template design: the editing menus" for further details).

Once you opened a new, empty file, you should fill it with graphic elements that will appear in the final report document.

For a detailed explanation of file creation (especially for Historical Report templates) please refers to the "Report template design: the editing menus – the file new menu"

As an example, see fig. 31 where a standard report template has been created with the described elements:

Fast Automation SpA

via Talete 2/4 Rubiera (Italy)

Main Plant Production Report

Date   <Act. Date>

Time   <Act. Time>

PROCESS VALUES

Reactor Phase	Item	Units	Set	Actual	Mean value last hour	Mean Value last day
Reactor 1	Temperature top zone	°C	0000	0000	0000	0000
phase r1	Temperature bottom zone	°C	0000	0000	0000	0000
	Pressure in zone	psi	0000	0000	0000	0000
	Pressure out zone	psi	0000	0000	0000	0000
Reactor 2	Temperature top zone	°C	0000	0000	0000	0000
phase r2	Temperature bottom zone	°C	0000	0000	0000	0000
	Pressure in zone	psi	0000	0000	0000	0000
	Pressure out zone	psi	0000	0000	0000	0000

Fig. 31 Report Example

To place texts, graphical elements and pictures in the report, use the *Draw* menu commands. You can insert text, images, lines, rectangles and placeholders. The colored elements have been made dynamic through the *Dynamic* menu commands. The placeholders do not need to be made dynamics (they already are).

The dynamic elements here are:
- ❖ Placeholders for date and time, in pink. The have been inserted in the page through *Draw/Others/Date* and *Draw/Others/Time* menus. They are already dynamic elements and will be updated with present date and time at the report activation.
- ❖ Numeric fields, in red. They are updated with their present value when the program is in run mode. To transform a static text in a numeric field dynamic element, select the text by clicking on it and choose the Dynamic - Numeric field menu. The following dialog should appear:
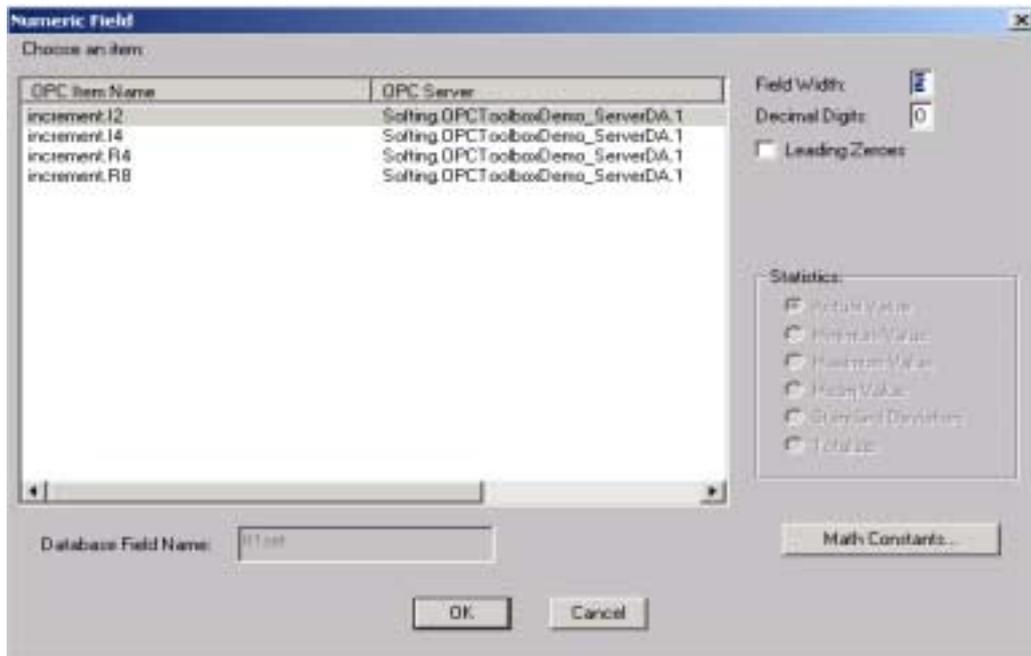
Fig.32 Numeric filed example

Fig. 32 dialog shows that the selected text has been associated to the "increment.i2" tag of report generator address space. The text will show the tag value in a five digits format ("Field width") with no decimal digits and no leading zeroes. The value will be saved on database, if requested, in the "tt1set" field ("Database Field Name"). It is mandatory to specify a database field name.

❖ DataLoggers, in green. They are updated when the program is in run mode with the result of statistical calculation as set in the DataLogger Input dialog. To transform a static text in a datalogger input element, select the text by clicking on it and choose the Dynamic – DataLogger input menu. The following dialog should appear:
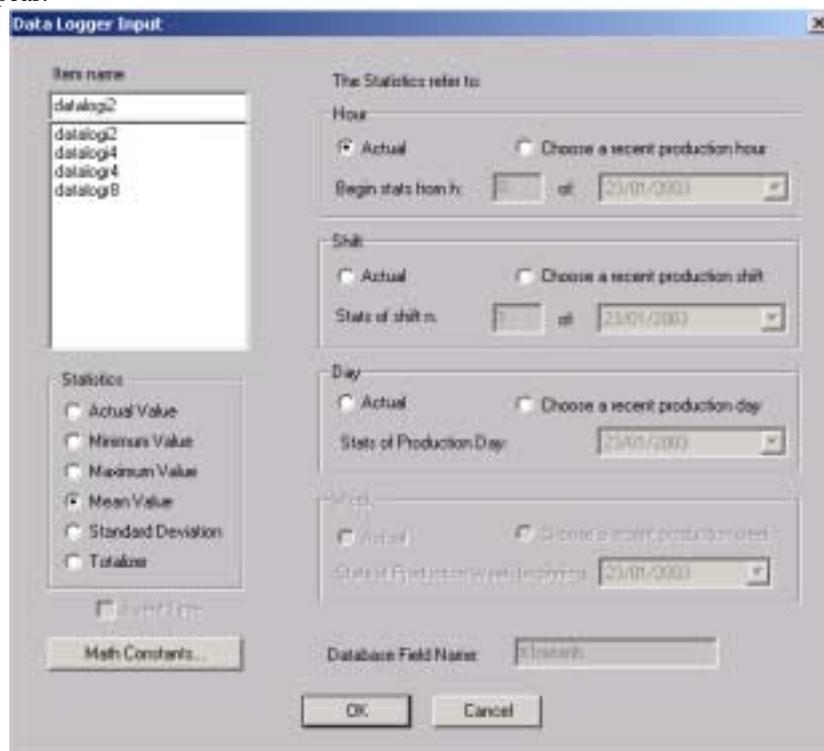
Fig. 33 DataLogger Input example

The selected text is associated with the "datalogi2" DataLogger, defined as data accumulator related to "increment.i2" tag of report generator address space. This DataLogger saves the tag actual value every second, as set in DataLogger Properties dialog in fig.34:
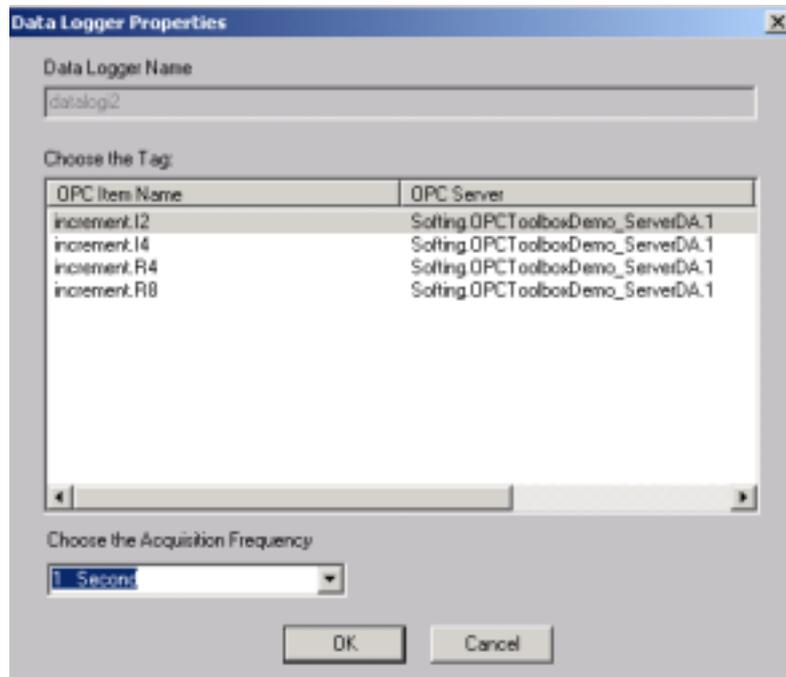
Fig. 34 DataLogger Properties example

According to fig.33 settings, the selected text will show the mean value of "increment.i2" calculated on values saved in the "datalogi2" DataLogger referring to last hour period.

❖ File messages, in blue. At runtime, they will show a string (i.e. the process phase) according to the messages setup. To transform a static text in a file message dynamic element, select the text by clicking on it and choose the Dynamic – File message menu. The File message dialog should appear:

Fig. 35 File message Input example

Here, the message indicating the process phase is related to "increment.i4" tag. According to this tag value, the selected text will show a string, as listed in fig.35 Message box .

4. Report Activation

Once the report template is completed, you need to choose when the report will be generated and where it will be saved. Select the Dynamic – Report Activation menu. The following dialog will appear:
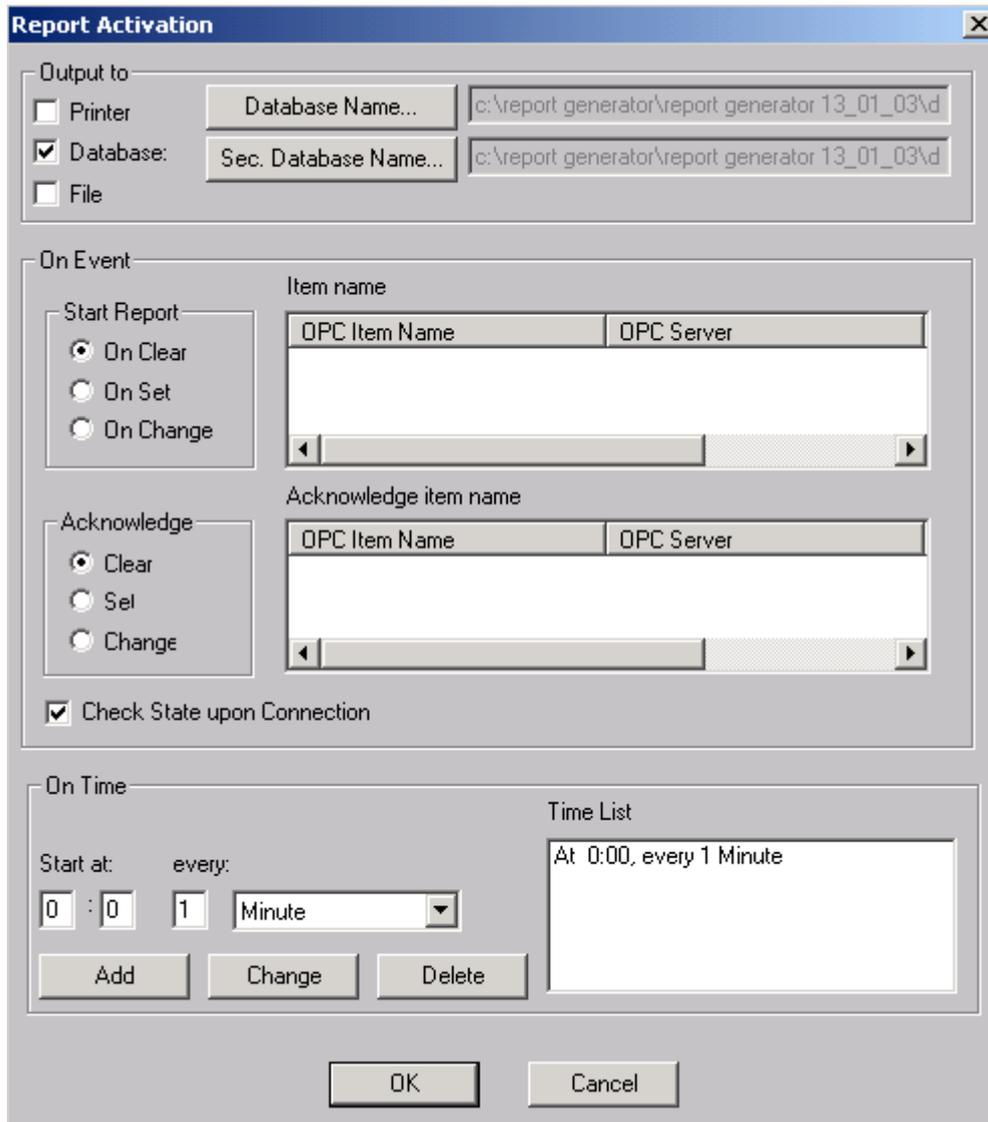
fig.36 Report Activation window

First of all, in "Output to " section select where the report will be saved: to Printer, on database (in this case you can choose a specific database where the data will be saved) or in a file (.fin format).

To activate the report, you can select if the activation will be on event, that is when the value of a specified tag, selected from the "Item name" list, will change (On Change) or become 0 (On Clear) or become different from 0 (On Set).
If you want to activate the report at a specific time interval, set the starting time, the interval and add it to the Time List.
For a detailed explanation, please refers to "Making the report dynamic: field Tags and Dataloggers, report activation" section of this manual.

5. Run!

Now you are ready to test your report: open one or more of the created report templates, press F5 or select the Dynamic – Enter Run mode menu to run the program. If everything is ok, the OPC server/s will be launched and on the screen you can see the data changing. When the activation condition is reached, a report will be generated. You can also use the Dynamic – Activate Report (or Activate Partial report, for Historical report only) to generate immediately a report.
To see the result, stop the runtime (pressing F5 or selecting the Dynamic – Exit Run mode menu) . The system will be stopped.
Close all report template files and use the viewer (menu Tools – Report Viewer) to see the report just created. For futher information on the Report viewer use, see the "Viewing report files – The report Viewer menu" section of this manual.

A possible result of our report can be:

Fast Automation SpA
via Talete 2/4 Rubiera (Italy)

Main Plant Production Report
Date   16 / 04 / 2002
Time   14 : 12 : 22

PROCESS VALUES

Reactor Phase	Item	Units	Set	Actual	Mean value last hour	Mean Value last day
Reactor 1	Temperature top zone	°C	125	132	79	98
Running	Temperature bottom zone	°C	140	147	110	127
	Pressure in zone	psi	25.00	28.12	24.98	25.77
	Pressure out zone	psi	20.00	23.76	22.63	23.81
Reactor 2	Temperature top zone	°C	120	113	122	110
Warm up	Temperature bottom zone	°C	135	129	137	143
	Pressure in zone	psi	24.00	22.18	21.90	23.39
	Pressure out zone	psi	19.00	18.50	20.13	20.33

Fig. 37 Report result example