



# XchedPro User Manual

[www.xchedpro.com](http://www.xchedpro.com)

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## 1. INTRODUCTION

XchedPro is a graphical user interface (GUI) for a powerful project schedule solver engine. Starting from basic schedule data (activities/tasks duration and precedence relationships), XchedPro calculates the start/end dates for all activities, critical path(s) and free float times. If data about resources is available, XchedPro is able to calculate planned Progress Curves (S-Curves) and different kinds of histograms. If data about actual activities progress is available, actual Progress Curves (S-Curves) and some basic KPIs can also be calculated.

XchedPro was designed to be applied mainly in EPC (Engineering, Procurement and Construction) and software development projects, however, it is flexible and powerful enough to be used for other kind of projects.

XchedPro uses MS Excel files for input and output data. This is very useful to generate input data for large and complex schedules and allow a great flexibility to customize reports from output data.

XchedPro is a safe standalone application and don't access the machine register, local network or the internet anytime. To install the application in a corporative computer, the support of IT group may be necessary.

XchedPro wasn't designed to be a distributed collaborative or multi project tool, it was designed to be used in a centralized way, by the project planning team and for a specific project.

This user manual describes how to access all XchedPro native features and provides some tips on how to extend/customize these features with little additional work.

Please feel free to send your doubts, comments, bug reports or suggestions through our website.

## 2. HOW TO INSTALL XCHEDPRO

XchedPro is provided as a single Windows zipped package file that contains all necessary files to run. To keep the user in control of every step and minimize the risk of security threats, there is no installation program and no access to the machine register or Internet is required when installing or running the application. The files should be extracted manually and copied for any folder in the user computer. We recommend to copy the hole original folder (XchedPro) to HD file root directory, all instructions in this manual considerer this installation option.

**IMPORTANT:** The folder location and folder name can be changed, but all XchedPro files provided in the package, must be kept in the same folder.

The installation package contains:

File	Description
XchedPro.exe	XchedPro Windows application
XchedPro.exe.config	XchedPro internal config data
TEMPLATE_NEW_I.xlsx	Template data file for new schedules
TEMPLATE_REPORT_I.xlsx	Report (output) data file template
XchedPro.lic	License file
XchedPro_UserManual.pdf	User Manual

Table 2.1 – Files in download XchedPro package

Optionally, after copies the files to the folder, the user can create a shortcut to access XchedPro.exe and put it in any place.

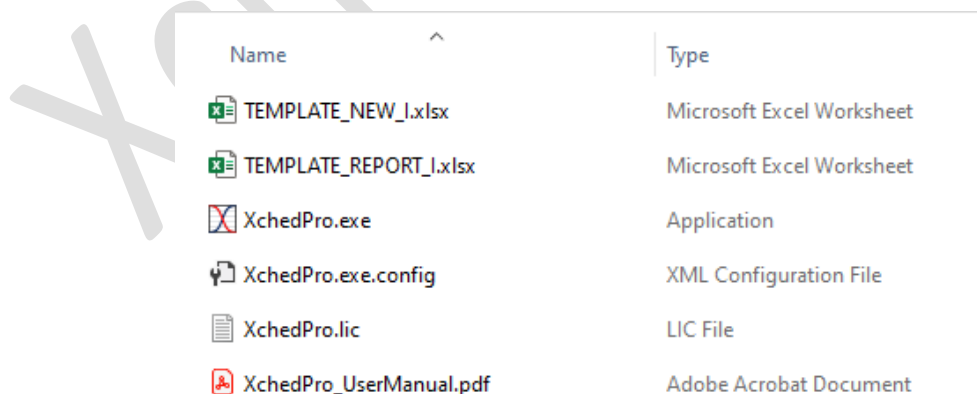


Figure 2.1 – Typical XchedPro folder content

### 3. HOW TO USE XCHEDPRO

A typical sequence of use is described below:

- A. Build the input data file using a copy of the input MS Excel file template (TEMPLATE\_NEW\_I.xlsx), available in the installation folder;
- B. Run XchedPro application and open the input file created in previous step. After the input file was read, XchedPro will check automatically the data for any errors or inconsistencies;
- C. If any error was found, the input data should be corrected before next step. The input data can be fixed (or changed) going back to step A and editing the input file, or using build-in XchedPro data edition capabilities. We recommend the use of XchedPro build-in edit capabilities for small changes in the input data and the use of MS Excel input file for the largest and complex ones;
- D. If no errors or inconsistencies are found, the schedule can be calculated and the results can be inspected using the build in XchedPro visualization capabilities, which include grids and charts that show the main results of calculation. If some adjust is necessary in the input data to improve the results, go back to step A (or C);
- E. If the results are OK, a complete report can be exported in a MS Excel file format.

Figure bellow illustrate a typical workflow.

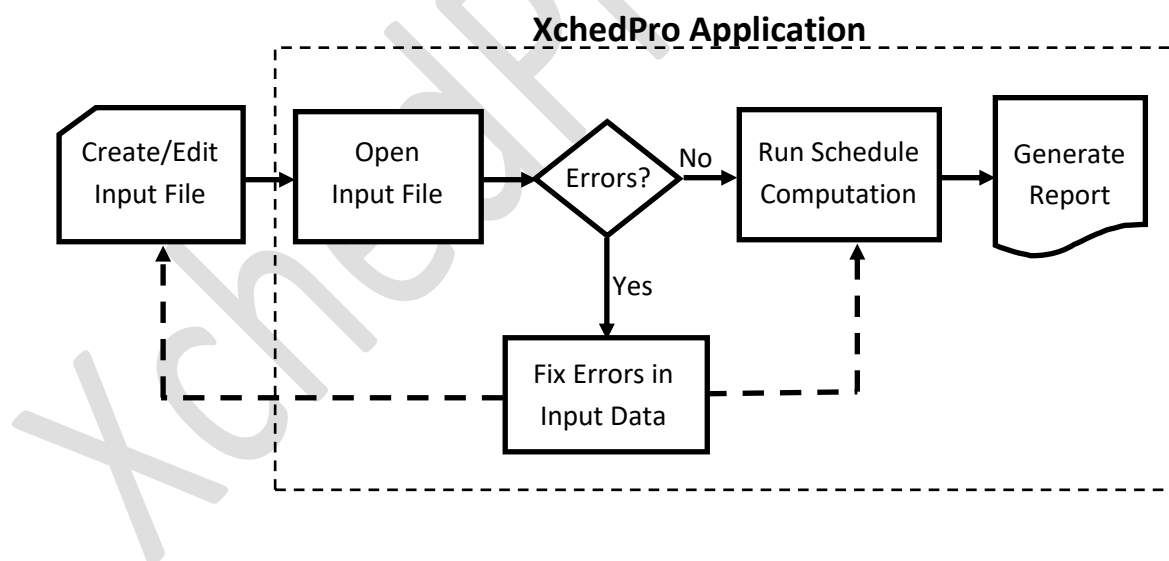


Figure 3.1 – Typical XchedPro workflow

## 4. INPUT DATA FILE GENERATION

All input data files should be created using the provided MS Excel template file (TEMPLATE\_INPUT\_I.xlsx) as a start point, ie, the template file should be copied and renamed to create a new file. This is necessary because there are several internal format rules and keywords (named cells) in the file, that are used by XchedPro to find the information to be read.

The input data file has four main sections, each one is a different sheet in the spreadsheet input file (CONFIG-DATA, SCHED-DATA, TASK-DATA and PROG-DATA sheets). As a general rule, the content of all grey and yellow header cells is not read by application, but these cells cannot be moved or removed from the sheet.

The next items will explain how to fill (or change) the input file.

**TIP**

The user can create different pre filled template files with customized initial parameters for each specific kind of project.

### 4.1. CONFIGURATION DATA SECTION

In this section (CONFIG-DATA sheet in the input file spreadsheet), the general configuration data are informed. The figure below presents the overall structure of this section.

INPUT TIME UNITS			WORK DAYS/HOURS			RESOURCE TYPES (FAMILIES)		RESOURCES			
Task Duration	Work Days [WD]		WEEK DAYS	INI TIME	END TIME	WRK HOURS	TYPE ID	DESCRIPTION	TYPE ID	RES ID	DESCRIPTION
Predecessor Offs	Work Days [WD]		Sunday	0:00	0:00	0:00	HC	HEAD COUNT	HC	EPM	Engineering Project Manager
			Monday	8:00	18:00	9:00	SOFT	SOFTWARE	HC	TCC	Technical Coordinator
			Tuesday	8:00	18:00	9:00			HC	PCP	Plan. & Cont. Professional
			Wednesday	8:00	18:00	9:00			HC	QDP	Qual. & Doc. Professional
			Thursday	8:00	18:00	9:00			HC	PRP	Procurement Professional
			Friday	8:00	14:00	6:00			HC	3DA	3D Administrator
			Saturday	0:00	0:00	0:00			HC	CVE	Civil Engineer
									HC	CVD	Civil Designer
									HC	CVW	Civil Worker
									HC	SFE	Safety Engineer
									HC	SFD	Safety Designer
									HC	PPE	Piping Engineer
									HC	PPD	Piping Designer
									HC	PPW	Piping Worker
									HC	MCE	Mechanical Engineer
									HC	MCD	Mechanical Designer
									HC	MCW	Mechanical Worker
									HC	ELE	Electrical Engineer
									HC	ELD	Electrical Designer
									HC	ELW	Electrical Worker
									HC	IAE	I&A Engineer
									HC	IAD	I&A Designer
									HC	IAW	I&A Worker
									SOFT	3DMOD	3D Model Licenses
									SOFT	ACAD	AutoCAD Licenses
									SOFT	S2K	SAP2000 Licenses
									SOFT	AFT	AFT Fathom Licenses

Figure 4.1 – Configuration data sheet- overall view

There are 5 main groups of configuration parameters to be defined in this sheet, as detailed bellow:

**A** – INPUT TIME UNITS. This group of parameters define the default time units related to task durations and predecessor offsets (Legs);

**B** – MESSAGE VIEW LIMITS. This group of parameters define the maximum number of messages (information, warnings and errors) to be showed in Message View panel;

- C** – REPORT appearance settings. In this group are defined some appearance parameters related to report file generation;
- D** – WORK DAYS/HOURS. Definitions about work days and work hours in a typical work week
- E** – HOLIDAYS. Definitions of holidays and/or other kinds of no work days in the year
- F** – RESOURCE TYPES (FAMILIES). Register of resource types (families), that are the way how project resources are grouped to generate consolidated information
- G** – RESOURCES. Register of all resources that can be used by the project

Each group of configuration data will be explained in details in the next sub sections.

### 4.1.1. Input Time Units

This table defines the default input time units related to tasks duration and predecessor offset (leg) values (please, refer to section 4.3 TASK DATA SECTION for more details about task duration and predecessor offsets).

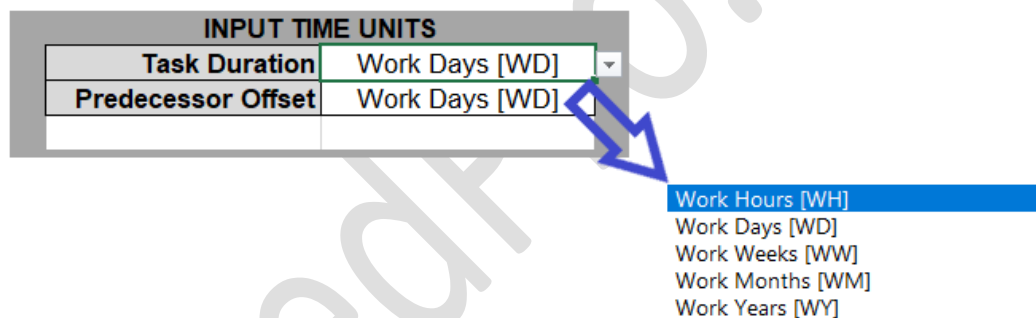


Figure 4.2 – Input Time Units definition

There are several options of time units, by selection of a respective item in the combo box. In the current XchedPro release, only options based in work times are accepted. The table below, describes what each time unit option means.

Work Hours [WH]	All values associated to this time unit will consider the number of working hours for each day of week as defined in the table WORK DAYS/HOURS (see section 4.1.4 Work Days/Hours definition).
Work Days [WD]	All values associated to this time unit will consider the number of working days as defined in the table WORK DAYS/HOURS (see section 4.1.4 Work Days/Hours definition). Every day with a non-zero number of work hours is considered a work day, no matter the number of work hours.
Work Weeks [WW]	All values associated to this time unit will be converted to work hours, by the formula: $WH = WW * WHW$ Where: WH = number of work hours to be used by XchedPro WW = number of work weeks, defined by user

	WHW = total number of work hours by week, defined in the WORK DAYS/HOURS table
Work Months [WM]	All values associated to this time unit will be converted to work hours, by the formula: $WH = WM * WHW * 4 * (30/28)$ Where: WH = number of work hours to be used by XchedPro WM = number of work months, defined by user WHW = total number of work hours by week, defined in the WORK DAYS/HOURS table
Work Years [WY]	All values associated to this time unit will be converted to work hours, by the formula: $WH = WY * WHW * 52$ Where: WH = number of work hours to be used by XchedPro WY = number of work years, defined by user WHW = total number of work hours by week, defined in the WORK DAYS/HOURS table

Table 4.2 – Time Units

### 4.1.2. Message Limits

The message limits configuration table defines the maximum number of messages (by type) that will be showed in the message view panel (see section 5.11 MESSAGE VIEW AND STATUS BAR). Several kinds of errors in the input data have a cascade behavior, is very common that just one root error generates dozens other error messages. Limiting the number of messages to be displayed can be a good idea to avoid message overload

MESSAGE VIEW LIMITS	
MESSAGE TYPE	MAX
ERROR	100
WARNING	100
INFORMATION	100

Figure 4.3 – Message limits parameters

### 4.1.3. Report Appearance Parameters

The REPORT group has 3 tables of parameters, all of them are related to the appearance of different information in the output schedule report file.

The first table under REPORT group defines the colors to be used in the horizontal bars of Gantt chart, generated in the output report file. The background color of cell beside to “Planned” cell, will be used to paint the tasks (activities) duration bars in Gantt chart. The background color of cell beside to “Crit.Path (Planned)” cell, will be used to paint the tasks durations bars in the critical path.

The background color of cell beside to “Connections” cell, will be used to paint the connect lines between the task duration bars.

REPORT	
GANTT CHART BAR	COLOR
Planned	
Actual	
Crit.Path (Planned)	
Crit.Path (Actual)	
Connections	
TASK LEVEL	COLOR
Level 1	
Level 2	
Level 3	
Level 4	
Level 5	
Level 6	
CHART	TIME INTERVAL
Gantt	Auto
SCurve+Histograms	Auto

Figure 4.4 – Report appearance parameters – Gantt chart bar colors

The user can change these background colors using Excel Theme Colors menu, as illustrate in the figure bellow.

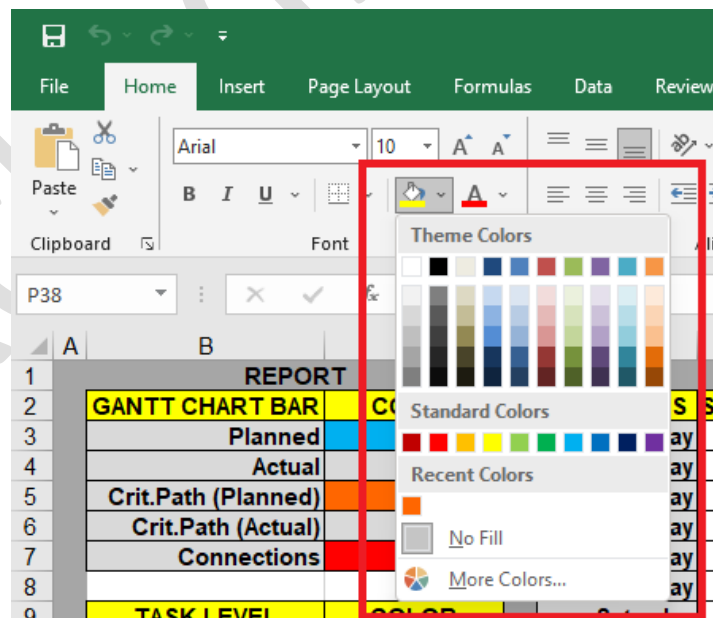


Figure 4.5 – Excel Theme Colors menu

The background colors beside the cells “Actual” and “Crit.Path (Actual)” are reserved for future implementations and are not used in the current XchedPro version.

Next picture reproduces the choice of colors effect in the Gantt chart report file.

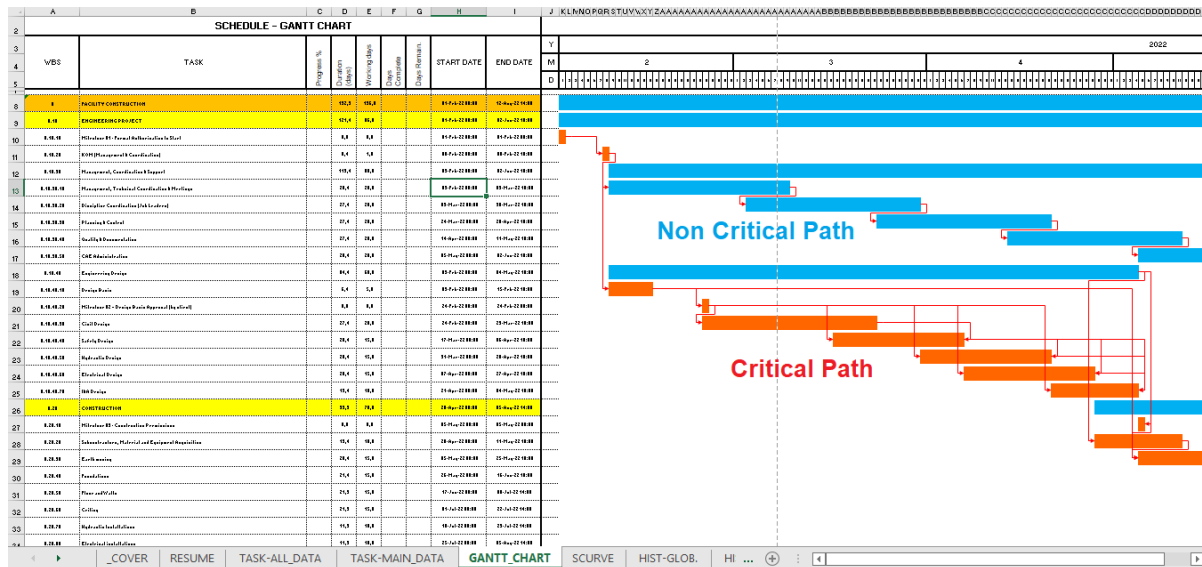


Figure 4.6 – Gantt chart color scheme

The second table under REPORT group defines the colors to be used to fill (highlight) rows of specific type of tasks in the report tables. The “TASK LEVEL” column informs the level of task in the WBS structure.

When the user defines a color for a specific level, all tasks with this level will be highlighted with this color in the tabular reports. More details about WBS structure and task levels, are available in APPENDIX A.

REPORT	
GANTT CHART BAR	COLOR
Planned	Blue
Actual	Grey
Crit.Path (Planned)	Orange
Crit.Path (Actual)	Grey
Connections	Red
TASK LEVEL	COLOR
Level 1	Yellow
Level 2	Yellow
Level 3	Yellow
Level 4	Yellow
Level 5	Yellow
Level 6	Yellow
CHART	TIME INTERVAL
Gantt	Auto
SCurve+Histograms	Auto

Figure 4.7 – Report appearance parameters – Task level colors

The next figure shows how the choice of level color impact the tables in the report file.

SCHEDULE - MAIN DATA											
LEVEL	WBS	ID	TASK TITLE	START DATE	END DATE	DURATION		CRIT. PATH	FREE FLOAT	TOTAL FLOAT	LATE START
						Work	Calendar				
1	0	0	FACILITY CONSTRUCTION	01-Feb-22 08:00	12-Aug-22 14:00	136,0	192,3		-7,0	-49,0	02-fev-22 08:00
2	0.10	1000	ENGINEERING PROJECT	01-Feb-22 08:00	02-Jun-22 18:00	86,0	121,4		-7,0	-49,0	02-fev-22 08:00
3	0.10.10	1100	Milestone #1 - Formal Authorization to Start	01-Feb-22 08:00	01-Feb-22 08:00	0,0	0,0	X	7,0	-42,0	08-fev-22 08:00
14	0.10.20	1200	KIM (Management & Coordination)	08-Feb-22 08:00	09-Feb-22 18:00	1,0	0,0	X	0,0	-49,0	09-fev-22 08:00
15	0.10.30	1300	Management, Coordination & Support	09-Feb-22 08:00	02-Jun-22 18:00	80,0	113,3		-7,0	45,0	02-fev-22 08:00
16	0.10.30.1	1301	Administration & Meetings (Leaders)	09-Feb-22 08:00	09-Mar-22 18:00	20,0	28,4		-7,0	45,0	02-fev-22 08:00
17	0.10.30.2	1302	Administration & Meetings (Leaders)	03-Mar-22 08:00	30-Mar-22 18:00	20,0	28,4		-7,0	52,0	24-fev-22 08:00
18	0.10.30.30	1330	Planning & Control	24-Mar-22 08:00	20-Apr-22 18:00	20,0	27,0		-7,0	59,0	17-mar-22 08:00
19	0.10.30.40	1340	Quality & Documentation	14-Apr-22 08:00	11-May-22 18:00	20,0	27,0		-7,0	66,0	07-abr-22 08:00
20	0.10.30.50	1350	CAE Administration	05-May-22 08:00	02-Jun-22 18:00	20,0	28,0		73,0	73,0	17-jul-22 00:00
21	0.10.40	1400	Engineering Design	09-Feb-22 08:00	04-May-22 18:00	60,0	84,0		-7,0	-31,0	02-fev-22 08:00
22	0.10.40.10	1410	Design Basis	09-Feb-22 08:00	19-Feb-22 18:00	5,0	6,4	X	-7,0	-49,0	02-fev-22 08:00
23	0.10.40.20	1420	Milestone #2 - Design Basis Approval (by client)	24-Feb-22 08:00	24-Feb-22 08:00	0,0	0,0	X	-7,0	-42,0	17-fev-22 08:00
24	0.10.40.30	1430	Civil Design	24-Feb-22 08:00	23-Mar-22 18:00	15,0	20,4	X	-7,0	-35,0	17-fev-22 08:00
25	0.10.40.40	1440	Safety Design	17-Mar-22 08:00	06-Apr-22 18:00	15,0	20,4	X	-7,0	-28,0	10-mar-22 08:00
26	0.10.40.50	1450	Hydraulic Design	31-Mar-22 08:00	20-Apr-22 18:00	15,0	20,4	X	-7,0	-21,0	24-mar-22 08:00
27	0.10.40.60	1460	Electrical Design	07-Apr-22 08:00	27-Apr-22 18:00	15,0	20,4	X	-7,0	-14,0	31-mar-22 08:00
28	0.10.40.70	1470	ME&A Design	21-Apr-22 08:00	04-May-22 18:00	10,0	13,4	X	-7,0	-7,0	14-abr-22 08:00
29	0.20	2000	CONSTRUCTION	28-Apr-22 08:00	05-Aug-22 14:00	70,0	99,3		0,0	0,0	21-abr-22 08:00
30	0.20.10	2100	Milestone #3 - Construction Permissions	05-May-22 08:00	05-May-22 08:00	0,0	0,0	X	0,0	-17,0	05-mai-22 08:00
31	0.20.20	2200	Subcontractors, Material and Equipment Acquisition	28-Apr-22 08:00	11-May-22 18:00	10,0	13,4	X	-7,0	-24,0	21-abr-22 08:00
32	0.20.30	2300	Earth moving	05-May-22 08:00	25-May-22 18:00	15,0	20,4	X	0,0	-17,0	05-mai-22 08:00
33	0.20.40	2400	Foundations	26-May-22 08:00	16-Jun-22 18:00	15,0	21,4	X	0,0	-17,0	26-mai-22 08:00
34	0.20.50	2500	Floor and Walls	17-Jun-22 08:00	08-Jul-22 14:00	15,0	21,3	X	-10,0	-17,0	07-jun-22 08:00
35	0.20.60	2600	Ceiling	01-Jul-22 08:00	22-Jul-22 14:00	15,0	21,3	X	-7,0	-7,0	24-jun-22 08:00
36	0.20.70	2700	Hydraulic Installations	18-Jul-22 08:00	29-Jul-22 14:00	10,0	11,3		0,0	0,0	18-jul-22 08:00
37	0.20.80	2800	Electric Installations	25-Jul-22 08:00	05-Aug-22 14:00	10,0	11,3		0,0	0,0	25-jul-22 08:00
38	0.20.90	2900	Safety and Firewater Installations	25-Jul-22 08:00	05-Aug-22 14:00	10,0	11,3		0,0	0,0	25-jul-22 08:00
39	0.30	3000	COMMISSIONING & STARTUP	08-Aug-22 08:00	12-Aug-22 14:00	5,0	4,3	X	0,0	0,0	08-ago-22 08:00

Figure 4.8 – Task level highlight color scheme

The third table under REPORT group define the scale for the time axis in report charts. This table defines the time interval under the resources and planned progress are totalized.

REPORT	
<b>GANTT CHART BAR</b>	<b>COLOR</b>
Planned	Blue
Actual	Green
Crit.Path (Planned)	Orange
Crit.Path (Actual)	Red
Connections	Red
<b>TASK LEVEL</b>	<b>COLOR</b>
Level 1	Yellow
Level 2	Orange
Level 3	Yellow
Level 4	White
Level 5	White
Level 6	White
<b>CHART</b>	<b>TIME INTERVAL</b>
Gantt	Auto
SCurve+Histograms	Auto
MESSAGE	Auto
MESSAGE T	Days
EL	Weeks
	Months
	Years

Figure 4.9 – Report appearance parameters - Charts time axis scale

If “Auto” option is chosen, an internal algorithm will calculate the best time interval, based in the schedule total duration (recommended option). For Gantt charts, just the “Auto” option is implemented in current version. The figure below illustrates the effect of the time interval impacts the output report, in this case, time interval select was “weeks”.

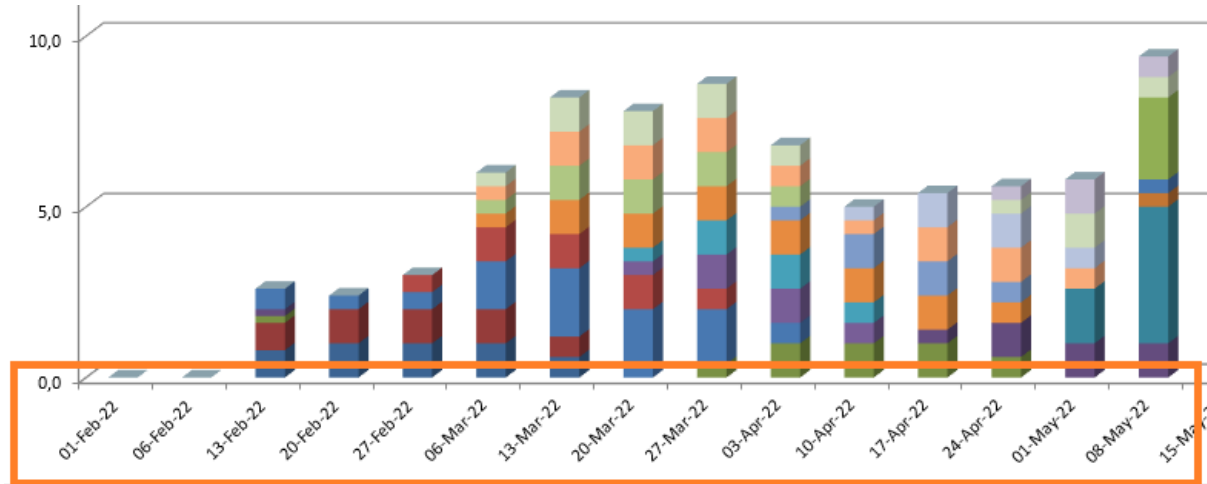


Figure 4.10 – Time interval effect for charts

#### 4.1.4. Work Days/Hours definition

This table defines the week working days and respective working hours. Week days with TOTAL HOURS = 0, are considered non-work days.

WORK DAYS/HOURS			
WEEK DAYS	START TIME	END TIME	TOTAL HOURS
Sunday	0:00	0:00	0:00
Monday	8:00	18:00	9:00
Tuesday	8:00	18:00	9:00
Wednesday	8:00	18:00	9:00
Thursday	8:00	18:00	9:00
Friday	8:00	14:00	6:00
Saturday	0:00	0:00	0:00

Figure 4.11 – Work Days/Hours definition

#### 4.1.5. Holidays definition

This table defines holidays and other non-work days, ie, days that will not be considered in the schedule calculations. Dates for all holidays and non-work days during the schedule interval should be informed here. Fixed date holidays can be informed just one time, using the year = 1904, in this case XchedPro will repeat this date as a holiday for all years during the schedule interval. No dates before 1<sup>st</sup>, January, 1904 are allowed.

HOLIDAYS	
DATE	DESCRIPTION
1-Jan-1904	New Year's Day
4-Jul-1904	Independence Day (USA)
11-Nov-1904	Veterans Day (USA)
25-Dec-1904	Christmas Day
17-Jan-2022	Martin Luther King, Jr. Day (USA)
21-Feb-2022	President's Day (USA)
30-May-2022	Memorial Day (USA)
5-Sep-2022	Labor Day (USA)
11-Oct-2022	Columbus Day (USA)
24-Nov-2022	Thanksgiving Day (USA)
16-Jan-2023	Martin Luther King, Jr. Day (USA)
20-Feb-2023	President's Day (USA)
29-May-2023	Memorial Day (USA)
4-Sep-2023	Labor Day (USA)
9-Oct-2023	Columbus Day (USA)
23-Nov-2023	Thanksgiving Day (USA)

Figure 4.12 – Holidays definition

**TIP**

Create different holiday tables with fixed data holidays for each country/state where projects are to be executed and (re)use it as a start point for new schedules.

### 4.1.6. Resources Types (Families) registration

In this table, the user should inform all types (families) of resources that will be used to group the project resources. For example, all kinds of technician resources (like several engineers and designers specialists) can be grouped under a resource type "HC" (head count). All kind of raw materials necessary to perform construction or assembly the project activities/tasks can be grouped under a type "MAT" (materials). The form how the resources are grouped allows different project visions. If a head count group is defined, the planned resources allocation is a project histogram, but if all kinds of financial disbursement are grouped, the planned progress curve report can be read as a planned cash-flow curve.

RESOURCE TYPES (FAMILIES)	
TYPE ID	DESCRIPTION
HC	HEAD COUNT
SOFT	SOFTWARE
MAT	RAW MATERIAL
EQP	EQUIPMENT
CAP	CAPITAL

Figure 4.13 – Resources Types registration

Just 2 (or optionally one) definitions are necessary to register a resource type:

**TYPE:** An alphanumeric code of the resource type (or family). In example showed in figure above, was defined 5 resource types (HC = head count, SOFT = software, MAT = raw material, EQP = equipment and CAP = capital). This is just an example; the user is free to define the code and the number of resources types. This information will be used by XchedPro to group resources of same type, during some calculations and reports.

**DESCRIPTION:** A free text to describe the resource type. This field is just for information and will not be used by XchedPro engine. This field is optional.

#### 4.1.7. Resources registration

In this table, the user should inform all kind of resources that are available to be consumed by the project activities. Resources are any kind of means or efforts necessary to complete a task. Resources can be work hours, raw materials, equipment, money, etc. or a combination of them.

RESOURCES		
TYPE ID	RES ID	DESCRIPTION
HC	EPM	Project Manager
HC	TCC	Technical Coordinator
HC	PCP	Plan. & Cont. Professional
HC	QDP	Qual. & Doc. Professional
HC	PRP	Procurement Professional
HC	3DA	3D Administrator
HC	CVE	Civil Engineer
HC	CVD	Civil Designer
HC	CVW	Civil Worker
SOFT	3DMOD	3D Model Licenses
SOFT	ACAD	2D Model Licenses
SOFT	REV	Structure Calculation
MAT	CONC	Concrete Tons
MAT	STL	Steel Tons
EQP	CRN	Crane
EQP	PLD	Pile Driver
CAP	USD	American Dolar
CAP	EUR	Euro

Figure 4.14 – Resources registration

There are 3 information about available resources to be provided:

**TYPE:** here should be defined an alphanumeric code to the resource type (or family). In example showed in figure above, was defined 4 resource types (HC = head count, SOFT = software, MAT = material and CAP = capital). This is just an example; the user is free to define the code and the number of resources types. This information will be used by XchedPro to group resources of same type, during some calculations.

**RES ID:** Resource identification (alphanumeric code). Identification for a specific resource. In this example was defined some professional positions, software tools, construction materials and

currencies. XchedPro will totalize these resources individually and by type (family) to provide useful information for schedule analysis and resources leveling. The resources totalization results are presented in output report file as histograms charts and tables, organized by resource type. The resource ID should be unique.

**DESCRIPTION:** A free text to describe the resource. This field is just for information and will not be used by XchedPro engine. This field is optional.

**TIP**

Depend on the kind of resource, XchedPro can generate different kind of information. For example, if the user defines capital as a resource and associate each task in the schedule to it cost, the resultant histogram is an expenditure curve, that can be use to a cash flow analysis.

## 4.2. SCHEDULE GENERAL DATA SECTION

This section provides general information about the current schedule. The information to be provided in each table of this section are detailed in the next items.

	A	B	C	D	E	F	G	H	I	J	K
1	<b>SCHEDULE BASIC INFO</b>										
2	<b>INFO</b>			<b>VALUE</b>							
3	<b>Project:</b>		NEW FACILITY CONSTRUCTION								
4	<b>Area/Department:</b>		ENGINEERING								
5	<b>Case:</b>		PRELIMINARY STUDY								
6	<b>Title:</b>		SIMPLE EXAMPLE FOR USER MANUAL								
7	<b>Doc Number:</b>		XX-YYY-ZZZ-NNN								
8	<b>Start Date:</b>		31-Jan-2022								
9	<b>Estimated Finish Date:</b>		1-Mar-2023								
10	<b>Calculation Base Date:</b>		1-Feb-2022								
11											
12	<b>REVISIONS CONTROL</b>										
13	<b>REV.</b>	<b>DESCRIPTION</b>				<b>DATE</b>	<b>ELAB.</b>	<b>CHECK.</b>	<b>APPR.</b>		
14	0	ORIGINAL ISSUE				18-Jan-2022	ABC	DEF	GHI		
15											
16											
17											
18											

Figure 4.15 – Schedule general data section

### 4.2.1. Schedule Basic Info

<b>SCHEDULE BASIC INFO</b>											
<b>INFO</b>			<b>VALUE</b>								
<b>Project:</b>		NEW FACILITY CONSTRUCTION									
<b>Area/Department:</b>		ENGINEERING									
<b>Case:</b>		PRELIMINARY STUDY									
<b>Title:</b>		SIMPLE EXAMPLE FOR USER MANUAL									
<b>Doc Number:</b>		XX-YYY-ZZZ-NNN									
<b>Start Date:</b>		1-Feb-2022									
<b>Estimated Finish Date:</b>		1-Mar-2023									
<b>Calculation Base Date:</b>		1-Feb-2022									

Figure 4.16 – Schedule Basic Info table

This table provide overall information about the current schedule. The information provided in the 5 first rows (Project, Area/Department, Case, Title and Doc Number) are basically free and will just be reproduced in output report header. All fields are alphanumeric and no kind of validation check is performed.

The information of last 3 rows (Start, Estimated Finish and Calculation Base dates), should be provided in a format of valid and consistent dates. No dates before 1<sup>st</sup>, January, 1905 are allowed. The "Calculation Base Date" is a reference date used internally by XchedPro algorithm to calculate overall progress and some KPIs, if no date is provided, a default value = "today" will be defined.

### 4.2.2. Revision Control

The information provided in this section are basically free and will just be reproduced in output report cover sheet. All fields are alphanumeric, except DATE field, that should contain a valid and consistent date. No dates before 1<sup>st</sup>, January, 1905 are allowed. The revision ID ("Rev." column) should be unique.

REVISIONS CONTROL						
REV.	DESCRIPTION	DATE	ELAB.	CHECK.	APPR.	
0	ORIGINAL ISSUE	18-Jan-2022	ABC	DEF	GHI	

Figure 4.17 – Schedule Revision Control table

### 4.3. TASK DATA SECTION

This is the most important and complex section in the input file. In the Detailed Task Data table, all data about the tasks (or activities) present in the schedule, should be informed. The schedule is basically a set of tasks, whose parameters are defined in this table.

DETAILED TASK DATA									
ID	WBS	CODE	TITLE	DESCRIPTION	DURATION Work Days	PRECURSORS	RELATION	OFFSET	NECESSARY / AVAILABLE RESOURCES
0	0	T-0010	FACILITY CONSTRUCTION						
1000	0.10	T-0020	ENGINEERING PROJECT						
1100	0.10.10	T-0030	Milestone #1 - Formal Authorization to Start		0.0				
1200	0.10.20	T-0040	KOM (Management & Coordination)		1.0	1100	SE 5		1 EPM;1 TCC;1 PCP;1 QDP
1300	0.10.30	T-0050	Management, Coordination & Support						
1310	0.10.30.10	T-0060	Management, Technical Coordination & Meetings		20.0	1200	SE 0		1 EPM;1 TCC
1320	0.10.30.20	T-0070	Discipline Coordination (Job Leaders)		20.0	1310	SE 5		1 CVE
1330	0.10.30.30	T-0080	Planning & Control		20.0	1320	SE 5		1 PCP
1340	0.10.30.40	T-0090	Quality & Documentation		20.0	1330	SE 5		1 QDP
1350	0.10.30.50	T-0100	CAE Administration		20.0	1340	SE 5		1 3DA;1 3DMOD
1400	0.10.40	T-0110	Engineering Design						
1410	0.10.40.10	T-0120	Design Basis		5.0	1200	SE 0		1 CVE
1420	0.10.40.20	T-0130	Milestone #2 - Design Basis Approval (by client)		0.0	1410	SE 5		
1430	0.10.40.30	T-0140	Civil Design		20.0	1420	SE 0		1 CVE; 1 CVD
1440	0.10.40.40	T-0150	Safety Design		15.0	1420	SE 0; 1430	EE 10	1 CVE; 1 CVD
1450	0.10.40.50	T-0160	Hydraulic Design		15.0	1420	SE 0; 1440	EE 10	1 CVE; 1 CVD
1460	0.10.40.60	T-0170	Electrical Design		15.0	1420	SE 0; 1440	EE 5; 1450	EE 5
1470	0.10.40.70	T-0180	I&A Design		10.0	1440	EE 10; 1450	EE 10; 1460	EE 5
2000	0.20	T-0190	CONSTRUCTION						
2100	0.20.10	T-0200	Milestone #3 - Construction Permissions		0.0	1400	EE 0		
2200	0.20.20	T-0210	Subcontractors, Material and Equipment Acquisition		10.0	1400	SE 5		4 PRP; 1 USD
2300	0.20.30	T-0220	Earth moving		15.0	1410	SE 0; 2100	SE 0; 2200	SE 5
2400	0.20.40	T-0230	Foundations		15.0	2300	SE 0		1 CVE; 10 CVW; 2 PLD
2500	0.20.50	T-0240	Floor and Walls		15.0	2400	SE 0		1 CVE; 8 CVW; 1 CRN
2600	0.20.60	T-0250	Ceiling		15.0	2500	SE 5		1 CVE; 10 CVW; 2 CRN
2700	0.20.70	T-0260	Hydraulic Installations		10.0	2500	SE 10; 2600	SE 5	1 CVE; 8 CVW
2800	0.20.80	T-0270	Electrical installations		10.0	2500	SE 10; 2600	SE 0	1 CVE; 8 CVW
2900	0.20.90	T-0280	Safety and Firewater Installations		10.0	2500	SE 0		1 CVE; 8 CVW
3000	0.30	T-0290	COMMISSIONING & STARTUP		5.0	2000	SE 0		1 CVE; 0; 1 USD

Figure 4.18 – Task data section

This table has 8 columns with information to be provide for each task (or activity) in the schedule. Each row in this table represents one task/activity. A detailed description of all information to be provide for each task is presented below:

- **ID** – Internal Task (also called “activity”) identification, used as a reference to the Task. An alphanumeric string that defines uniquely the task. The ID string should not contain the following characters: “/”, “\”, “|”, “,”, “;”, “<”, “>”, “ ”, “'”, “””. This field is MANDATORY;
- **WBS** – A codification of the Task position in the project Work Breakdown Structure. Each level in the WBS codification should defined by a delimiter “.”. This field is MANDATORY.

TASK ID	WBS	HIERARCHICAL REPRESENTATION
TASK1	T1	<pre> graph TD     TASK1[TASK1] --- TASK2[TASK2]     TASK1 --- TASK3[TASK3]     TASK1 --- TASK4[TASK4]     TASK4 --- TASK5[TASK5]     TASK4 --- TASK6[TASK6]             </pre>
TASK2	T1.T2	
TASK3	T1.T3	
TASK4	T1.T4	
TASK5	T1.T4.T5	
TASK6	T1.T4.T6	

Table 4.1 – WBS coding example

The information in this column defines ordinary tasks and super tasks. A super task can be defined as a group of ordinary tasks and/or other super tasks. In the example above, TASK1 and TASK4 are super tasks. It is important to note that each level identification (string between the “.” in the WBS code), doesn’t need to have any relation to Task ID. Refer to APPENDIX A, for a more detailed explanation about tasks, super tasks and XchedPro WBS concept;

- **CODE** – A free string code (max 32 characters) related to the Task. If the Task is a document, the code can be the document number. If the Task is a maintenance job, the CODE can be the Service Order number. This information can be very useful to create customized reports. No kind of check is done with this value. This field is OPTIONAL;
- **TITLE** – A title (or resumed description) for the Task (max 252 characters). A free text used just for report purposes. No kind of check is done with this value. This field is OPTIONAL;
- **DESCRIPTION** – A long description for the Task (max 1024 characters). A free text used just for report purposes. No kind of check is done with this value. This field is OPTIONAL;
- **DURATION** – The Task duration (necessary time to perform the Task). This field is MANDATORY for Tasks and OPTIONAL for Super Tasks, if provided should be a number greater than or equal zero. Tasks with zero duration are considered milestones. The task duration can be defined in several time units, as specified in by selection of a respective option in the column header combo box.

Work Hours	Number of work hours required to perform the task. The maximum number of working hours for each day of week is obtained from the table WORK DAYS/HOURS defined in the Config section
Work Days	Number of work days required to perform the task. The number of working days is obtained from the table WORK DAYS/HOURS defined in the Config section. Every day with a non-zero number of work hours is considered a work day, no matter the number of work hours.
Work Weeks	Number of work weeks required to perform the task. Internally, XchedPro convert this number to work hours, by the formula: $WH = WW * WHW$ Where: WH = number of work hours to be used by XchedPro WW = number of work weeks, defined by user WHW = total number of work hours by week, defined in the WORK DAYS/HOURS table
Work Months	Number of work months required to perform the task. Internally, XchedPro convert this number to work hours, by the formula: $WH = WM * WHW * 4 * (30/28)$ Where: WH = number of work hours to be used by XchedPro WM = number of work months, defined by user WHW = total number of work hours by week, defined in the WORK DAYS/HOURS table
Work Years	Number of work years required to perform the task. Internally, XchedPro convert this number to work hours, by the formula: $WH = WY * WHW * 52$ Where: WH = number of work hours to be used by XchedPro WY = number of work years, defined by user WHW = total number of work hours by week, defined in the WORK DAYS/HOURS table

- **PREDECESSORS INFO** – A codified block of information (or set of blocks, separated by “;”), that defines the predecessor(s) task(s), the precedence relationship between the current and predecessor task and the offset (or leg) to be applied in this precedence relationship. Each block of information has the following structure:

**PRED\_ID|REL\_TYPE|LEG\_VAL**

Where:

**PRED\_ID** = ID from predecessor Task

**REL\_TYPE** = relationship between current Task and predecessor Task, can assume the values bellow:

**EE** = End-End, the current task finish at same time that predecessor task

**ES** = End-Start, the current Task finish at same time that the predecessor task starts

**SE** = Start-End, the current Task starts at same time that predecessor Task finish

**SS** = Start-Start, the current Task starts at same time that predecessor Task

**LEG\_VAL** = A time offset to be applied in precedence relationship. The offset can be positive (the time is added), negative (the time is subtracted) or zero. The offset can be defined in several time units, by selection of a respective option in the column header combo box. The options and behavior for the offset time units are the same of previous DURATION column time unit explanation.

This entire field is OPTIONAL, if not provided, XchedPro will consider that current Task starts at "Start Date", defined in "Schedule Basic Info" table, in SCHED-DATA sheet/section. If provided, this field should contain, at least, one complete block of information.

- **RESOURCES INFO** – A codified block of information (or set of blocks, separated by ";"), that defines the kind and the quantity of resources necessary to perform the Task. Each block of information has the following structure:

**RES\_QTTY|RES\_ID**

Where:

**RES\_QTTY** = number of resources, of **RES\_ID** name, to perform the task

**RES\_ID** = resource ID, as defined in the Resource register table in CONFIG-DATA section

This field is OPTIONAL, if not provided, XchedPro will assume that no resources are necessary to perform this task. If this data is provided for super tasks, XchedPro will consider the resources as an estimate and will compare the quantity of each resource with the totalization of each resource across all tasks under this super task. More details about Resource Balance can be found in section 5.8.1. If provided, this field should contain, at least, one complete block of information.

The next example illustrates all task definition parameters. Let's consider the definition of a specific Task (ID = 1440), as highlighted in the figure bellow.

DETAILED TASK DATA							
ID	WBS	CODE	TITLE	DESCRIPTION	DURATION Work Days [WD]	PREDECESSORS RELATION OFFSET Work Days [WD]	NECESSARY / AVAILABLE RESOURCES
0	0	T-0010	FACILITY CONSTRUCTION				
1000	0.10	T-0020	ENGINEERING PROJECT				
1100	0.10.10	T-0030	Milestone #1 - Formal Authorization to Start		0,0		
1200	0.10.20	T-0040	KOM (Management & Coordination)		1,0	1100 SE 5	1 EPM;1 TCC;1 PCP;1 QDP
1300	0.10.30	T-0050	Management, Coordination & Support				
1310	0.10.30.10	T-0060	Management, Technical Coordination & Meetings		20,0	1200 SE 0	1 EPM;1 TCC
1320	0.10.30.20	T-0070	Discipline Coordination (Job Leaders)		20,0	1310 SE -5	1 CVE
1330	0.10.30.30	T-0080	Planning & Control		20,0	1320 SE -5	1 PCP
1340	0.10.30.40	T-0090	Quality & Documentation		20,0	1330 SE -5	1 QDP
1350	0.10.30.50	T-0100	CAE Administration		20,0	1340 SE -5	1 3DA;1 3DMOD
1400	0.10.40	T-0110	Engineering Design				
1410	0.10.40.10	T-0120	Design Basis		5,0	1200 SE 0	1 CVE
1420	0.10.40.20	T-0130	Milestone #2 - Design Basis Approval (by client)		0,0	1410 SE 0	
1430	0.10.40.30	T-0140	Civil Design		20,0	1420 SE 0	1 CVE; 1 CVD
1440	0.10.40.40	T-0150	Safety Design		15,0	1420 SE 0; 1430 EE 10	1 SFE; 1 SFD
1450	0.10.40.50	T-0160	Hydraulic Design		15,0	1420 SE 0; 1440 EE 10	1 CVE; 1 CVD
1460	0.10.40.60	T-0170	Essential Design		15,0	1430 SE 0; 1440 SE 0; 1450 SE 0	1 SFE; 1 SFD
1470	0.10.40.70	T-0180	I&A Design		10,0	1440 EE 10; 1450 EE 10; 1460 EE 5	1 CVE; 1 CVD
2000	0.20	T-0190	CONSTRUCTION				
2100	0.20.10	T-0200	Milestone #3 - Construction Permissions		0,0	1400 EE 0	
2200	0.20.20	T-0210	Subcontractors, Material and Equipment Acquisition		10,0	1400 SE -5	4 PRP; 1 USD
2300	0.20.30	T-0220	Earth moving		15,0	1410 SE 0; 2100 SE 0; 2200 SE -5	1 CVE; 6 CVW
2400	0.20.40	T-0230	Foundations		15,0	2300 SE 0	1 CVE; 10 CVW; 2 PLD
2500	0.20.50	T-0240	Floor and Walls		15,0	2400 SE 0	1 CVE; 8 CVW; 1 CRN
2600	0.20.60	T-0250	Ceiling		15,0	2500 SE -5	1 CVE; 10 CVW; 2 CRN
2700	0.20.70	T-0260	Hydraulic Installations		10,0	2500 SE -10; 2600 SE -5	1 CVE; 8 CVW
2800	0.20.80	T-0270	Electrical installations		10,0	2500 SE -10; 2600 SE 0	1 CVE; 8 CVW
2900	0.20.90	T-0280	Safety and Firewater Installations		10,0	2600 SE 0	1 CVE; 8 CVW
3000	0.30	T-0290	COMMISSIONING & STARTUP		5,0	2000 SE 0	1 CVE; 0,1 USD

Figure 4.19 – Example for detailed Task definition

In the next table, each field related to a specific Task definition is explained in details

FIELD	VALUE	DESCRIPTION
ID	1440	Task internal ID, this ID should be used to define the Task uniquely. In this case the Task ID is 1440
WBS	0.10.40.40	Task position in the project WBS structure. In this case the Task is in the fourth level, under the super Task with WBS = 0.10.40
CODE	T-0150	The Task Code. A mnemonic identification for the task. This text will be reproduced in the reports
TITLE	Safety Design	The Task Title. This text will be reproduced in the reports.
DESCRIPTION		The Task Description. This text will be reproduced in the reports. In this case, no description was provided
DURATION	15,0	The Task Duration. This value represents the total Task duration in the units defined in the column header (in this example “Work Days”)
PREDECESSORS INFO	1420 SE 0; 1430 EE 10	Predecessor(s) Information. In this case, the content of this field informs that the current task (ID=1440) has two predecessor tasks (ID=1420 and ID=1430). The precedence type is Start-End for Task 1420 (with no leg) and End-End for Task 1430, with a leg (offset) of 10 time units. The time units is defined in the column header (in this example “Work Days”)
RESOURCES INFO	1 SFE; 1 SFD	Quantity and Type of necessary resources to execute current task. In this case are necessary two resources, one SFE and one SFD

Table 4.2 – Time units for Task duration

### 4.4. ACTUAL PROGRESS DATA SECTION

This table should be used to provide actual progress information for schedule tasks. This entire table/sheet is OPTIONAL. If data about the actual schedule progress is not available, XchedPro will generate project planning data only, but if data about actual schedule progress is available, XchedPro is able to generate data to help in project management and control activities, like actual progress curves and some KPIs. A detailed description of all information to be provide for each task is presented below:

- **TASK ID** – Task identification. The task ID should exist in the schedule task list, provided in the task definition section (see item 4.3 - TASK DATA SECTION). This field is MANDATORY;
- **START DATE** – Actual task start date. The true task start date. This field is MANDATORY;
- **ACTUAL PROG (%)** – Actual task physical percentual progress until the date defined by column **DATE**. This field is MANDATORY;
- **ACTUAL CONSUMED RESOURCES** – Number of actual resources consumed by the task until the date defined by column **DATE**. This field is OPTIONAL;
- **DATE** – Date to which, the values of ACTUAL PROG and ACTUAL CONSUMED RESOURCES are linked. This field is MANDATORY;

ACTUAL PROGRESS TASK DATA					
TASK ID	START DATE	ACTUAL PROG. (%)	ACTUAL CONSUMED RESOURCES		DATE
1100	31-Jan-2022	50,0%	0,5 CVE; 0,5 CVD		31-Jan-2022
1200	7-Feb-2022	50,0%	0,15 CVE; 0,25 CVD		7-Feb-2022
1310	8-Feb-2022	50,0%	0,15 CVE; 0,25 CVD		8-Mar-2022
1320	2-Mar-2022	50,0%	0,15 CVE; 0,25 CVD		29-Mar-2022
1330	23-Mar-2022	50,0%	0,15 CVE; 0,25 CVD		19-Apr-2022
1340	13-Apr-2022	50,0%	0,15 CVE; 0,25 CVD		10-May-2022
1350	4-May-2022	50,0%	0,15 CVE; 0,25 CVD		1-Jun-2022
1410	8-Feb-2022	50,0%	0,15 CVE; 0,25 CVD		14-Feb-2022
1420	23-Feb-2022	50,0%	0,15 CVE; 0,25 CVD		23-Feb-2022
1430	23-Feb-2022	50,0%	0,15 CVE; 0,25 CVD		22-Mar-2022
1440	16-Mar-2022	50,0%	0,15 CVE; 0,25 CVD		5-Apr-2022
1450	30-Mar-2022	50,0%	0,15 CVE; 0,25 CVD		19-Apr-2022
1460	6-Apr-2022	50,0%	0,15 CVE; 0,25 CVD		26-Apr-2022
1470	20-Apr-2022	50,0%	0,15 CVE; 0,25 CVD		3-May-2022
2100	4-May-2022	50,0%	0,15 CVE; 0,25 CVD		4-May-2022
2200	27-Apr-2022	50,0%	0,15 CVE; 0,25 CVD		10-May-2022
2300	4-May-2022	50,0%	0,15 CVE; 0,25 CVD		24-May-2022
2400	25-May-2022	50,0%	0,15 CVE; 0,25 CVD		15-Jun-2022
2500	16-Jun-2022	50,0%	0,15 CVE; 0,25 CVD		7-Jul-2022
2600	30-Jun-2022	50,0%	0,15 CVE; 0,25 CVD		21-Jul-2022
2700	15-Jul-2022	50,0%	0,15 CVE; 0,25 CVD		28-Jul-2022
2800	22-Jul-2022	50,0%	0,15 CVE; 0,25 CVD		4-Aug-2022
2900	22-Jul-2022	50,0%	0,15 CVE; 0,25 CVD		4-Aug-2022

Figure 4.20 – Actual Progress Task definition

This is a cumulative data table, i.e., updated information can be included without deleting the older ones. Multiples rows with the same TASK ID are allowed at different DATES, but just one pair (TASK ID, DATE) will be accepted. XchedPro, when necessary, will use the most recent info (DATE column) for each task in internal calculations.

**TIP**

In order to save a lot of processing time and machine resources, mainly in large schedules, we recommend that outdated progress information be deleted and/or replaced by updated info. Past information is necessary just to generate the actual progress curves (S-Curves) report, but if a previous report was saved with past data, the user can only recovery data form previous S-Curve report and complement with the new one.

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## 5. XCHEDPRO APPLICATION

XchedPro Graphical User Interface (GUI) can be used for:

- Create a new schedule
- Open an existing schedule (MS Excel input file)
- Edit, include and/or delete schedule data
- Check errors in schedule input data
- Perform all schedule calculations (run a schedule)
- Visualize main results
- Generate the complete report (MS Excel output file)

The application has a classic interface with 1 menu bar, 1 icon bar, 3 panels (views) and 1 status bar, as illustrated by figure bellow.

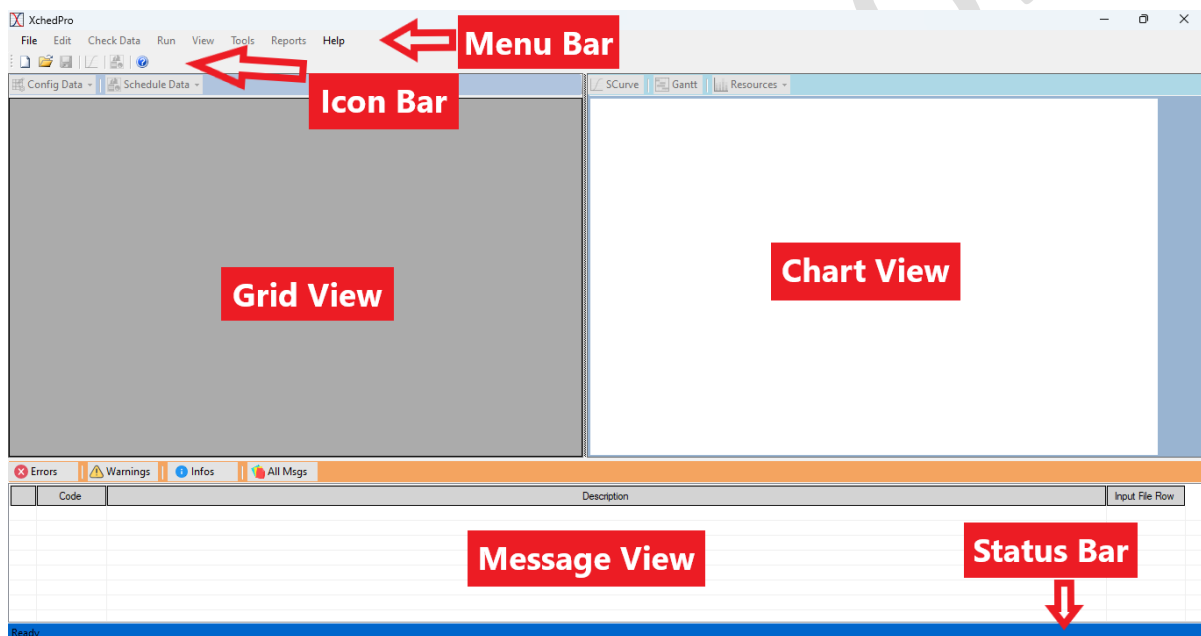


Figure 5.1 – XchedPro Main Frame Interface

All application functionalities are explained in the next sections.

### 5.1. CREATING A NEW SCHEDULE

Under the File option in Menu Bar, click New item. This will start a new schedule. The new schedule will be started with information present in the TEMPLATE\_NEW\_I.xlsx file.

Beside the capabilities in XchedPro interface to create new schedules from zero, we strongly recommend the creation of new schedules directly in the MS Excel input file, this is especially useful for large and/or complex schedules, in these cases the MS Excel capabilities for “copy & paste”, replace and create simple or complex formulas can facilitate a lot the tedious job of create a

schedule with hundreds of tasks. More experienced users can even use macro or VBA programs to automatize parts of schedule creation job.

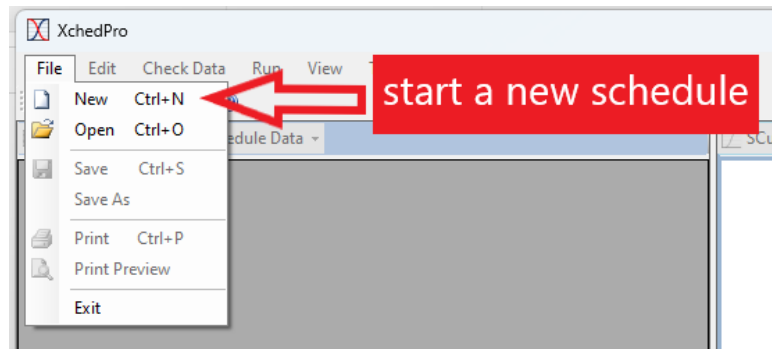


Figure 5.2 – Start a New Schedule

**TIP**

Edit the TEMPLATE\_NEW\_I.xlsx file provide with XchedPro package, to include your common initial information for new schedules (like configuration parameters and basic tasks). If necessary, prepare several files (with different parameters) and just rename them to TEMPLATE\_NEW\_I.xlsx before open a new schedule.

### 5.2. OPENING AN EXISTING SCHEDULE INPUT FILE

Under the File option in Menu Bar, click Open item. This will open a standard dialog to choose an existing MS Excel input file to be open, this file can be read form any folder accessible by computer.

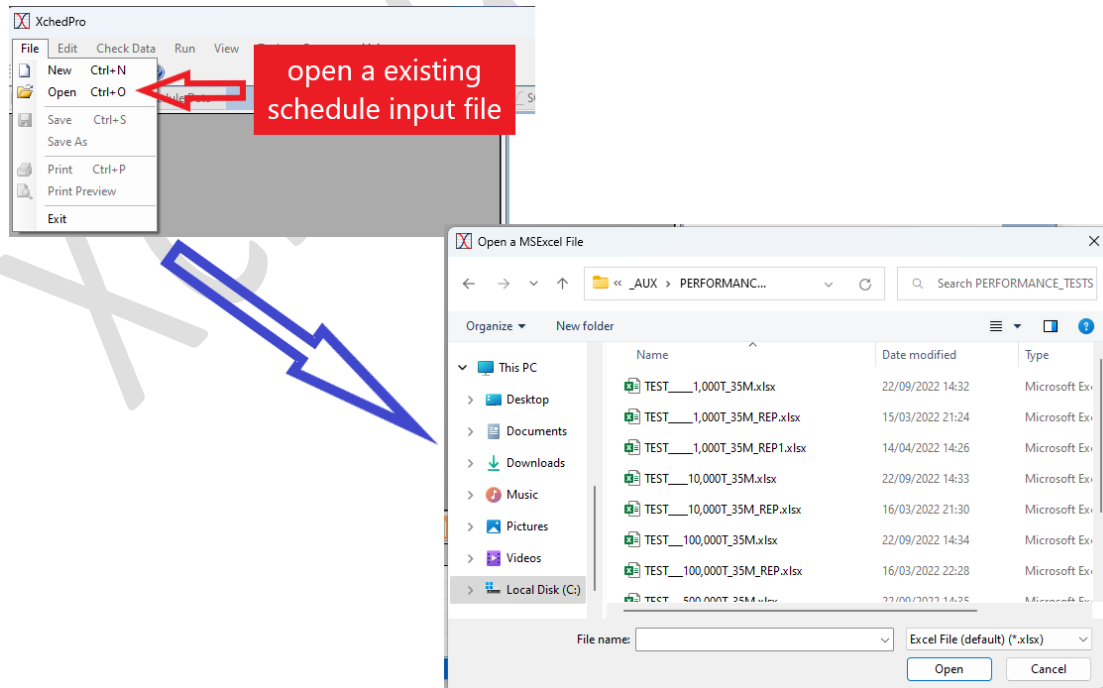


Figure 5.3 – Open an Existing Schedule

### 5.3. EDITING/INCLUDING/DELETING SCHEDULE DATA

The entry point for all input data definition in XchedPro interface is the Grid View panel. There are 2 drop down menus in the top of Grid View panel, “Config Data” menu and “Schedule Data” menu, from these menus and sub-menus its possible access (to visualize or change) all input data.

For each section in the MS Excel schedule input data, there is an equivalent menu entry, that shows a grid with current information about this section. A mouse left or right button click over the grid, will open a dialog for edition (for the fixed number of parameters info: Colors, Work Days and General data) or a context menu with options “Edit Row”, “Insert Row” or “Delete Row”, related to selected row (for the variable number of parameters info: Holidays, Resources, Revisions and Tasks).

All dialogs are intuitive, self-explained and have a first level of input data check. However, due the strong interdependency between schedule data, the most important consistency checks are done just after all data has been provided. After user makes changes in the input data, the data consistency check needs to be executed, pressing item “Check Data” in the Menu Bar. If input data check was not performed and with no errors, the schedule calculations will not be performed, because the item “Run” in Menu Bar will remain disabled.

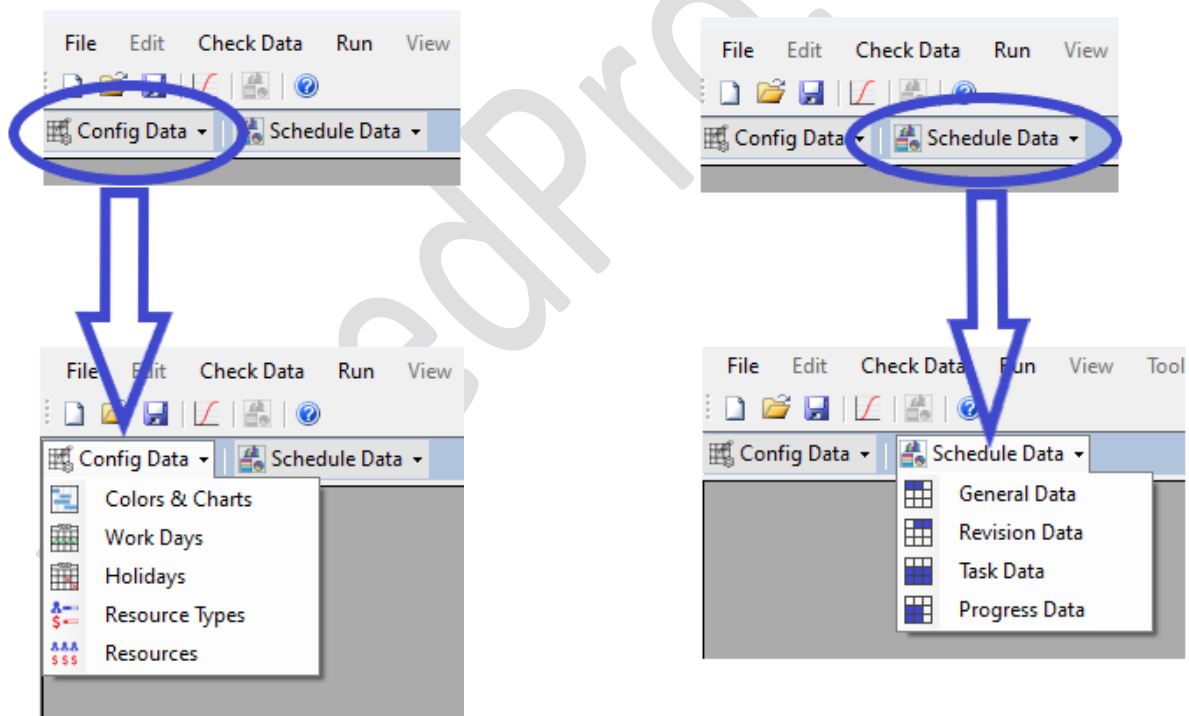


Figure 5.4 – Grid View Menus

#### 5.3.1. Report Appearance Parameters

A click in the menu option “Colors & Charts” will open an edition dialog where the user will be able to configure some appearance parameters for final report file (same information present on REPORT table, in the CONFIG-DATA section of the input data file).

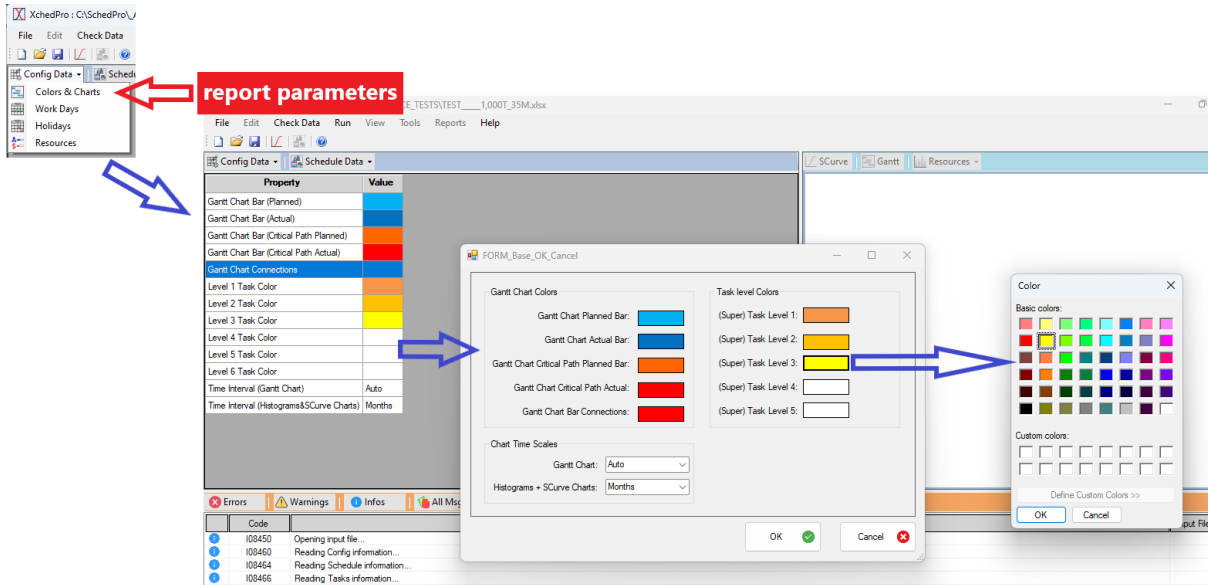


Figure 5.5 – Report Parameters definition

### 5.3.2. Work Days/Hours definition

This dialog can be used to provide the information about the work hours by day and work days by week (same information present on WORK DAYS/HOURS table, in the CONFIG-DATA section of the input data file).

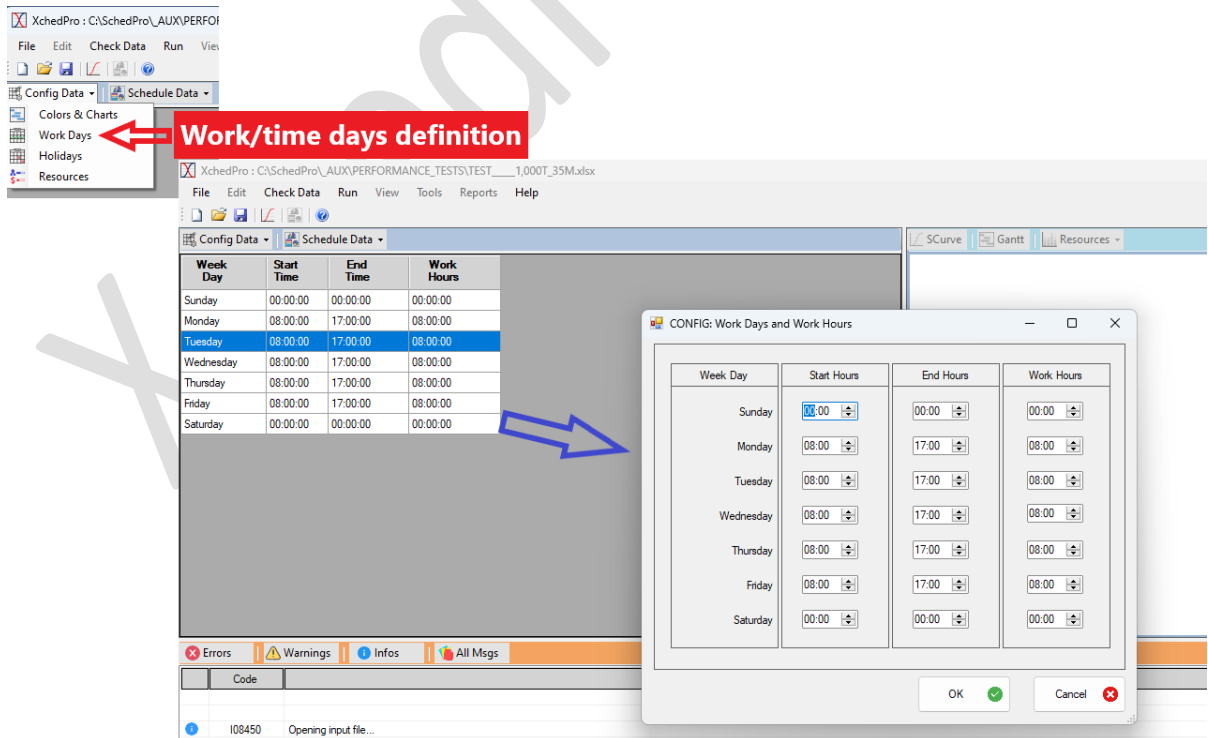


Figure 5.6 – Work Days/Hours definition

### 5.3.3. Holidays definition

This dialog can be used to provide the information about the holidays and/or other specific non-work days (same information present on HOLIDAYS table, in the CONFIG-DATA section of the input data file).

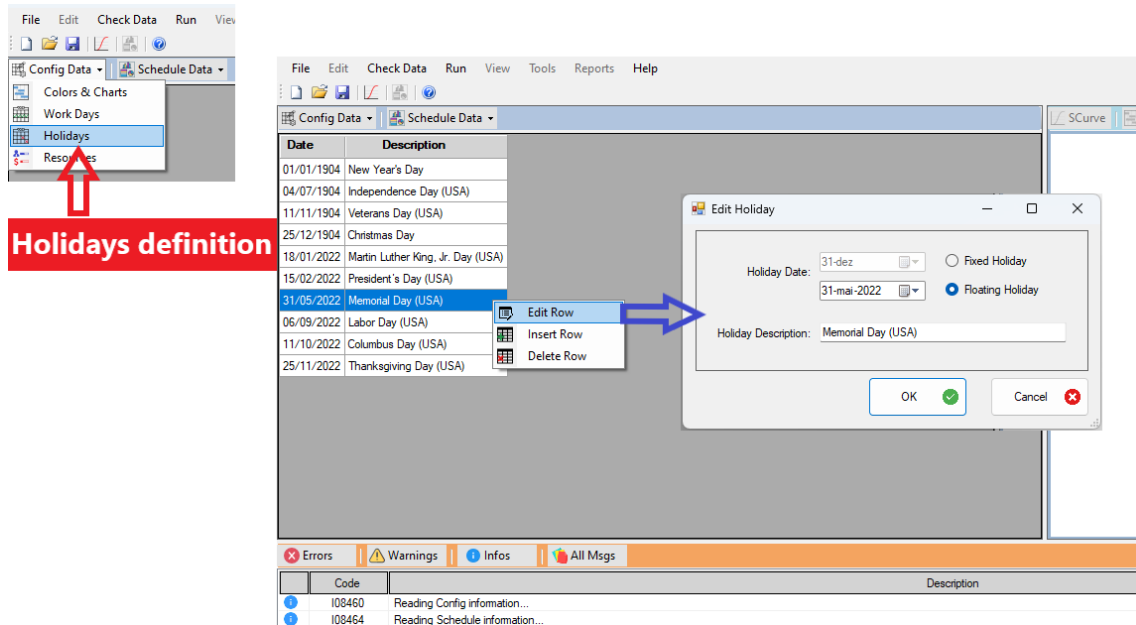


Figure 5.7 – Holidays definition

### 5.3.4. Resources registration

This dialog can be used to register the Resources available (same information present on RESOURCES table, in the CONFIG-DATA section of the input data file).

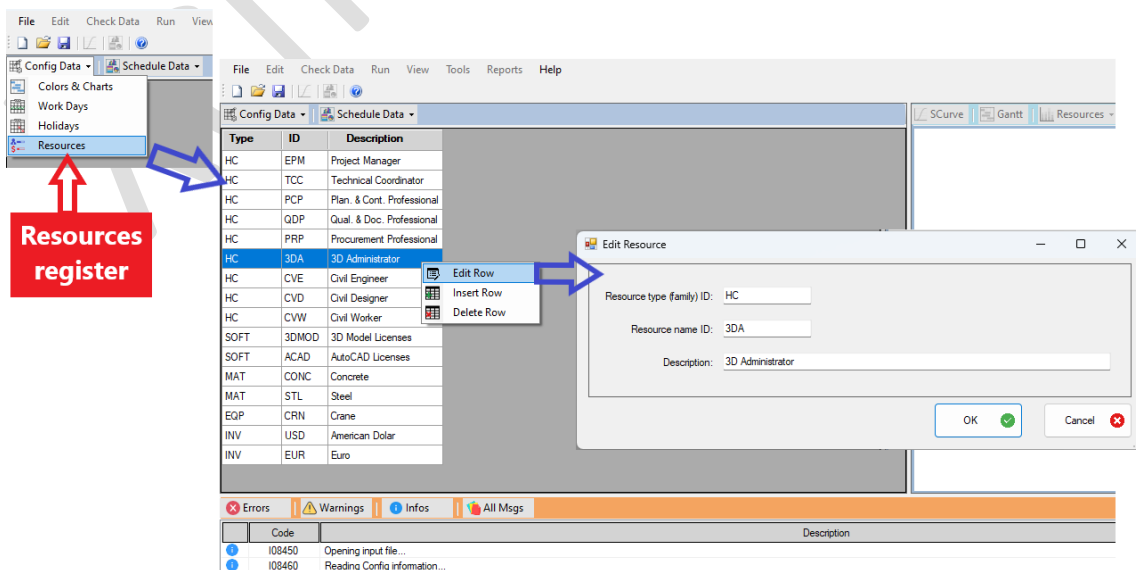


Figure 5.8 – Resources registration

### 5.3.5. Schedule Basic Info

This dialog can be used to provide basic schedule information (same information present on SCHEDULE BASIC INFO table, in the SCHED-DATA section of the input data file).

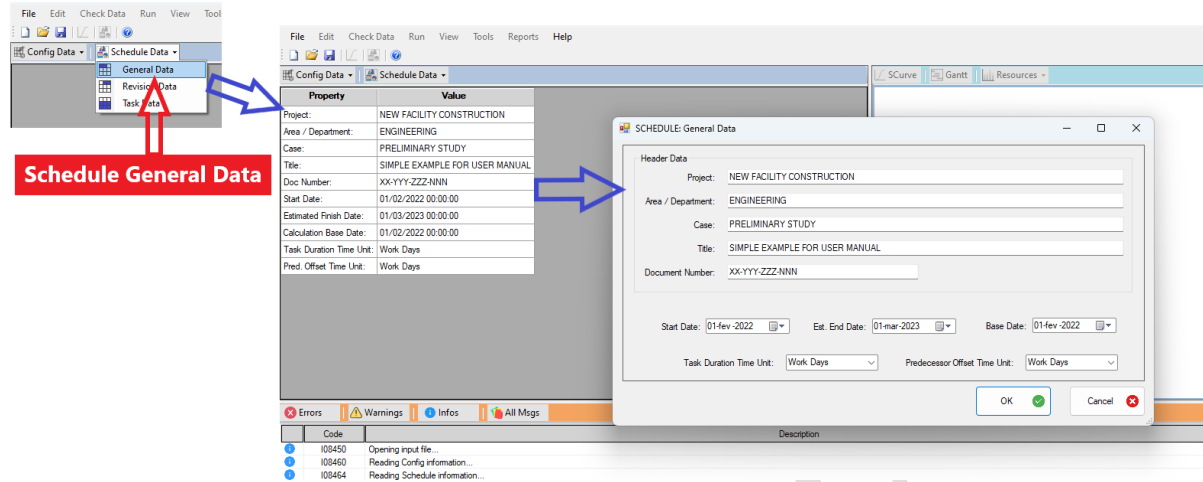


Figure 5.9 – Basic Data definition

### 5.3.6. Revision Control

This dialog can be used to provide information about current schedule revision (same information present on REVISIONS CONTROL table, in the SCHED-DATA section of the input data file).

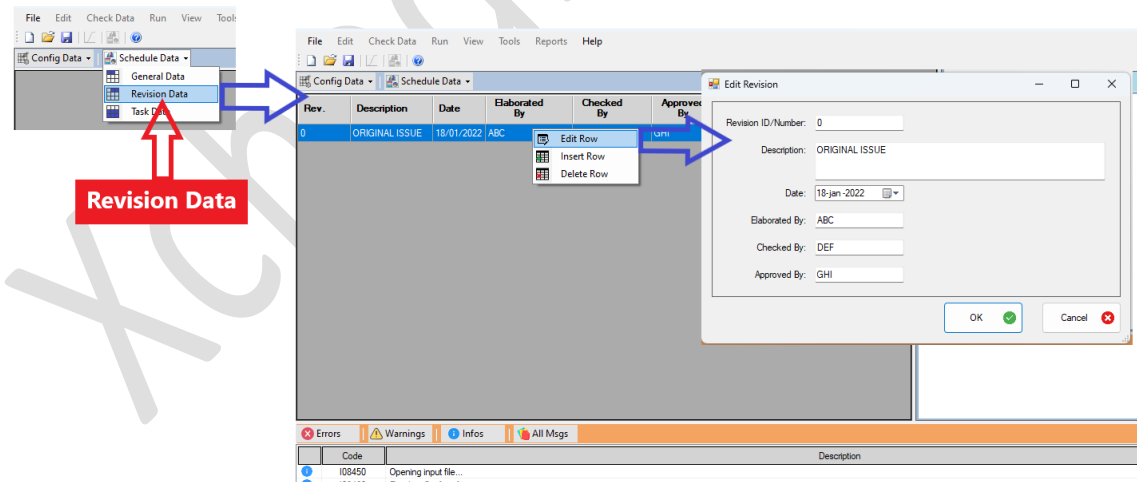


Figure 5.10 – Revisions definition

### 5.3.7. Task Data

This dialog can be used to edit, insert or delete information about all schedule tasks/activities (same information present on DETAILED TASK DATA table, in the TASK-DATA sheet of the input data file).

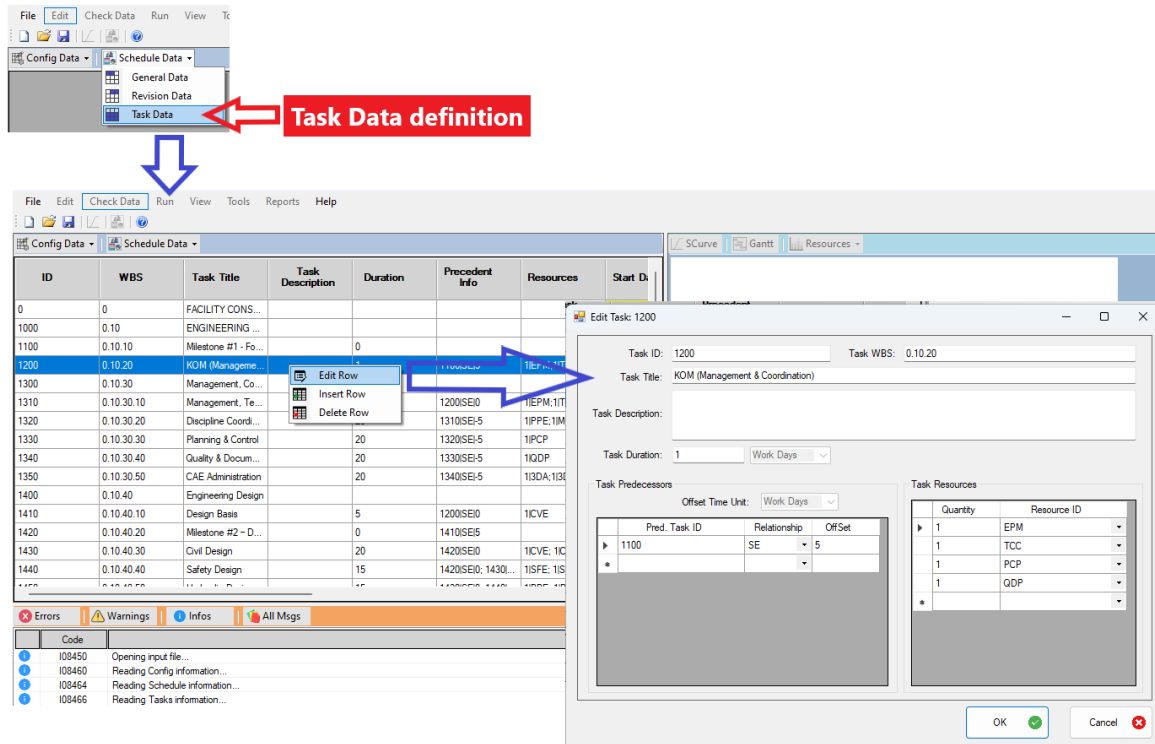


Figure 5.11 – Task Data definition

### 5.3.8. Actual Progress Data

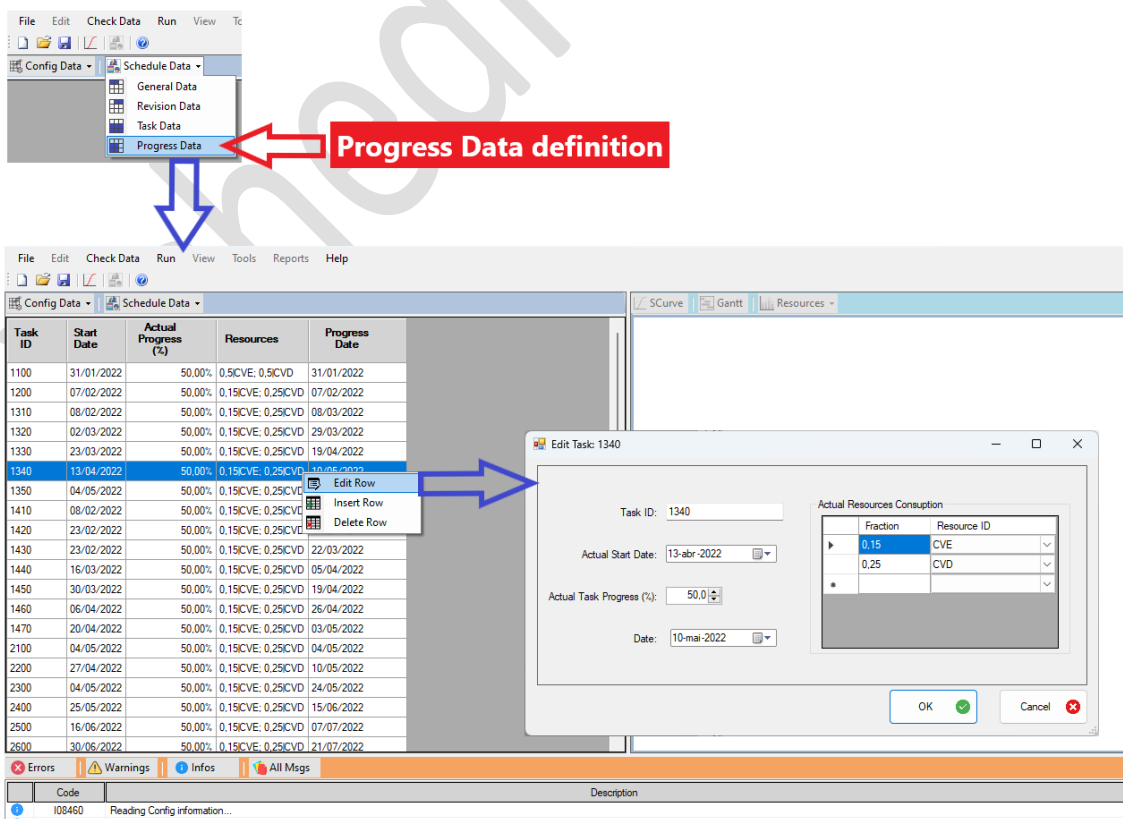


Figure 5.12 – Progress Data definition

This dialog can be used to edit, insert or delete information about actual progress for all schedule tasks/activities (same information present on ACTUAL TASK PROGRESS DATA table, in the PROG-DATA sheet of the input data file).

#### 5.4. SAVING / SAVING AS A SCHEDULE INPUT FILE

After read/edit an existing schedule input file or create a new one, the user can save (or save as) current input data, using options “Save” or “Save As” under File menu.

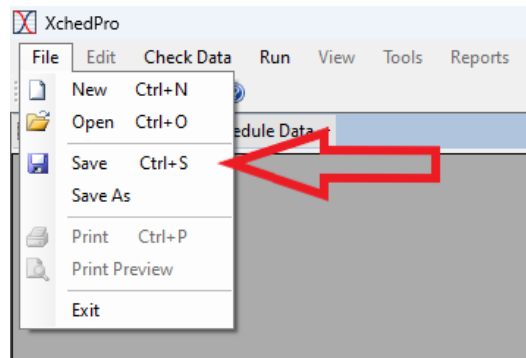


Figure 5.13 – Save input file option

If the “Save” option is chosen, the opened input file will be rewritten with current data. No message to confirm this action will be showed. The “Save” option has no effect if the user has created a new schedule, in this case, the user should use “Save As” option and choose a name for the file (existing or new) where the new schedule data will be (re)write.

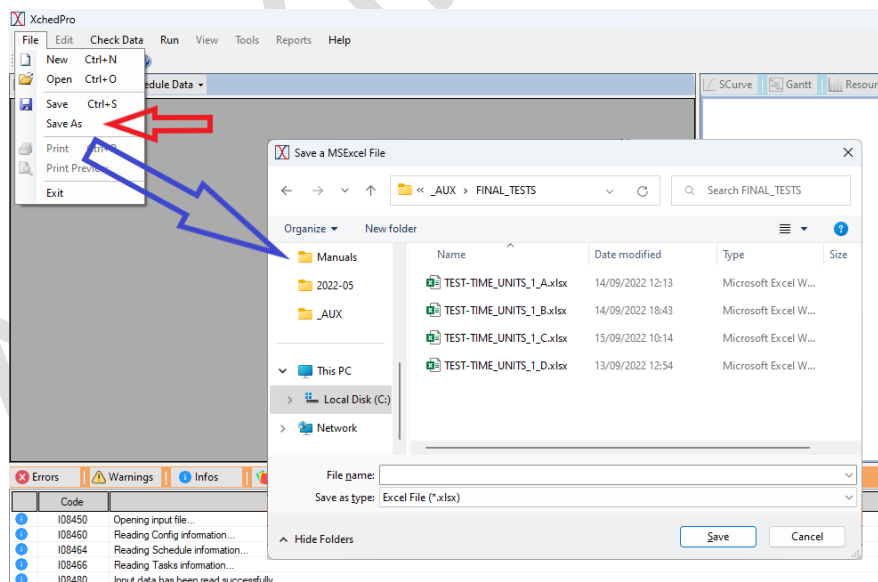


Figure 5.14 – Save As input file option

The “Save As” option can also be used to save current data of an existing input file in a new (or existing) file.

## 5.5. IDENTIFYING AND CORRECTING ERRORS IN INPUT DATA

The schedule data check is performed by 2 ways. The first one is after open a new or existing input data file. In this case XchedPro will perform the data check automatically, immediately after reads all data. The second one need to be done manually by the user, if any data is changed by XchedPro dialogs. The manual consistency check is triggered by “Check Data” item in Menu Bar.

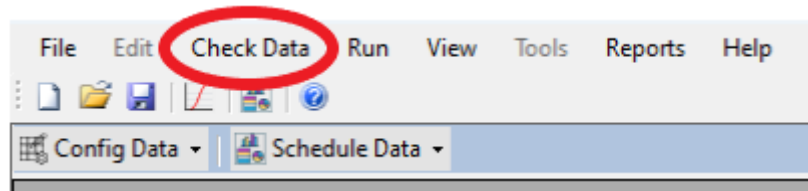


Figure 5.15 – Save/Save As input file option

All issues detected in the data check step are showing in the Message View. There are 3 types of messages:

- Information – messages about data processing. No user action is necessary.
- Warnings – messages about attention points. No user action is necessary.
- Errors – messages about errors in input data. All errors need to be correct before schedule calculation.

To increase the errors understanding, for the majority of errors, a double click over the error message will open the edit view where the error can be corrected with specific item identified (highlighted). More details about Message View can be found in section 5.11.

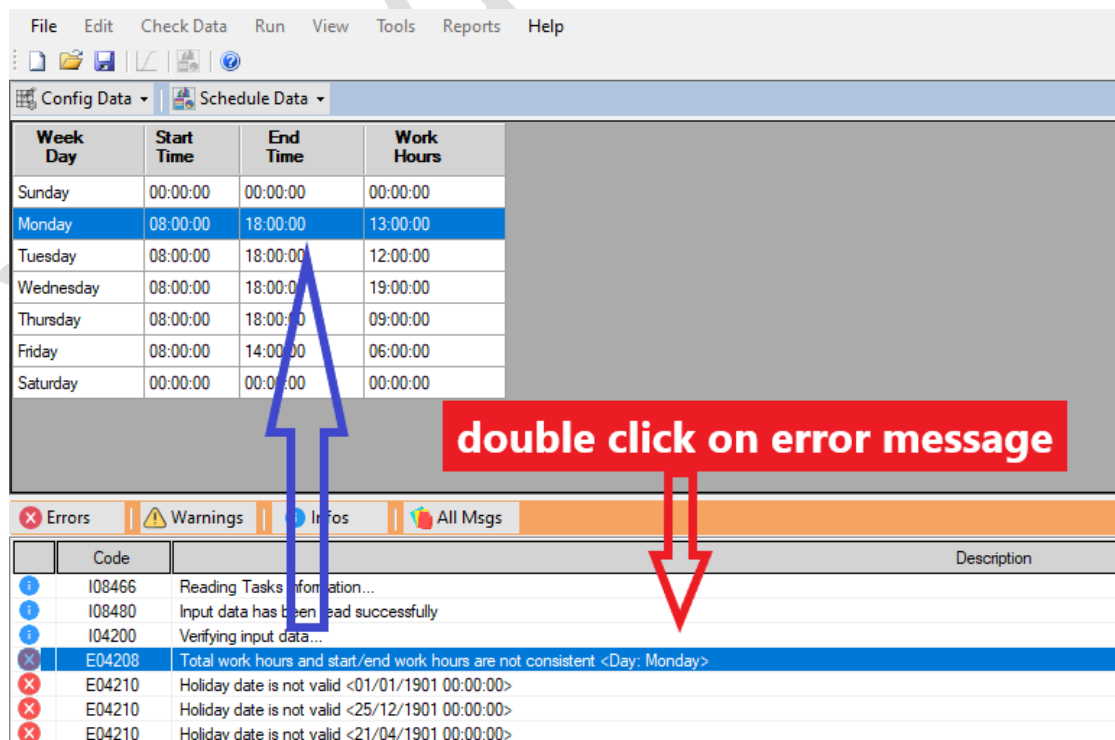


Figure 5.16 – Connection between Error in Message View and edit views

## 5.6. RUNNING SCHEDULE CALCULATIONS

If an input file data is read, created or edited and, after the data check step, no errors was found, XchedPro is able to perform the schedule calculations. The Run option in menu bar will start all schedule calculations.

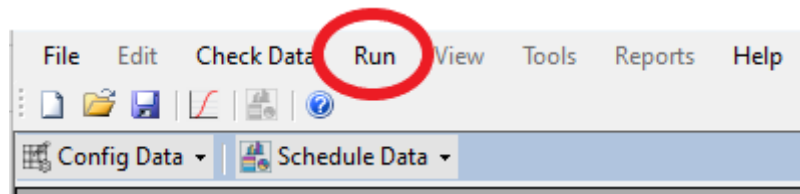


Figure 5.17 – Run schedule option

All steps of schedule calculations can be followed by the Message View and Status Bar interfaces. More details about Message View and Status Bar, can be found in section 5.11.

## 5.7. VISUALIZING RESULTS

XchedPro allows a preliminary and simplified visualization of schedule calculation results, before generate a complete report output file. This is especially useful during the initial phases of schedule building, when the project duration and resources demand are being defined, and adjusts in the schedule parameters are constant.

There are 2 ways to access XchedPro quick visualization capabilities. One of them is by “View” option in Menu Bar, the other one is from the popup menu located in the topo of Chart View panel, as showed in the next figure. Both ways open the same visualization views, as explained in the following sub sections.

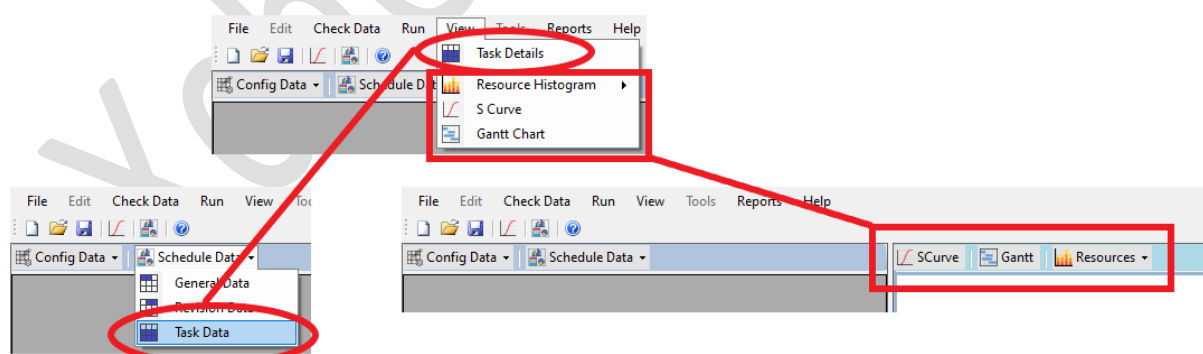


Figure 5.18 – Visualize results options

### 5.7.1. Task Details View

This option opens a grid that allows a consultation of detailed Task information. The yellow highlighted columns have calculated values. The not highlighted columns contain input (user

defined) data for tasks. This view can also be used to edit, delete and insert tasks, as explained in the sub section 5.3.7.

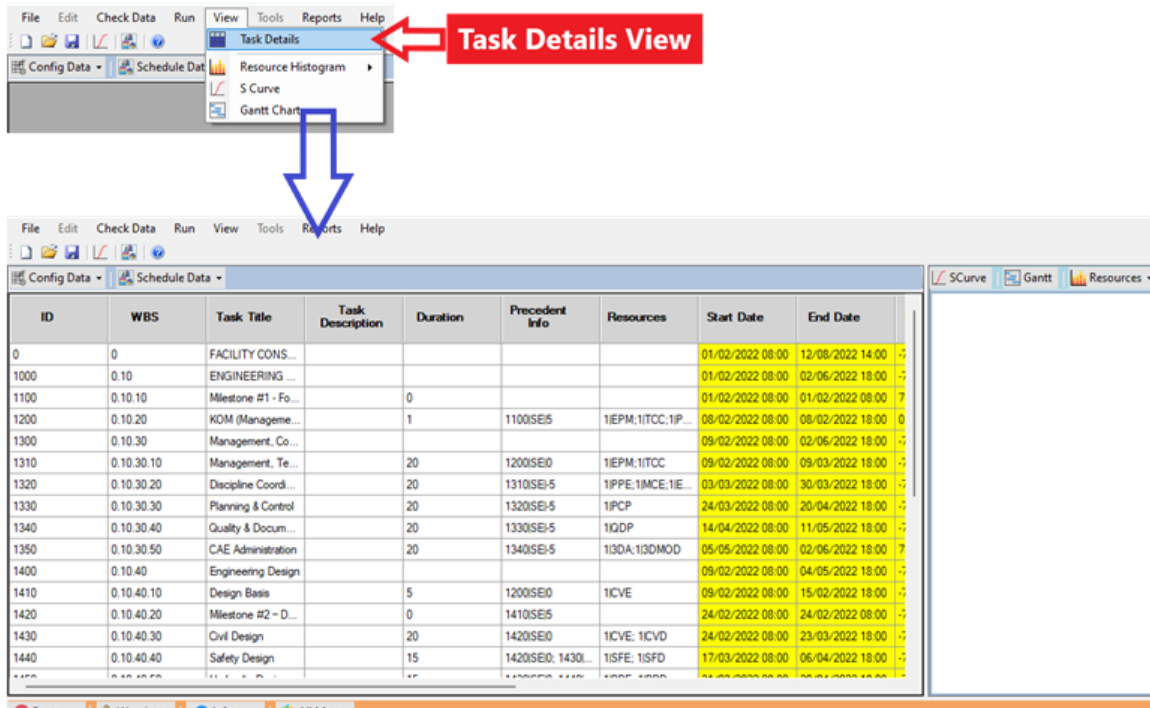


Figure 5.19 – Task details view

### 5.7.2. Resources Histogram Chart

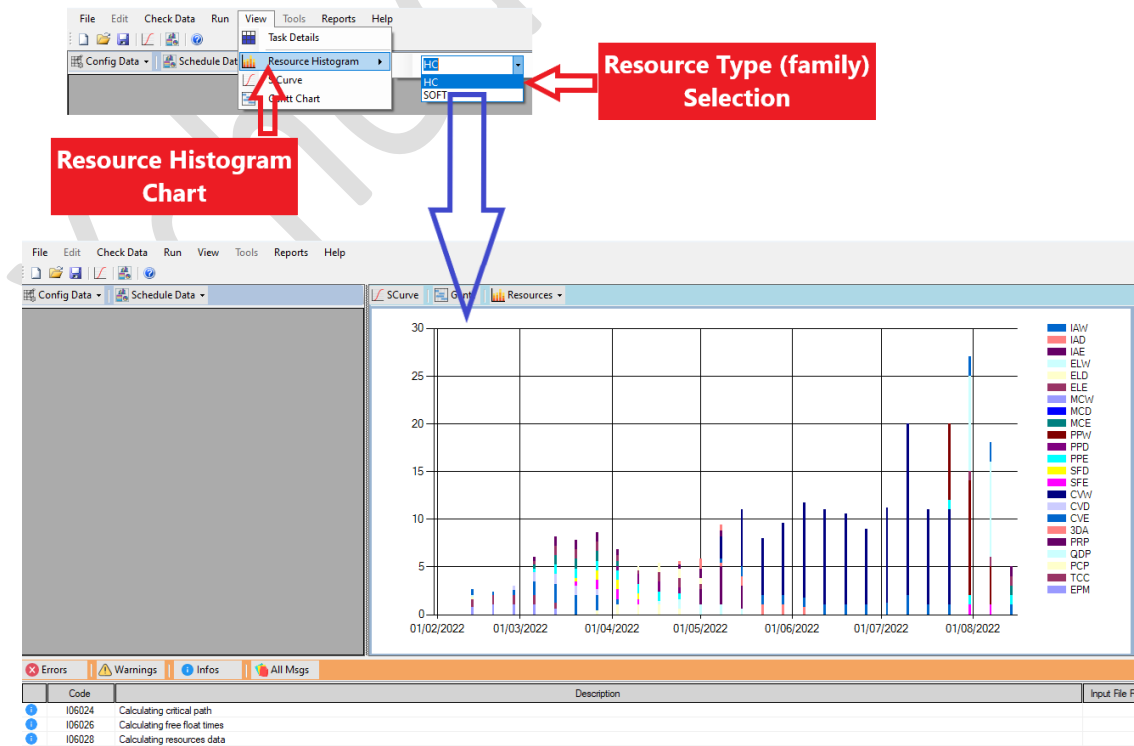


Figure 5.20 – Histogram chart view

This submenu option opens a histogram chart view. One histogram chart is showed for each resource family. The user may select the resource family for current chart in the combo box that appear when submenu item is selected. Except by choice of resource family, this view doesn't have edition capabilities.

### 5.7.3. S-Curve (planned and actual progress curve) Chart

This submenu option opens a S-Curve (progress curve) chart view. All defined resource types (families) are showed in the same chart, represented by different curves. If data about actual progress is available, the chart will show planned and actual progress curves for all resources types (families) simultaneously. This view doesn't have edition capabilities.

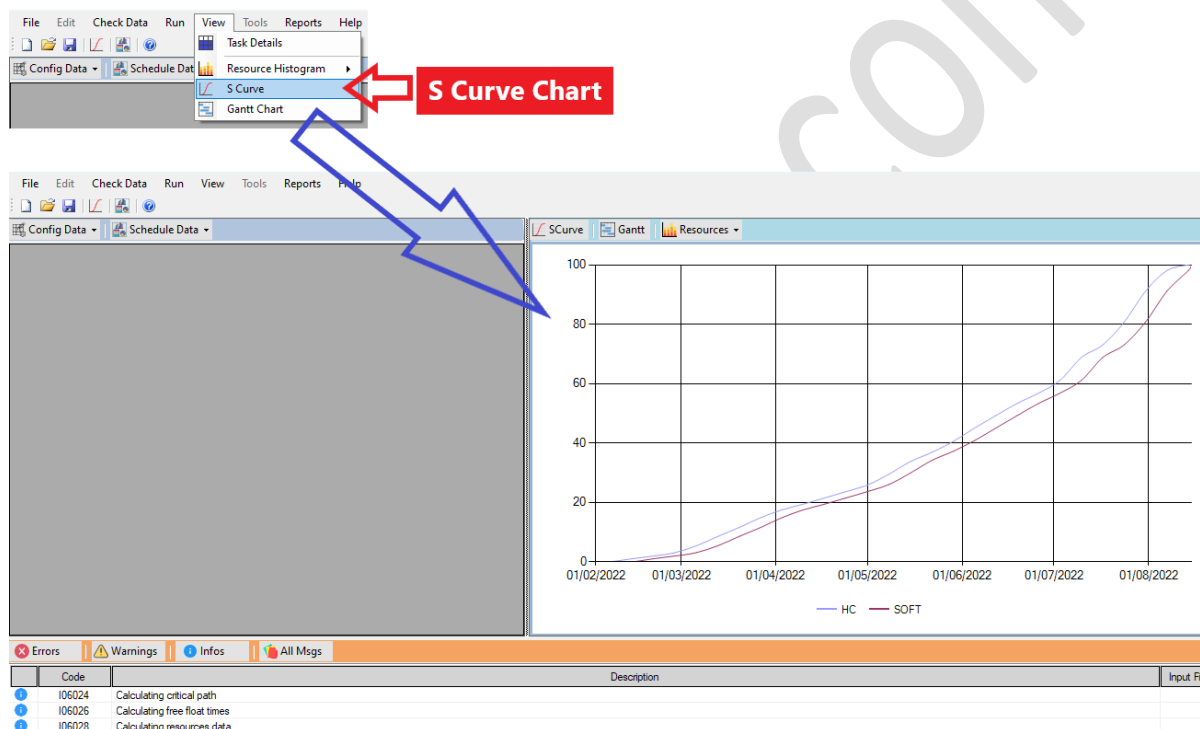


Figure 5.21 – S Curve (planned progress curve) chart view

### 5.7.4. Gantt Chart

This submenu option opens a simplified Gantt chart view. For large schedules, an internal algorithm filters the number of tasks to be showed in this chart, in order to present, at least, a schedule overview. In this chart, each task (activity) is identified by his WBS code. This view doesn't have edition capabilities.

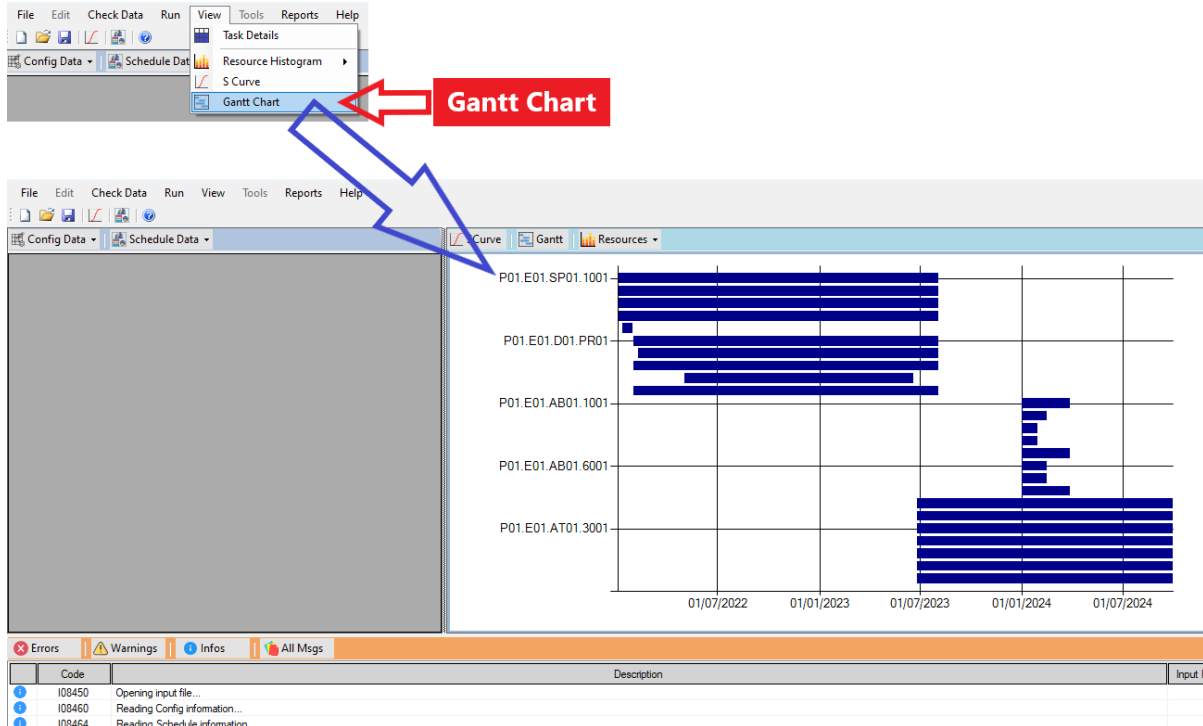


Figure 5.22 – Gantt chart view

## 5.8. COMPLEMENTARY ANALYSIS

Based on provided data and the calculation results, XchedPro can perform some additional schedule analysis. In the current version the additional analysis available is the Resource Balance, as explained in the next item.

### 5.8.1. Resource Balance

If the user filled the Resources field for any Super Task, the provided values will be considered as an estimate of available Resources for the set of Tasks under the current Super Task, and the provided values will be compared with the totalization of the sub set of tasks.

The resource balance window will present the result of this comparison between available resources (defined in the Super Task resources field) and the necessary resources, calculated by the resources totalization across all Tasks under the Super Task. If the totalization generates a quantity of resources greater than the available resources, in some period of time during the project duration, the cell where the resource ID and the time intersect will be filled with this difference and highlighted in red. In the opposite situation, the cell will be highlighted in yellow. If the quantity of estimated (available) and calculated resources is the same (difference = zero), the cell will keep empty and will not be highlighted. Resources or periods with no unbalance in the entire schedule, will not be showed.

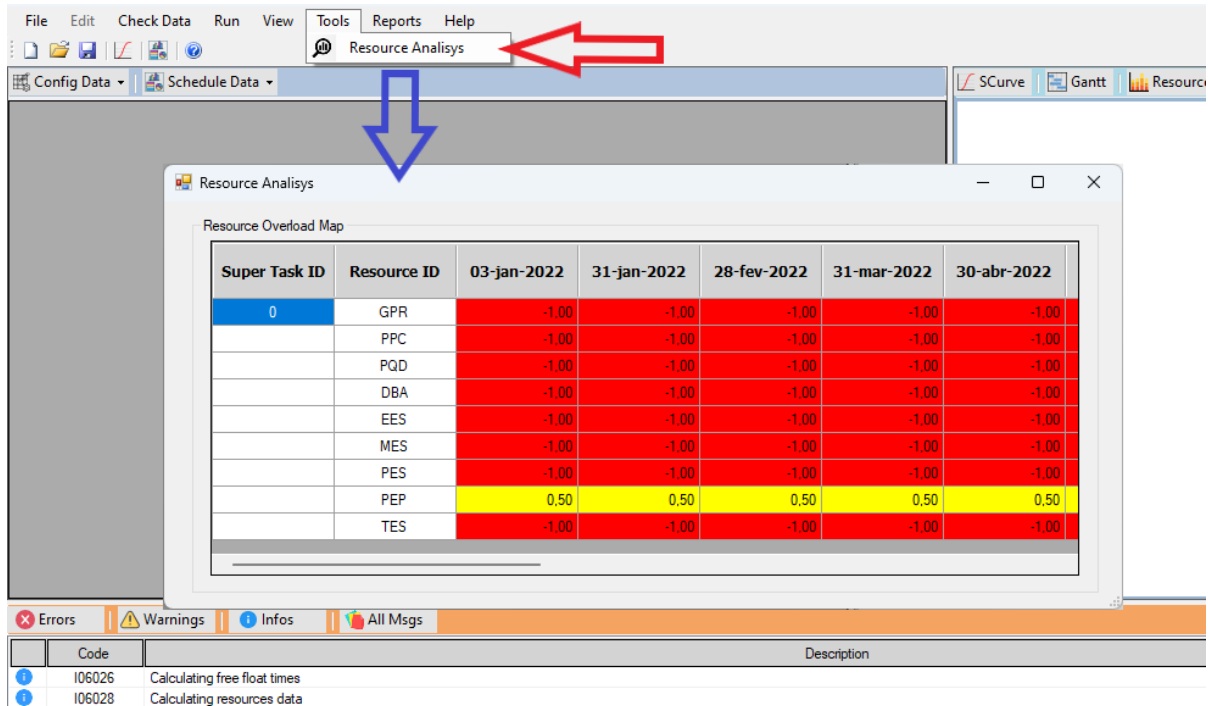


Figure 5.23 – Resources Balance view

## 5.9. REPORT GENERATION

After calculations without errors, the final report generation will be available. XchedPro is able to generate several kinds of reports in a pre-configured MS Excel file with several sheets, each one related to a report section. The user should choose which sections will be generated and press the “Save Report” button. After an internal preparation step, the user will be prompted to choose the MS Excel file name to save the report.

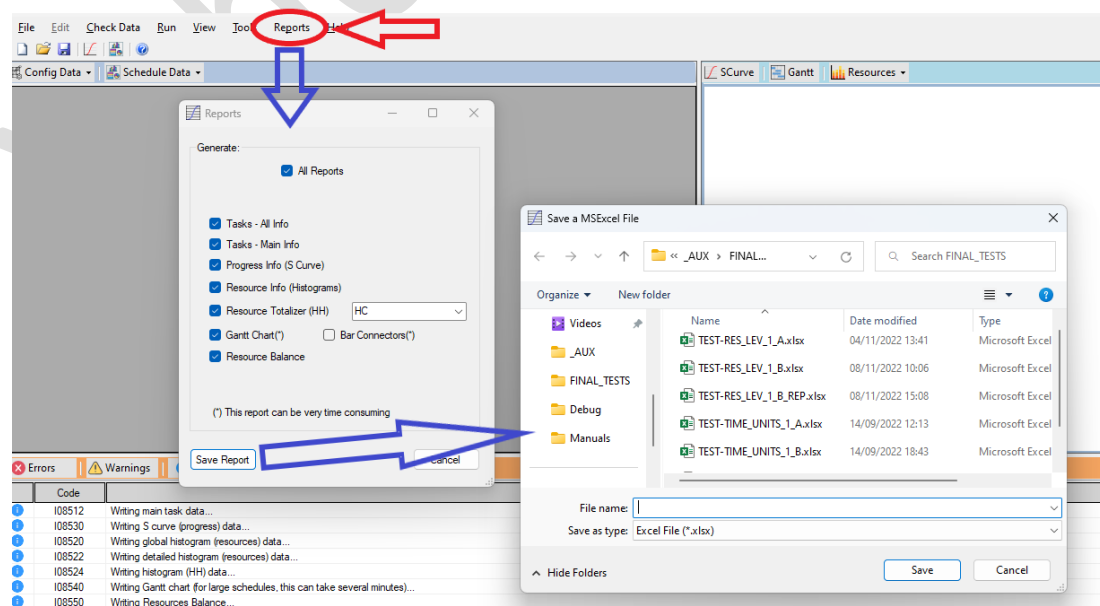


Figure 5.24 – Report generation dialog

A description of each pre-configured report section is provided in the next sub items.

**TIP**

For large schedules, the generation of some report sections is very time consuming and subject to Excel limitations. In these cases, we recommend that some sections (specially Gantt chart and connectors) be generated just in the final report version.

### 5.9.1. Resources Legend Report

This is a *default* report that will be generated whenever any resource is present in the schedule tasks. The purpose of this report is to provide a description of the resource types IDs and resources IDs presented in other reports, to be used as a legend for charts and tables.

LOGO COMPANY/CLIENT		XchedPro 2.0 - Project Schedule Solver (www.xchedpro.com)			
		DOC. TYPE:	SCHEDULE	XX-YYY-ZZZ-NNN	0
		PROJECT:	NEW FACILITY CONSTRUCTION		
		AREA:	ENGINEERING		
		CASE:	PRELIMINARY STUDY		
		TITLE:	<b>SIMPLE EXAMPLE FOR USER MANUAL</b>		
<b>RESOURCES LEGEND</b>					
<b>RESOURCE TYPES</b>		<b>RESOURCES</b>			
<b>TYPE ID</b>	<b>DESCRIPTION</b>	<b>RES ID</b>	<b>DESCRIPTION</b>	<b>TYPE ID</b>	
HC	HEAD COUNT	EPM	Project Manager	HC	
SOFT	SOFTWARE	TCC	Technical Coordinator	HC	
MAT	RAW MATERIAL	PCP	Plan. & Cont. Professional	HC	
EQP	EQUIPMENT	QDP	Qual. & Doc. Professional	HC	
CAP	CAPITAL	PRP	Procurement Professional	HC	
		3DA	3D Administrator	HC	
		CVE	Civil Engineer	HC	
		CVD	Civil Designer	HC	
		CVW	Civil Worker	HC	
		3DMOD	3D Model Licenses	SOFT	
		CRN	Crane	EQP	
		PLD	Pile Driver	EQP	
		USD	MM American Dolar	CAP	
<span style="margin-right: 20px;">&lt; ▶</span> <span style="margin-right: 20px;">_COVER</span> <span style="margin-right: 20px; border-bottom: 1px solid black;"><b>RES-LEGEND</b></span> <span style="margin-right: 20px;">RESUME</span> <span style="margin-right: 20px;">TASK-ALL_DATA</span> <span style="margin-right: 20px;">TASK-MAIN_DATA</span> <span>GANTT_CHAI</span>					

Figure 5.25 – Resources Legend table

### 5.9.2. Schedule Resume Report

The schedule resume report (“RESUME” sheet) contains consolidated overall information about the schedule. This is a *default* report that will be always generated as part of the report file

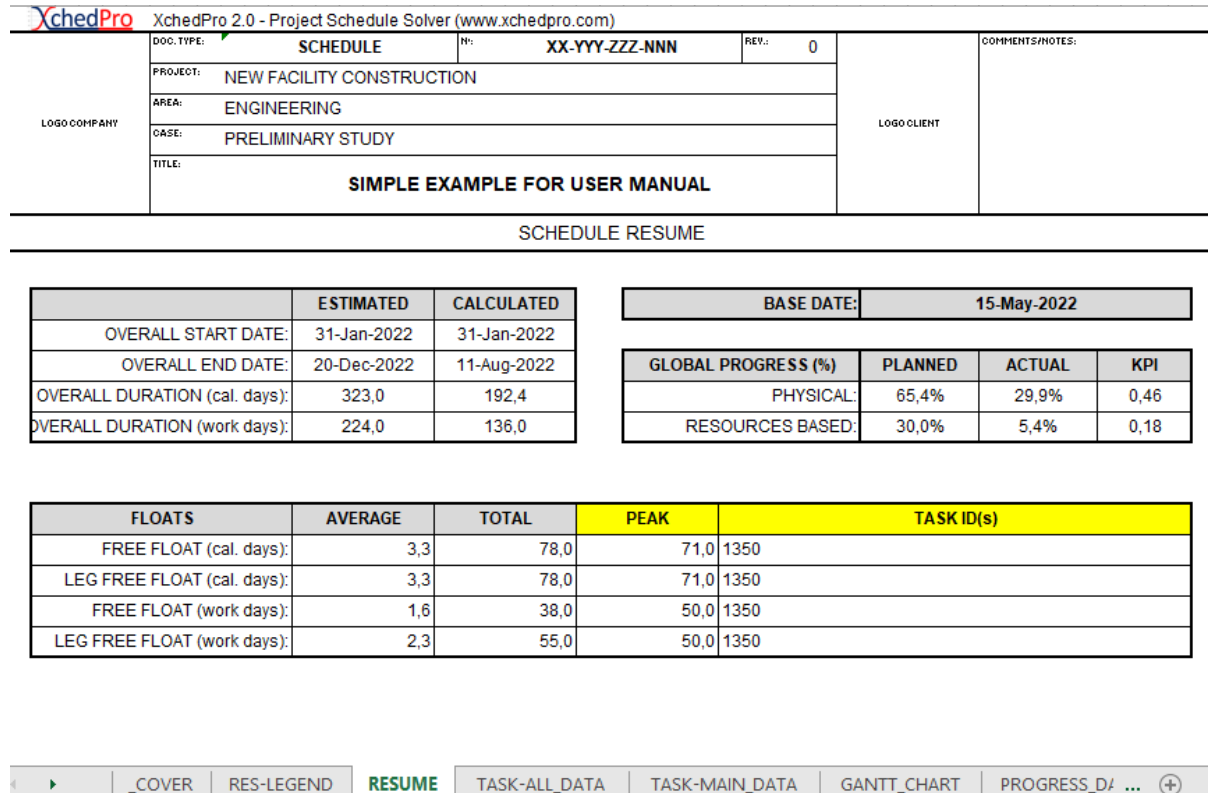


Figure 5.26 – Schedule Resume report

This report has 3 groups of information:

- Information about schedule duration (estimate and calculated values for start / final dates and overall duration);
- Consolidate progress data at “BASE DATE”. If information about actual progress is available a SPI and CPI indexes are calculated;
- Total schedule free floats.

### 5.9.3. Tasks – All Info Report

This report (“TASK-ALL\_DATA” sheet) is a large table that contains all tasks related data. This table is very useful for complementary analysis and/or to user-defined reports generation. Experienced users can use this table as a data base for a MS Power BI (or other similar tool) in order to produce more sophisticated analysis and dynamic reports.

The following figure reproduces a typical tasks all-data table.

Figure 5.27 – Tasks All Data report table

In this report each row is related to a Task and each column is related to a Task property. The columns with yellow headers, reproduce the user input data. A detailed description for each field (column) in this table is presented below.

FIELD (COLUMN)		DESCRIPTION
LEVEL		Task level in the WBS structure (CALCULATED)
ID		Current Task ID (see item 4.3)
WBS		WBS code associated to current Task (see item 4.3)
TASK CODE		Current Task code (see item 4.3)
TASK TITLE		Current Task title (see item 4.3)
TASK DESCRIPTION		Current Task description (see item 4.3)
DUR.		Current Task time duration (see item 4.3)
PREDECESSORS INFO		Current Task predecessor data (see item 4.3)
RESOURCES INFO		Current Task resources data (see item 4.3)
PLANNED START DATE		Current Task planned start date (CALCULATED)
PLANNED END DATE		Current Task planned finish date (CALCULATED)
ACTUAL START DATE		Actual Task planned start date (CALCULATED)
ACTUAL END DATE		Actual Task planned finish date (CALCULATED)
DUR. (cal.)		Current Task duration, in calendar days (CALCULATED)
CRIT. PATH		If filled with a "X" => current Task is in the critical path (CALCULATED)
LAST PREDEC.		A list of the last predecessors of the current Task (CALCULATED)
FREE FLOAT	Cal. Days	Free float for the current Task, in calendar days (CALCULATED)
	Wrk Days	Free float for the current Task, in work days (CALCULATED)
TOTAL FLOAT	Cal. Days	Total float for the current Task, in calendar days (CALCULATED)
	Wrk Days	Total float for the current Task, in work days (CALCULATED)
PATH TOTAL F	Cal. Days	Path total float for the current Task, in calendar days (CALCULATED)
	Wrk Days	Path total float for the current Task, in work days (CALCULATED)
FREE F (w/o Leg)	Cal. Days	Free float without Legs for the current Task, in calendar days (CALCULATED)

FIELD (COLUMN)		DESCRIPTION
	Wrk Days	Free float without Legs for the current Task, in work days (CALCULATED)
TOTAL F (w/o Leg)	Cal. Days	Total float without Legs for the current Task, in calendar days (CALCULATED)
	Wrk Days	Total float without Legs for the current Task, in work days (CALCULATED)
LATE START (Free Float)		Late start date, based in the free float, for the current Task
LATE END (Free Float)		Late finish date, based in the free float, for the current Task
LATE START (Total Float)		Late start date, based in the total float, for the current Task
LATE END (Total Float)		Late finish date, based in the total float, for the current Task
LATE START (FF, w/o Leg)		Late start date, based in the free float without Legs, for the current Task
LATE END (FF, w/o Leg)		Late finish date, based in the free float without Legs, for the current Task
LATE START (TF, w/o Leg)		Late start date, based in the total float without Legs, for the current Task
LATE END (TF, w/o Leg)		Late finish date, based in the total float without Legs, for the current Task
SUP. TASK		If filled with a "X" => current Task is a Super Task (CALCULATED)
Weight		The Task weight in the project. Weight is a measure of the task contribution to the project. The weight can be calculated on different basis. XchedPro calculates a weight based in the task duration and in each resource family (see section 4.1.6 Resources Types (Families) registration for details). In all cases, the weight is calculated dividing the task value by the total schedule value.

Table 5.1 – Fields description for Task all-data report

### 5.9.4. Tasks – Main Info Report

XchedPro 2.2 - Project Schedule Solver (www.xchedpro.com)												
DOC TYPE: SCHEDULE		DOC REV: SHD-0001KT-2022-001_0		A		COMMENTS/NOTES:						
PROJECT: SCHEDULE SOLVER												
AREA: PRODUCT TEST												
CASE: SCHEDULE WITH 1,000 TASKS AND 35 MONTHS LONG												
TITLE: SCHEDULE STRESS TEST (1,000 TASKS AND 35 MONTHS)												
SCHEDULE - MAIN DATA												
LEVEL	TASK CODE	TASK TITLE	START DATE	END DATE	DURATION		CRIT. PATH	FREE FLOAT	TOTAL FLOAT	LATE START (Free Float)	LATE START (Total Float)	WEIGHT (Duration)
					Work	Calendar						
1	Task 000001	Task 000001 Title	03-jan-22 08:00	30-sep-24 17:00	690,0	1001,3		0,0	0,0	03-jan-22 08:00	03-jan-22 08:00	1,000000
2	Task 000002	Task 000002 Title	03-jan-22 08:00	03-jan-22 08:00	0,0	0,0	X	0,0	0,0	03-jan-22 08:00	03-jan-22 08:00	0,000000
2	Task 000003	Task 000003 Title	03-jan-22 08:00	30-sep-24 17:00	690,0	1001,3		0,0	0,0	03-jan-22 08:00	03-jan-22 08:00	1,000000
3	Task 000004	Task 000004 Title	03-jan-22 08:00	04-ago-23 17:00	400,0	578,3		-42,0	0,0	03-jan-22 08:00	03-jan-22 08:00	0,11134
4	Task 000005	Task 000005 Title	03-jan-22 08:00	04-ago-23 17:00	400,0	578,3	X	0,0	0,0	03-jan-22 08:00	03-jan-22 08:00	0,027784
4	Task 000006	Task 000006 Title	03-jan-22 08:00	04-ago-23 17:00	400,0	578,3		421,0	421,0	28-fev-23 08:00	28-fev-23 08:00	0,027784
4	Task 000007	Task 000007 Title	03-jan-22 08:00	04-ago-23 17:00	400,0	578,3		421,0	421,0	28-fev-23 08:00	28-fev-23 08:00	0,027784
4	Task 000008	Task 000008 Title	03-jan-22 08:00	04-ago-23 17:00	400,0	578,3		421,0	421,0	28-fev-23 08:00	28-fev-23 08:00	0,027784
2	Task 000009	Task 000009 Title	03-jan-22 08:00	03-jan-22 08:00	0,0	0,0		7,0	428,0	10-jan-22 08:00	07-mar-23 08:00	0,000000
2	Task 000010	Task 000010 Title	14-fev-22 08:00	14-fev-22 08:00	0,0	0,0		960,0	960,0	01-out-24 08:00	01-out-24 08:00	0,000000
2	Task 000011	Task 000011 Title	14-fev-22 08:00	14-fev-22 08:00	0,0	0,0		960,0	960,0	01-out-24 08:00	01-out-24 08:00	0,000000
3	Task 000012	Task 000012 Title	10-jan-22 08:00	04-ago-23 17:00	395,0	571,3		421,0	421,0	10-jan-22 08:00	07-mar-23 08:00	0,711746
4	Task 000013	Task 000013 Title	10-jan-22 08:00	28-jan-22 17:00	15,0	18,3		0,0	421,0	10-jan-22 08:00	07-mar-23 08:00	0,001042
4	Task 000014	Task 000014 Title	31-jan-22 08:00	04-ago-23 17:00	380,0	550,3		421,0	421,0	31-jan-22 08:00	28-mar-23 08:00	0,110231
5	Task 000015	Task 000015 Title	31-jan-22 08:00	03-fev-22 17:00	8,0	9,3		964,0	964,0	21-set-24 00:00	21-set-24 00:00	0,000556
5	Task 000016	Task 000016 Title	24-jan-22 08:00	04-fev-22 17:00	5,0	4,3		967,0	967,0	24-set-24 08:00	24-set-24 08:00	0,000347

Figure 5.28 – Tasks Main Data report table

This report ("TASK-MAIN\_DATA" sheet) is a sub set of the previous one (all data), and contains the key information about the Tasks in a formatted report.

### 5.9.5. Planned Progress Curve (S-Curve) Report

This report ("SCURVE-PLAN" sheet) contains information about the schedule planned progress. The S-Curve represents the cumulative percent of planned progress during the project duration. XchedPro generates one S-Curve for each resource type/family (see section 4.1.7, for more details about resources types/families), plus a curve based in the task duration (physical progress curve), always identified as "TAKS DUR." curve.

This report (sheet) presents the information in a chart and tabular form. A typical chart for the S-Curve report is showed below.

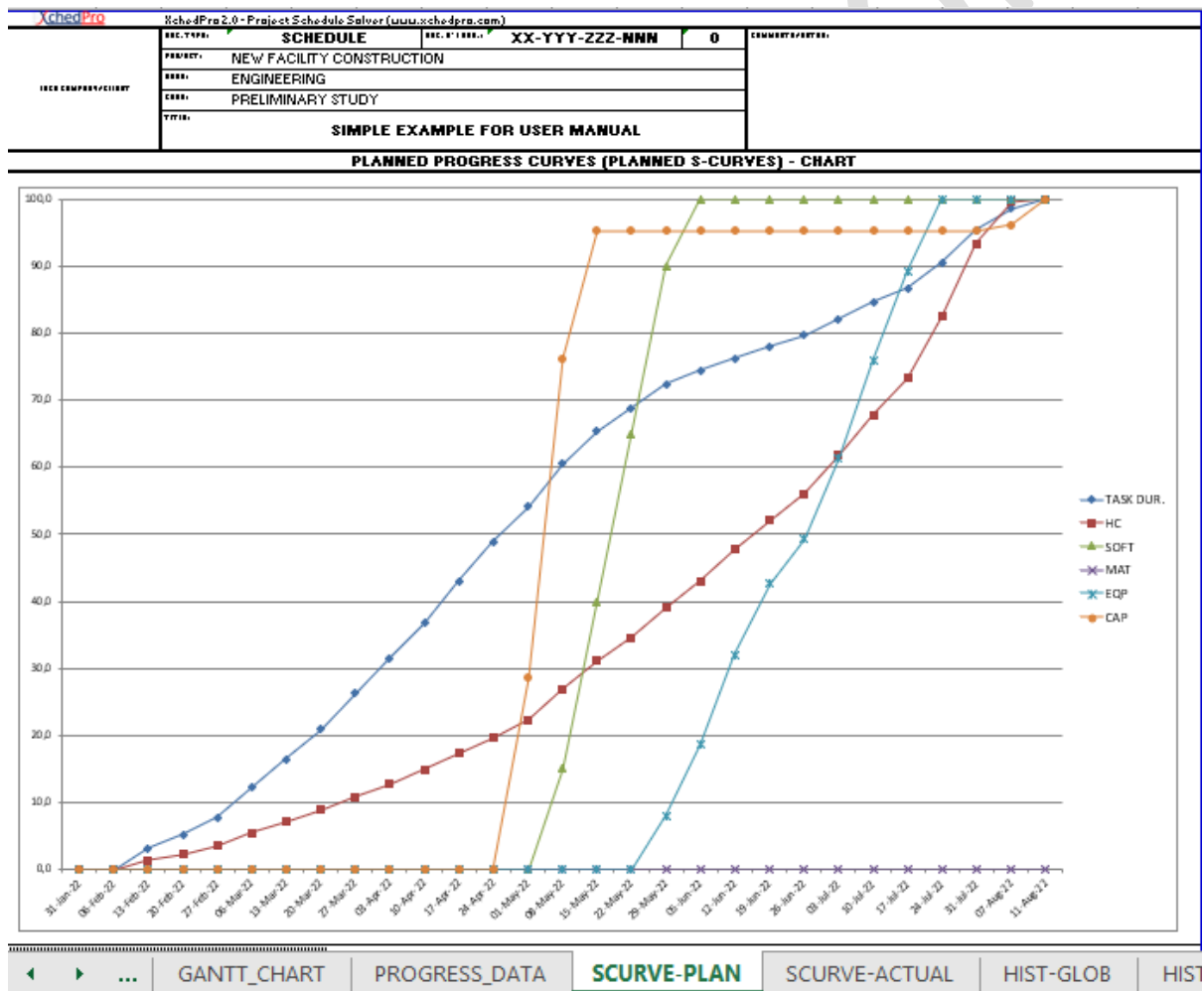


Figure 5.29 – S-Curve (planned progress) chart

**TIP**

Depending on how the user organize the resources families, the S Curves can represent different kind of planned progresses, like physical progress, financial progress and/or cash flow, for example.

The information used to generate the S-Curve chart is also presented in the tabular form. The chart is connected to the table in MS Excel file, i.e., if any data is manually changed in the table, the chart will be updated too.

A typical tabular form report for the S Curve is showed in the next figure.

XchedPro 2.0 - Project Schedule Solver (www.xchedpro.com)							
DOC. TYPE: SCHEDULE		DOC. #/REV.: XX-YYY-ZZZ-NNN		0		COMMENTS/NOTES:	
PROJECT: NEW FACILITY CONSTRUCTION							
AREA: ENGINEERING							
CASE: PRELIMINARY STUDY							
TITLE: SIMPLE EXAMPLE FOR USER MANUAL							
PLANNED PROGRESS CURVES (PLANNED S-CURVES) - TABLE							
TASK DUR	HC	SOFT	MAT	EQP	CAP		
31-Jan-22	0,0	0,0	0,0	0,0	0,0	0,0	
06-Feb-22	0,0	0,0	0,0	0,0	0,0	0,0	
13-Feb-22	3,5	1,4	0,0	0,0	0,0	0,0	
20-Feb-22	5,2	2,3	0,0	0,0	0,0	0,0	
27-Feb-22	7,7	3,5	0,0	0,0	0,0	0,0	
06-Mar-22	12,2	5,5	0,0	0,0	0,0	0,0	
13-Mar-22	16,4	7,1	0,0	0,0	0,0	0,0	
20-Mar-22	21,0	8,9	0,0	0,0	0,0	0,0	
27-Mar-22	24,2	10,8	0,0	0,0	0,0	0,0	
03-Apr-22	31,5	12,8	0,0	0,0	0,0	0,0	
10-Apr-22	36,7	14,9	0,0	0,0	0,0	0,0	
17-Apr-22	43,0	17,4	0,0	0,0	0,0	0,0	
24-Apr-22	49,0	19,7	0,0	0,0	0,0	0,0	
01-May-22	54,2	22,3	0,0	0,0	0,0	20,6	
08-May-22	60,5	26,9	15,0	0,0	0,0	76,2	
15-May-22	65,4	31,2	40,0	0,0	0,0	95,2	
22-May-22	68,9	34,6	65,0	0,0	0,0	95,2	
29-May-22	72,4	38,1	90,0	0,0	8,0	95,2	
05-Jun-22	74,5	42,0	100,0	0,0	10,7	95,2	
12-Jun-22	76,2	47,3	100,0	0,0	32,0	95,2	
19-Jun-22	78,0	52,1	100,0	0,0	42,7	95,2	
26-Jun-22	79,7	56,0	100,0	0,0	49,3	95,2	
03-Jul-22	82,2	61,8	100,0	0,0	61,3	95,2	
10-Jul-22	84,6	67,9	100,0	0,0	75,0	95,2	
17-Jul-22	86,7	73,4	100,0	0,0	89,3	95,2	
24-Jul-22	90,6	82,6	100,0	0,0	100,0	95,2	
31-Jul-22	95,5	93,4	100,0	0,0	100,0	95,2	
07-Aug-22	98,6	99,7	100,0	0,0	100,0	96,2	
11-Aug-22	100,0	100,0	100,0	0,0	100,0	100,0	

Figure 5.30 – S Curve (planned progress) data table

**TIP**  
 The user can save this table in order to compare the current planned progress curve with a possible future replanning.

### 5.9.6. Actual Progress Curve (S-Curve) Report

This report (“SCURVE-ACTUAL” sheet) contains information about the schedule actual progress. The S-Curve represents the cumulative percent of actual progress during the project duration. XchedPro generates one S-Curve for each resource type/family (see section 4.1.7, for more details about resources types/families), plus a curve based in the task duration (physical progress curve), always identified as “TAKS DUR.” Of course, this curve will only be available if actual progress information has been provided as input.

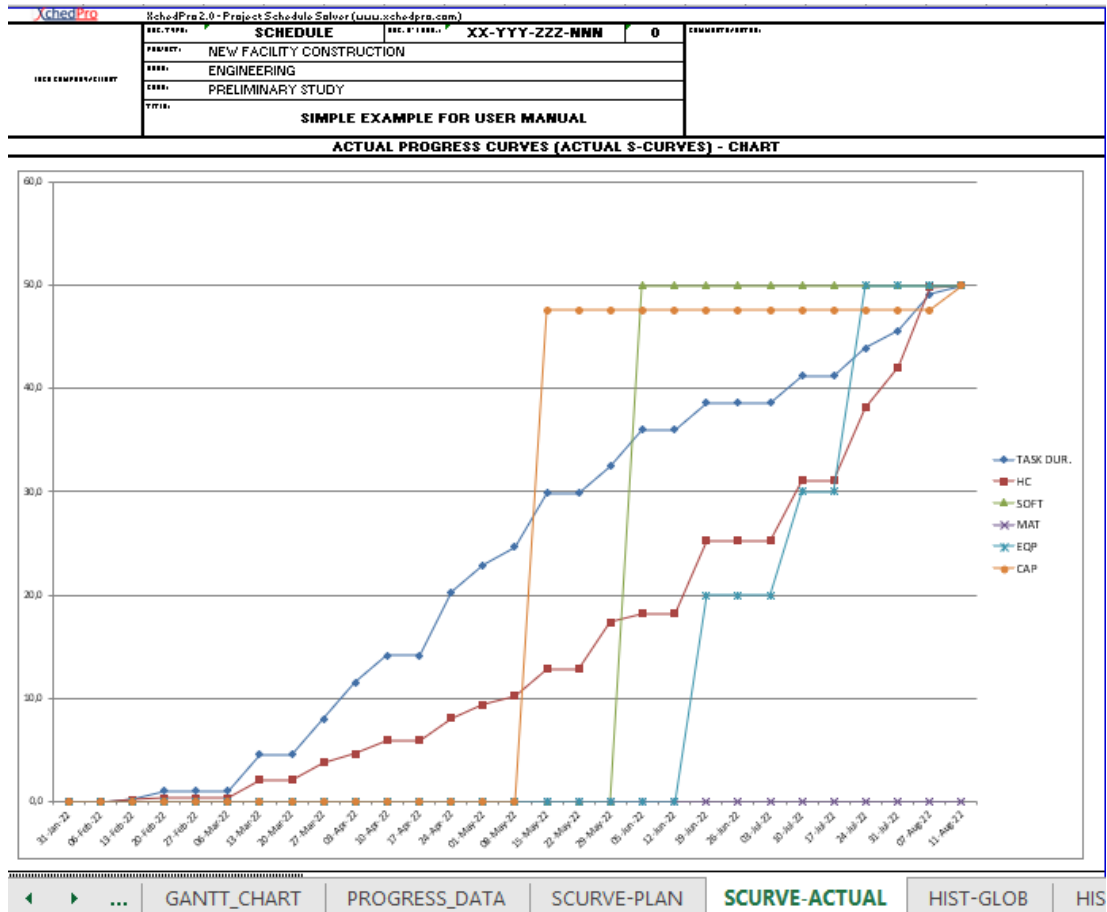


Figure 5.31 – S-Curve (actual progress) chart

ACTUAL PROGRESS CURVES (ACTUAL S-CURVES) - TABLE						
TASK DUR.	HC	SOFT	MAT	EQP	CAP	
31-Jan-22	0,0	0,0	0,0	0,0	0,0	0,0
06-Feb-22	0,0	0,0	0,0	0,0	0,0	0,0
13-Feb-22	0,2	0,2	0,0	0,0	0,0	0,0
20-Feb-22	1,0	0,4	0,0	0,0	0,0	0,0
27-Feb-22	1,0	0,4	0,0	0,0	0,0	0,0
06-Mar-22	1,0	0,4	0,0	0,0	0,0	0,0
13-Mar-22	4,5	2,4	0,0	0,0	0,0	0,0
20-Mar-22	4,5	2,4	0,0	0,0	0,0	0,0
27-Mar-22	5,0	3,0	0,0	0,0	0,0	0,0
03-Apr-22	11,5	4,7	0,0	0,0	0,0	0,0
10-Apr-22	14,2	6,0	0,0	0,0	0,0	0,0
17-Apr-22	14,2	6,0	0,0	0,0	0,0	0,0
24-Apr-22	20,3	8,4	0,0	0,0	0,0	0,0
01-May-22	22,9	9,4	0,0	0,0	0,0	0,0
08-May-22	24,7	10,3	0,0	0,0	0,0	0,0
15-May-22	29,9	12,8	0,0	0,0	0,0	47,6
22-May-22	29,9	12,8	0,0	0,0	0,0	47,6
29-May-22	32,5	17,4	0,0	0,0	0,0	47,6
05-Jun-22	36,0	19,2	50,0	0,0	0,0	47,6
12-Jun-22	36,0	19,2	50,0	0,0	0,0	47,6
19-Jun-22	38,6	25,3	50,0	0,0	20,0	47,6
26-Jun-22	38,6	25,3	50,0	0,0	20,0	47,6
03-Jul-22	38,6	25,3	50,0	0,0	20,0	47,6
10-Jul-22	41,3	31,4	50,0	0,0	30,0	47,6
17-Jul-22	41,3	31,4	50,0	0,0	30,0	47,6
24-Jul-22	42,9	39,2	50,0	0,0	50,0	47,6
31-Jul-22	45,6	42,4	50,0	0,0	50,0	47,6
07-Aug-22	49,1	49,8	50,0	0,0	50,0	47,6
11-Aug-22	50,0	50,0	50,0	0,0	50,0	50,0

Figure 5.32 – S Curve (actual progress) data table

### 5.9.7. Resource Info (Histograms) Report

There are two basic kinds of resource histograms. A global histogram, where the resources are grouped (totalized) by type (see section 4.1.7 for more details about resources types/families), and detailed histograms, where the quantity of resources is presented in an individual way for each type.

XchedPro generates different reports (MS Excel sheets) for the different kinds of resource histograms. The next figure reproduces a typical global histogram, where the resources are grouped (totalized) by type (family), i.e., each data series in the chart correspond to a resource totalization by type.

The next figures present a typical global histogram report (sheet HIST-GLOB), where the totalization of each resource type (family) is associated to one data series in the chart and table form. The chart is connected to the table, i.e., if any data is manually changed in the table, the chart will be updated too.

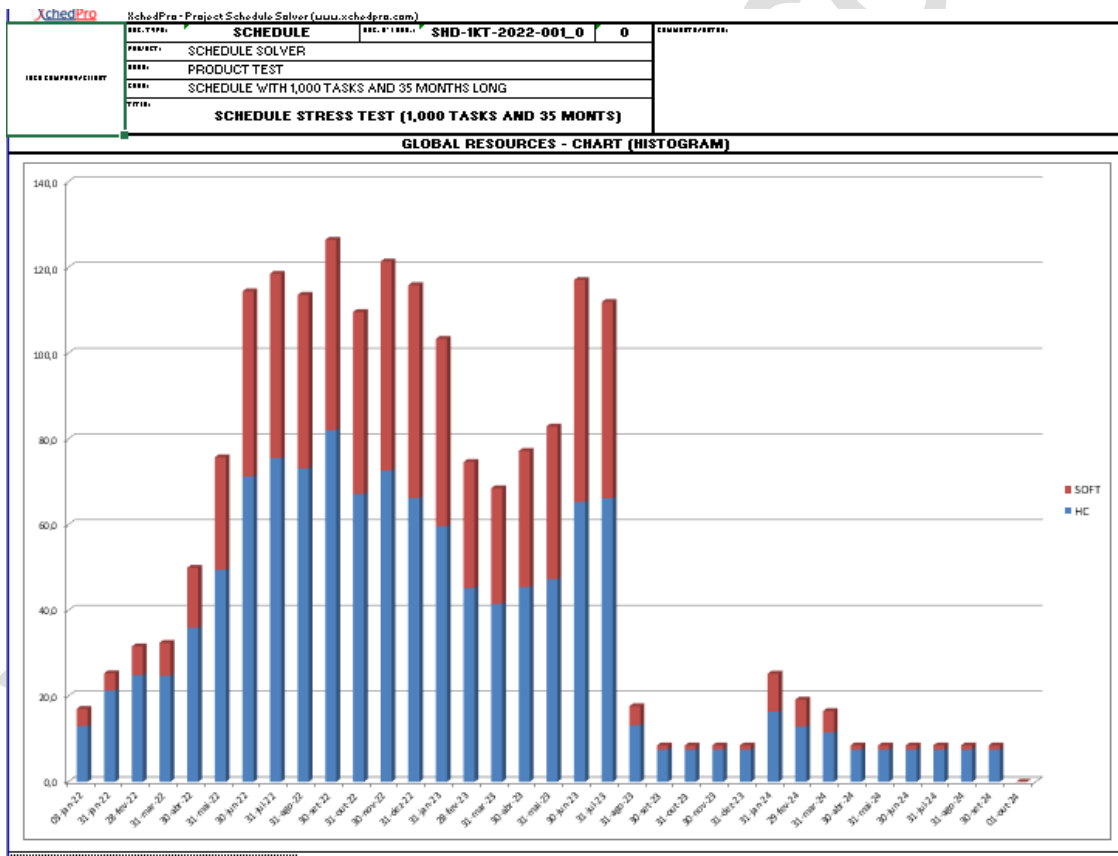


Figure 5.33 – Global Resource Histogram chart

The same data are also presented in a tabular form, in order to allow further analysis.

XchedPro		SchedPro - Project Schedule Solver (www.xchedpro.com)		
SEC. TYPE	SCHEDULE	SEC. #	NAME	0
PROPERTY:	SCHEDULE SOLVER	SHD-1KT-2022-001_0		
ISSUE COMPLETION:	PRODUCT TEST			
ISSUE:	SCHEDULE WITH 1,000 TASKS AND 35 MONTHS LONG			
TITLE:	SCHEDULE STRESS TEST (1,000 TASKS AND 35 MONTHS)			

GLOBAL RESOURCES - TABLE		
DATE	HC	SOFT
03-Jan-22	49,8	4,8
31-Jan-22	51,8	4,8
28-Feb-22	54,8	4,8
27-Mar-22	57,8	4,8
30-Apr-22	60,8	4,8
30-May-22	63,8	4,8
30-Jun-22	66,8	4,8
30-Jul-22	69,8	4,8
30-Aug-22	72,8	4,8
30-Sep-22	75,8	4,8
30-Oct-22	78,8	4,8
30-Nov-22	81,8	4,8
30-Dec-22	84,8	4,8
31-Jan-23	87,8	4,8
30-Feb-23	90,8	4,8
31-Mar-23	93,8	4,8
30-Apr-23	96,8	4,8
31-May-23	99,8	4,8
30-Jun-23	102,8	4,8
31-Jul-23	105,8	4,8
31-Aug-23	108,8	4,8
30-Sep-23	111,8	4,8
30-Oct-23	114,8	4,8
31-Nov-23	117,8	4,8
30-Dec-23	120,8	4,8
31-Jan-24	123,8	4,8
29-Feb-24	126,8	4,8
29-Mar-24	129,8	4,8
30-Apr-24	132,8	4,8
30-May-24	135,8	4,8
31-Jun-24	138,8	4,8
30-Jul-24	141,8	4,8
30-Aug-24	144,8	4,8
30-Sep-24	147,8	4,8
30-Oct-24	150,8	4,8
30-Nov-24	153,8	4,8
30-Dec-24	156,8	4,8
31-Jan-25	159,8	4,8
31-Feb-25	162,8	4,8
31-Mar-25	165,8	4,8
30-Apr-25	168,8	4,8
30-May-25	171,8	4,8
30-Jun-25	174,8	4,8
30-Jul-25	177,8	4,8
30-Aug-25	180,8	4,8
30-Sep-25	183,8	4,8
30-Oct-25	186,8	4,8
30-Nov-25	189,8	4,8
30-Dec-25	192,8	4,8
31-Jan-26	195,8	4,8
31-Feb-26	198,8	4,8
31-Mar-26	201,8	4,8
30-Apr-26	204,8	4,8
30-May-26	207,8	4,8
30-Jun-26	210,8	4,8
30-Jul-26	213,8	4,8
30-Aug-26	216,8	4,8
30-Sep-26	219,8	4,8
30-Oct-26	222,8	4,8
30-Nov-26	225,8	4,8
30-Dec-26	228,8	4,8
31-Jan-27	231,8	4,8
31-Feb-27	234,8	4,8
31-Mar-27	237,8	4,8
30-Apr-27	240,8	4,8
30-May-27	243,8	4,8
30-Jun-27	246,8	4,8
30-Jul-27	249,8	4,8
30-Aug-27	252,8	4,8
30-Sep-27	255,8	4,8
30-Oct-27	258,8	4,8
30-Nov-27	261,8	4,8
30-Dec-27	264,8	4,8
31-Jan-28	267,8	4,8
31-Feb-28	270,8	4,8
31-Mar-28	273,8	4,8
30-Apr-28	276,8	4,8
30-May-28	279,8	4,8
30-Jun-28	282,8	4,8
30-Jul-28	285,8	4,8
30-Aug-28	288,8	4,8
30-Sep-28	291,8	4,8
30-Oct-28	294,8	4,8
30-Nov-28	297,8	4,8
30-Dec-28	300,8	4,8
31-Jan-29	303,8	4,8
31-Feb-29	306,8	4,8
31-Mar-29	309,8	4,8
30-Apr-29	312,8	4,8
30-May-29	315,8	4,8
30-Jun-29	318,8	4,8
30-Jul-29	321,8	4,8
30-Aug-29	324,8	4,8
30-Sep-29	327,8	4,8
30-Oct-29	330,8	4,8
30-Nov-29	333,8	4,8
30-Dec-29	336,8	4,8
31-Jan-30	339,8	4,8
31-Feb-30	342,8	4,8
31-Mar-30	345,8	4,8
30-Apr-30	348,8	4,8
30-May-30	351,8	4,8
30-Jun-30	354,8	4,8
30-Jul-30	357,8	4,8
30-Aug-30	360,8	4,8
30-Sep-30	363,8	4,8
30-Oct-30	366,8	4,8
30-Nov-30	369,8	4,8
30-Dec-30	372,8	4,8
31-Jan-31	375,8	4,8
31-Feb-31	378,8	4,8
31-Mar-31	381,8	4,8
30-Apr-31	384,8	4,8
30-May-31	387,8	4,8
30-Jun-31	390,8	4,8
30-Jul-31	393,8	4,8
30-Aug-31	396,8	4,8
30-Sep-31	399,8	4,8
30-Oct-31	402,8	4,8
30-Nov-31	405,8	4,8
30-Dec-31	408,8	4,8
31-Jan-32	411,8	4,8
31-Feb-32	414,8	4,8
31-Mar-32	417,8	4,8
30-Apr-32	420,8	4,8
30-May-32	423,8	4,8
30-Jun-32	426,8	4,8
30-Jul-32	429,8	4,8
30-Aug-32	432,8	4,8
30-Sep-32	435,8	4,8
30-Oct-32	438,8	4,8
30-Nov-32	441,8	4,8
30-Dec-32	444,8	4,8
31-Jan-33	447,8	4,8
31-Feb-33	450,8	4,8
31-Mar-33	453,8	4,8
30-Apr-33	456,8	4,8
30-May-33	459,8	4,8
30-Jun-33	462,8	4,8
30-Jul-33	465,8	4,8
30-Aug-33	468,8	4,8
30-Sep-33	471,8	4,8
30-Oct-33	474,8	4,8
30-Nov-33	477,8	4,8
30-Dec-33	480,8	4,8
31-Jan-34	483,8	4,8
31-Feb-34	486,8	4,8
31-Mar-34	489,8	4,8
30-Apr-34	492,8	4,8
30-May-34	495,8	4,8
30-Jun-34	498,8	4,8
30-Jul-34	501,8	4,8
30-Aug-34	504,8	4,8
30-Sep-34	507,8	4,8
30-Oct-34	510,8	4,8
30-Nov-34	513,8	4,8
30-Dec-34	516,8	4,8
31-Jan-35	519,8	4,8
31-Feb-35	522,8	4,8
31-Mar-35	525,8	4,8
30-Apr-35	528,8	4,8
30-May-35	531,8	4,8
30-Jun-35	534,8	4,8
30-Jul-35	537,8	4,8
30-Aug-35	540,8	4,8
30-Sep-35	543,8	4,8
30-Oct-35	546,8	4,8
30-Nov-35	549,8	4,8
30-Dec-35	552,8	4,8
31-Jan-36	555,8	4,8
31-Feb-36	558,8	4,8
31-Mar-36	561,8	4,8
30-Apr-36	564,8	4,8
30-May-36	567,8	4,8
30-Jun-36	570,8	4,8
30-Jul-36	573,8	4,8
30-Aug-36	576,8	4,8
30-Sep-36	579,8	4,8
30-Oct-36	582,8	4,8
30-Nov-36	585,8	4,8
30-Dec-36	588,8	4,8
31-Jan-37	591,8	4,8
31-Feb-37	594,8	4,8
31-Mar-37	597,8	4,8
30-Apr-37	600,8	4,8
30-May-37	603,8	4,8
30-Jun-37	606,8	4,8
30-Jul-37	609,8	4,8
30-Aug-37	612,8	4,8
30-Sep-37	615,8	4,8
30-Oct-37	618,8	4,8
30-Nov-37	621,8	4,8
30-Dec-37	624,8	4,8
31-Jan-38	627,8	4,8
31-Feb-38	630,8	4,8
31-Mar-38	633,8	4,8
30-Apr-38	636,8	4,8
30-May-38	639,8	4,8
30-Jun-38	642,8	4,8
30-Jul-38	645,8	4,8
30-Aug-38	648,8	4,8
30-Sep-38	651,8	4,8
30-Oct-38	654,8	4,8
30-Nov-38	657,8	4,8
30-Dec-38	660,8	4,8
31-Jan-39	663,8	4,8
31-Feb-39	666,8	4,8
31-Mar-39	669,8	4,8
30-Apr-39	672,8	4,8
30-May-39	675,8	4,8
30-Jun-39	678,8	4,8
30-Jul-39	681,8	4,8
30-Aug-39	684,8	4,8
30-Sep-39	687,8	4,8
30-Oct-39	690,8	4,8
30-Nov-39	693,8	4,8
30-Dec-39	696,8	4,8
31-Jan-40	699,8	4,8
31-Feb-40	702,8	4,8
31-Mar-40	705,8	4,8
30-Apr-40	708,8	4,8
30-May-40	711,8	4,8
30-Jun-40	714,8	4,8
30-Jul-40	717,8	4,8
30-Aug-40	720,8	4,8
30-Sep-40	723,8	4,8
30-Oct-40	726,8	4,8
30-Nov-40	729,8	4,8
30-Dec-40	732,8	4,8
31-Jan-41	735,8	4,8
31-Feb-41	738,8	4,8
31-Mar-41	741,8	4,8
30-Apr-41	744,8	4,8
30-May-41	747,8	4,8
30-Jun-41	750,8	4,8
30-Jul-41	753,8	4,8
30-Aug-41	756,8	4,8
30-Sep-41	759,8	4,8
30-Oct-41	762,8	4,8
30-Nov-41	765,8	4,8
30-Dec-41	768,8	4,8
31-Jan-42	771,8	4,8
31-Feb-42	774,8	4,8
31-Mar-42	777,8	4,8
30-Apr-42	780,8	4,8
30-May-42	783,8	4,8
30-Jun-42	786,8	4,8
30-Jul-42	789,8	4,8
30-Aug-42	792,8	4,8
30-Sep-42	795,8	4,8
30-Oct-42	798,8	4,8
30-Nov-42	801,8	4,8
30-Dec-42	804,8	4,8
31-Jan-43	807,8	4,8
31-Feb-43	810,8	4,8
31-Mar-43	813,8	4,8
30-Apr-43	816,8	4,8
30-May-43	819,8	4,8
30-Jun-43	822,8	4,8
30-Jul-43	825,8	4,8
30-Aug-43	828,8	4,8
30-Sep-43	831,8	4,8
30-Oct-43	834,8	4,8
30-Nov-43	837,8	4,8
30-Dec-43	840,8	4,8
31-Jan-44	843,8	4,8
31-Feb-44	846,8	4,8
31-Mar-44	849,8	4,8
30-Apr-44	852,8	4,8
30-May-44	855,8	4,8
30-Jun-44	858,8	4,8
30-Jul-44	861,8	4,8
30-Aug-44	864,8	4,8
30-Sep-44	867,8	4,8
30-Oct-44	870,8	4,8
30-Nov-44	873,8	4,8
30-Dec-44	876,8	4,8
31-Jan-45	879,8	4,8
31-Feb-45	882,8	4,8
31-Mar-45	885,8	4,8
30-Apr-45	888,8	4,8
30-May-45	891,8	4,8
30-Jun-45	894,8	4,8
30-Jul-45	897,8	4,8
30-Aug-45	900,8	4,8
30-Sep-45	903,8	4,8
30-Oct-45	906,8	4,8
30-Nov-45	909,8	4,8
30-Dec-45	912,8	4,8
31-Jan-46	915,8	4,8
31-Feb-46	918,8	4,8
31-Mar-46	921,8	4,8
30-Apr-46	924,8	4,8
30-May-46	927,8	4,8
30-Jun-46	930,8	4,8
30-Jul-46	933,8	4,8
30-Aug-46	936,8	4,8
30-Sep-46	939,8	4,8
30-Oct-46	942,8	4,8
30-Nov-46	945,8	4,8
30-Dec-46	948,8	4,8
31-Jan-47	951,8	4,8
31-Feb-47	954,8	4,8
31-Mar-47	957,8	4,8
30-Apr-47	960,8	4,8
30-May-47	963,8	4,8
30-Jun-47	966,8	4,8
30-Jul-47	969,8	4,8
30-Aug-47	972,8	4,8
30-Sep-47	975,8	4,8
30-Oct-47	978,8	4,8
30-Nov-47	981,8	4,8
30-Dec-47	984,8	4,8
31-Jan-48	987,8	4,8
31-Feb-48	990,8	4,8
31-Mar-48	993,8	4,8
30-Apr-48	996,8	4,8
30-May-48	999,8	4,8
30-Jun-48	1002,8	4,8
30-Jul-48	1005,8	4,8
30-Aug-48	1008,8	4,8
30-Sep-48	1011,8	4,8
30-Oct-48	1014,8	4,8
30-Nov-48	1017,8	4,8
30-Dec-48	1020,8	4,8
31-Jan-49	1023,8	4,8
31-Feb-49	1026,8	4,8
31-Mar-49	1029,8	4,8
30-Apr-49	1032,8	4,8
30-May-49	1035,8	4,8
30-Jun-49	1038,8	4,8
30-Jul-49	1041,8	4,8
30-Aug-49	1044,8	4,8
30-Sep-49	1047,8	4,8
30-Oct-49	1050,8	4,8
30-Nov-49	1053,8	4,8
30-Dec-49	1056,8	4,8
31-Jan-50	1059,8	4,8
31-Feb-50	1062,8	4,8
31-Mar-50	1065,8	4,8
30-Apr-50	1068,8	4,8
30-May-50	1071,8	4,8
30-Jun-50	1074,8	4,8
30-Jul-50	1077,8	4,8
30-Aug-50	1080,8	4,8
30-Sep-50	1083,8	4,8
30-Oct-50	1086,8	4,8
30-Nov-50	1089,8	4,8
30		



### 5.9.9. Gantt Chart Report

The Gantt chart is one of the most common schedule representations. A Gantt chart allows a graphical visualization of the schedule and how the Tasks are distributed in the time.

Bar Connectors are a common complement for Gantt charts, they are used to represent graphically the precedence relationship between the tasks and connect the start/end point in the predecessor task bar to start/end point in the successor task bar, regarding the precedence relationship (EE, ES, SE and SS, as detailed in section 4.3).

#### IMPORTANT

For large schedules, the Gantt chart and the connectors are not a practical visualization tool, and demands a lot of processing time during report generation step. Their use should be evaluated carefully.

The next figure reproduces a typical Gantt chart with task connectors.

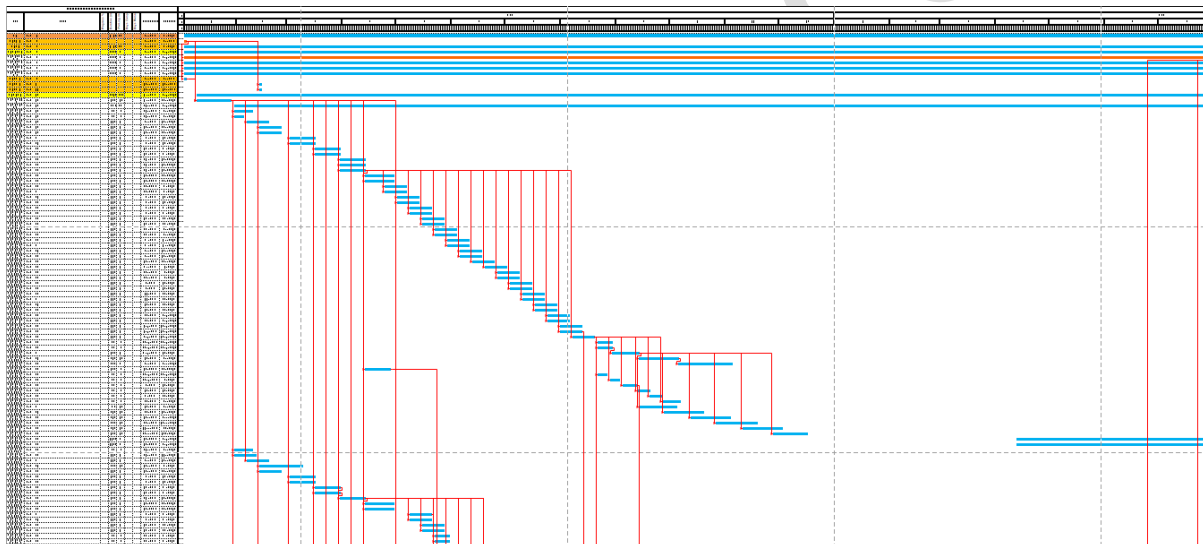


Figure 5.38 – Gantt chart

#### TIP

For large projects, the Gantt chart can be more useful if the tasks were filtered by WBS, in order to allow a visualization of schedule of a coherent task group by time.

### 5.9.1. Progress Report

The progress report table (“PROGRESS\_DATA” sheet) is available only if progress data was provided in the input data. This report contains the most recent progress information provided (columns with yellow headers) and some calculated complementary information.

XchedPro 2.0 - Project Schedule Solver (www.xchedpro.com)													
PROJECT: SCHEDULE		PROJ. REF. NO.: XX-YYY-ZZZ-NNN		0		COMMENTS/NOTES:							
USER COMPANY/CLIENT: NEW FACILITY CONSTRUCTION		AREA: ENGINEERING		CASE: PRELIMINARY STUDY		TITLE: SIMPLE EXAMPLE FOR USER MANUAL							
PROGRESS DATA - LAST INFO													
STATUS	PROGRESS INFO DATE	TASK ID	TASK TITLE	ACTUAL START DATE	DAYS ELAPSED		ACTUAL PROG. (%)	HIG CODE	DAYS COMPLETE		DAYS REMAIN		RESOURCE INFO
					Work	Calendar			Work	Calendar	Work	Calendar	
		0	FACILITY CONSTRUCTION				50,0%	-1	68,0	68,0	49,5	142,9	
		1000	ENGINEERING PROJECT				50,0%	-1	43,0	43,0	53,6	67,8	
DL	31-Jan-2022	1100	Milestone #1 - Formal Authorization to Start	31-Jan-2022	74,0	105,0	50,0%	2	0,0	0,0	0,0	0,0	0,5(C)VE, 0,5(C)VD
DL	7-Feb-2022	1200	KOM (Management & Coordination)	7-Feb-2022	69,0	98,0	50,0%	2	0,5	0,5	0,2	0,2	0,5(C)VE, 0,25(C)VD
		1300	Management, Coordination & Support				50,0%	-1	40,0	40,0	45,1	68,3	
DL	8-Mar-2022	1310	Management, Technical Coordination & Meetings	8-Feb-2022	68,0	97,0	50,0%	2	10,0	10,0	14,2	14,2	0,5(C)VE, 0,25(C)VD
DL	29-Mar-2022	1320	Discipline Coordination (Job Leaders)	2-Mar-2022	53,0	75,0	50,0%	2	10,0	10,0	13,7	13,7	0,5(C)VE, 0,25(C)VD
DL	19-Apr-2022	1330	Planning & Control	23-Mar-2022	38,0	54,0	50,0%	2	10,0	10,0	13,7	13,7	0,5(C)VE, 0,25(C)VD
DL	10-May-2022	1340	Quality & Documentation	13-Apr-2022	23,0	33,0	50,0%	2	10,0	10,0	13,7	13,7	0,5(C)VE, 0,25(C)VD
DL		1350	CAE Administration	4-May-2022	8,0	12,0	0,0%	3	0,0	20,0	0,0	28,4	0,5(C)VE, 0,25(C)VD
		1400	Engineering Design				50,0%	-1	30,0	30,0	42,2	42,2	
DL	14-Feb-2022	1410	Design Basis	8-Feb-2022	68,0	97,0	50,0%	2	2,5	2,5	3,2	3,2	0,5(C)VE, 0,25(C)VD
DL	23-Feb-2022	1420	Milestone #2 - Design Basis Approval (by client)	23-Feb-2022	58,0	82,0	50,0%	2	0,0	0,0	0,0	0,0	0,5(C)VE, 0,25(C)VD
DL	22-Mar-2022	1430	Civil Design	23-Feb-2022	58,0	82,0	50,0%	2	10,0	10,0	13,7	13,7	0,5(C)VE, 0,25(C)VD
DL	5-Apr-2022	1440	Safety Design	16-Mar-2022	43,0	61,0	50,0%	2	7,5	7,5	10,2	10,2	0,5(C)VE, 0,25(C)VD
DL	19-Apr-2022	1450	Hydraulic Design	30-Mar-2022	33,0	47,0	50,0%	2	7,5	7,5	10,2	10,2	0,5(C)VE, 0,25(C)VD
DL	26-Apr-2022	1460	Electrical Design	6-Apr-2022	28,0	40,0	50,0%	2	7,5	7,5	10,2	10,2	0,5(C)VE, 0,25(C)VD
DL	3-May-2022	1470	ItA Design	20-Apr-2022	18,0	26,0	50,0%	2	5,0	5,0	6,7	6,7	0,5(C)VE, 0,25(C)VD
		2000	CONSTRUCTION				50,0%	-1	35,0	35,0	4,8	94,8	
DL	4-May-2022	2100	Milestone #3 - Construction Permissions	4-May-2022	8,0	12,0	50,0%	2	0,0	0,0	0,0	0,0	0,5(C)VE, 0,25(C)VD
DL	10-May-2022	2200	Subcontractors, Material and Equipment Acquisition	27-May-2022	13,0	19,0	50,0%	2	5,0	5,0	6,7	6,7	0,5(C)VE, 0,25(C)VD

Figure 5.39 – Progress data table

### 5.9.2. Resource Balance Report

The resource balance report (“RES\_BAL” sheet) is useful to identify any imbalance between the available and calculated resources in the project. This report has the same structure and information as resource analysis dialog (see section 5.8.1 - Resource Balance). The figure below reproduces a typical Resource Balance report.

XchedPro 2.0 - Project Schedule Solver (www.xchedpro.com)																			
PROJECT: SCHEDULE		PROJ. REF. NO.: XX-YYY-ZZZ-NNN		0		COMMENTS/NOTES:													
USER COMPANY/CLIENT: NEW FACILITY CONSTRUCTION		AREA: ENGINEERING		CASE: PRELIMINARY STUDY		TITLE: SIMPLE EXAMPLE FOR USER MANUAL													
TEST - RESOURCES LEVELING (RESOURCES TOTALIZATION)																			
RESOURCE BALANCE																			
TASK ID	RES ID	30-Jan-2022	30-Jun-2022	30-Sep-2022	30-Oct-2022	30-Nov-2022	30-Dec-2022	30-Jan-2023	30-Feb-2023	30-Mar-2023	30-Apr-2023	30-May-2023	30-Jun-2023	30-Jul-2023	30-Aug-2023	30-Sep-2023	30-Oct-2023	30-Nov-2023	30-Dec-2023
0	RES	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
1000	RES	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
1100	RES	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
1200	RES	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
1300	RES	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
1310	RES	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
1320	RES	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
1330	RES	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
1340	RES	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
1350	RES	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
1400	RES	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
1410	RES	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
1420	RES	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
1430	RES	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
1440	RES	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
1450	RES	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
1460	RES	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
1470	RES	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
2000	RES	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
2100	RES	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
2200	RES	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

Figure 5.40 – Resource Balance report

### 5.9.3. Customizing the Report File

All XchedPro reports are generated based in a MSeExcel file template (TEMPLATE\_REPORT\_1.xlsx) located at XchedPro application folder (see section 2 for details). This template file can be customized and/or complemented with additional reports.

The header (see figure bellow) of all reports (sheets in the template file) can be fully changed (except \_COVER, TASK-ALL\_DATA and GANTT\_CHART sheets). Several levels of customization are allowed, since the inclusion of company logos in the predefined areas and language text changes, until a complete reformulation of the header formatting and content. The unique restriction is that the number of rows and columns cannot be changed.

1	XchedPro	XchedPro - Project Schedule Solver (www.xchedpro.com)		
2	LOGO COMPANY/CLIENT	DOC. TYPE: SCHEDULE	DOC. NUMBER: XX-AA-YY-ZZZ-NNN	0
3		PROJECT: PROJECT NAME / ID		
4		AREA: AREA OR DEPARTMENT		
5		CASE: CASE NAME / ID		
6		TITLE: DOCUMENT TITLE		
7				

Figure 5.41 – Header area in the reports

Additional reports can also be included in the template report file, by creating new sheets that use the data available in basic sheets to generate new reports (tables and charts). The unique restriction is that the existing sheets cannot be deleted or renamed.

#### TIP

Prepare several versions of the TEMPLATE\_REPORT\_1.xlsx with different logos, languages and header content in order to customize the report for different projects and/or clients.

It is always a good idea to make a backup of the original TEMPLATE\_REPORT\_1.xlsx, before customize it. Anyway, if you make same mistake during the customization process, just download the XchedPro package form the site and recover a report template file.

### 5.9.4. Report Limits

As mentioned for input file, the use of MS Excel files to report presentation bring some limitations in terms of time processing and size. These limitations are handled before the report generation step, as consequence, depending on the schedule parameters (number of tasks, number of distinct resources and duration), some options will be disable in the report generation dialog.

## 5.10. LICENSE ID GENERATION

The license ID will be necessary as part of the procedure to get a XchedPro licensed version. The license ID can be obtained following the steps bellow:

- Open About dialog (Help -> About menu item);
- In About dialog press "License Info" button;
- In the License Activation window, copy the content of "license ID" field;

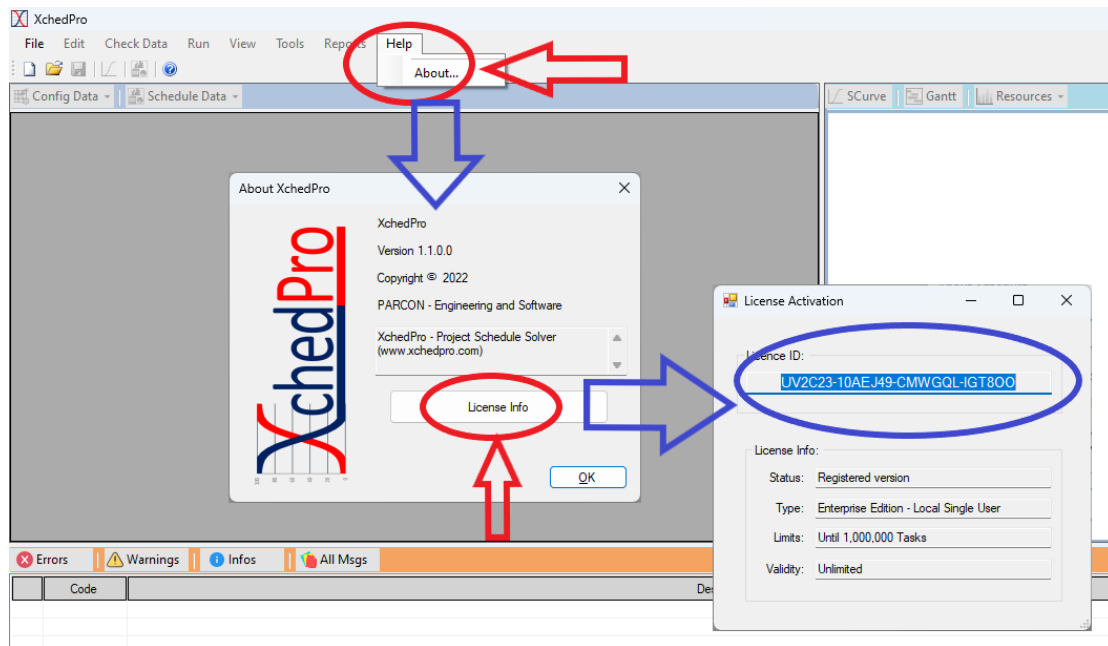


Figure 5.42 – License Info dialog

It is important to note that the unique difference between the XchedPro licensed versions is the maximum number of tasks that can be handled by application, all other capabilities are the same. When the kind of license is changed, just the license file needs to be replaced in application folder.

**TIP**

The license validation is performed just before the schedule calculation (when “Run” command starts). Not registered or not enterprise versions can be used to build and/or pre validate the input data files with any number of tasks.

### 5.11. MESSAGE VIEW AND STATUS BAR

XchedPro interface will inform all execution steps through the Message View panel and Status Bar. Message View will register the consolidate messages (mainly messages about the steps start and end. The Status Bar will provide an intermediate real time information, showing a progress bar for the most time-consuming execution steps.

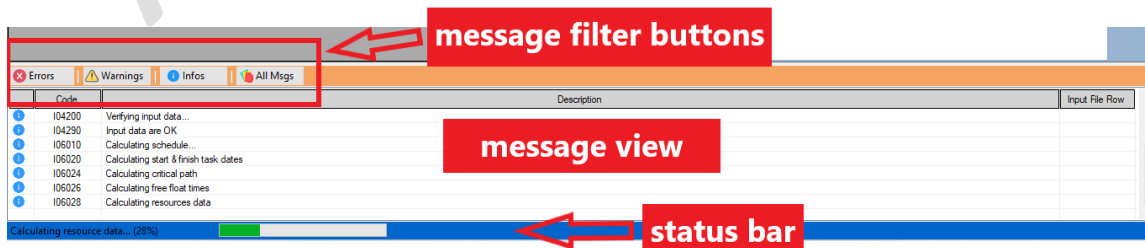


Figure 5.43 – Message view and status bar

## APPENDIX A – BASIC CONCEPTS AND NOMENCLATURE

There are several concepts, nomenclatures and definitions, some of them, not universals, that need to be explained to allow a correct creation of an input file and a correct interpretation of the results generated by XchedPro. This appendix presents the definitions of these terms in the scope of XchedPro application.

### A.1 Project Schedule

A project schedule is one of the most popular ways to generate and present a project planning. A well-built and updated schedule is very a powerful and complete tool for project planning and control. For a large number of projects, regarding its size/complexity, no additional toll is necessary. A typical schedule has just 4 basic elements:

- a) A list of Tasks (activities) and Mile Stones (if applicable) necessary for project completion;
- b) Time duration for each Task;
- c) Precedence relationship between all tasks and mile stones, that represents the time sequence of execution;
- d) The necessary resources to perform each task.

### A.2 Tasks (or Activities)

A Task or Activity (they are synonyms for XchedPro), is defined as any kind of work (physical or not) that requires a specific time (duration) to be done. Generate an engineering document, built a wall or just a project study preparation are examples of Tasks. The best practices recommend that all Task should be associated to some kind of deliverable in order to characterize it finish (and intermediate progress, if applicable).

### A.3 Mile Stone

A Mile Stone represents an important event in the schedule, but not associated to a real Task, like receive a construction permission. Mile Stones can also be associated to the start and/or finish of an important set of Tasks (like the client project approval or the finish of building foundations construction). For XchedPro, a Mile Stone is a Task with zero duration and no resources associated.

## A.4 Precedence Relationships Between Tasks

The precedence relationship defines how one Task is connect (in the time) to other ones. There are four basic precedence relationships between tasks:

- Start-Start (SS) – The task starts when the predecessor task also starts
- Start-End (SE) – The task starts when the predecessor task finish
- End-Start (ES) – The task finishes when the predecessor task starts
- End-End (EE) – The task finishes when the predecessor task also finishes

The following table, helps to clarify these concepts.

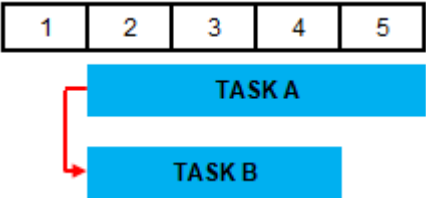
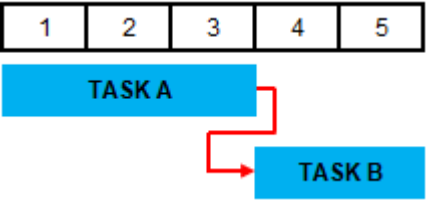
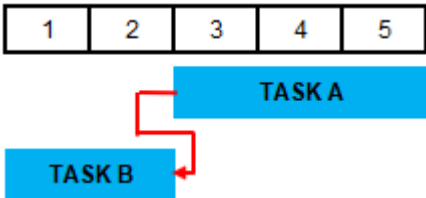
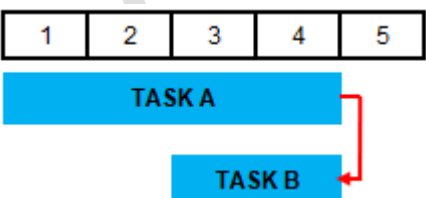
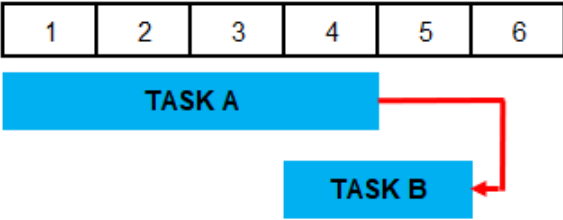
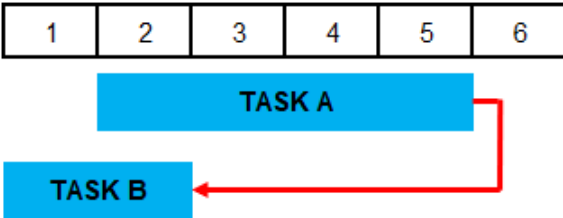
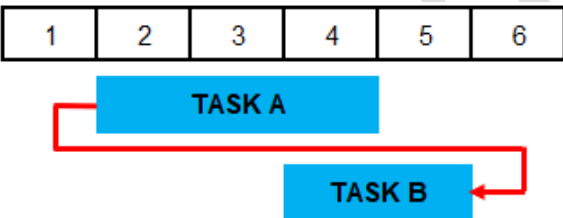
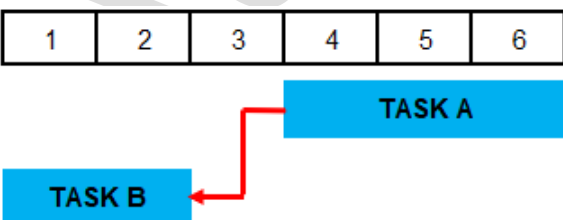
Gantt chart representation	Interpretation
	<ul style="list-style-type: none"> <li>➤ Task A has a duration of 4 t.u. (time units)</li> <li>➤ Task B has a duration of 3 t.u.</li> <li>➤ Task B starts at same time than Task A = Task B has a relation SS (Start-Start) to Task B</li> <li>➤ PREDECESSORS INFO code = A SS 0</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Task A has a duration of 3 t.u. (time units)</li> <li>➤ Task B has a duration of 2 t.u.</li> <li>➤ Task B starts at end of Task A = Task B has a relation SE (Start-End) to Task B</li> <li>➤ PREDECESSORS INFO code = A SE 0</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Task A has a duration of 3 t.u. (time units)</li> <li>➤ Task B has a duration of 2 t.u.</li> <li>➤ Task B finishes when Task A starts = Task B has a relation ES (End-Start) to Task B</li> <li>➤ PREDECESSORS INFO code = A ES 0</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Task A has a duration of 4 t.u. (time units)</li> <li>➤ Task B has a duration of 2 t.u.</li> <li>➤ Task B finishes at same time than Task A = Task B has a relation EE (End-End) to Task B</li> <li>➤ PREDECESSORS INFO code = A EE 0</li> </ul>

Table A.1 – Precedence relationships between tasks

### A.5 Legs Between Tasks

Leg is an amount of time that should be included between tasks regarding its precedence relationship. Legs should be always associate to some kind of precedence relationship between tasks. The leg can be positive, when the time is added, or negative (also called Leads), when the time is subtracted from precedence relationship.

The following table, helps to clarify these concepts.

Gantt chart representation	Interpretation
	<ul style="list-style-type: none"> <li>➤ Task A has a duration of 4 t.u. (time units)</li> <li>➤ Task B has a duration of 2 t.u.</li> <li>➤ Task B finishes at same time than Task A, with a Leg = 1 t.u.</li> <li>➤ PREDECESSORS INFO code = A EE 1</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Task A has a duration of 4 t.u. (time units)</li> <li>➤ Task B has a duration of 2 t.u.</li> <li>➤ Task B finishes at same time than Task A, with a Leg = -3 t.u.</li> <li>➤ PREDECESSORS INFO code = A EE -3</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Task A has a duration of 3 t.u. (time units)</li> <li>➤ Task B has a duration of 2 t.u.</li> <li>➤ Task B finishes when Task A starts, with a Leg = 4 t.u.</li> <li>➤ PREDECESSORS INFO code = A ES 4</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Task A has a duration of 3 t.u. (time units)</li> <li>➤ Task B has a duration of 2 t.u.</li> <li>➤ Task B finishes when Task A starts, with a Leg = -1 t.u.</li> <li>➤ PREDECESSORS INFO code = A ES -1</li> </ul>

	<ul style="list-style-type: none"> <li>➤ Task A has a duration of 3 t.u. (time units)</li> <li>➤ Task B has a duration of 2 t.u.</li> <li>➤ Task B starts at end of Task A, with a Leg = 1 t.u.</li> <li>➤ PREDECESSORS INFO code = A SE 1</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Task A has a duration of 3 t.u. (time units)</li> <li>➤ Task B has a duration of 2 t.u.</li> <li>➤ Task B starts at end of Task A, with a Leg = -4 t.u.</li> <li>➤ PREDECESSORS INFO code = A SE -4</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Task A has a duration of 4 t.u. (time units)</li> <li>➤ Task B has a duration of 3 t.u.</li> <li>➤ Task B starts at same time than Task A, with Leg = 2</li> <li>➤ PREDECESSORS INFO code = A SS 2</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Task A has a duration of 4 t.u. (time units)</li> <li>➤ Task B has a duration of 3 t.u.</li> <li>➤ Task B starts at same time than Task A, with Leg = -1</li> <li>➤ PREDECESSORS INFO code = A SS -1</li> </ul>

Table A.2 – Predecence relationships between tasks

Legs can be used to expand (or compact, if negative) the schedule, adding (or removing) time reserves or in resources leveling studies. Is not a good practice use Legs to represent intrinsic wait times in the project that cannot be easily changed, like time to receive an equipment or time required for concrete to dry, in these cases should be used a Task without resources, in order to avoid a misinterpretation of schedule free times.

## A.6 Float Time Calculations

There are several kinds of “float times” that can be calculated from a schedule, some of them doesn’t have an universal definition. Next items present a specific definition about how XchedPro calculates these values.

## a) Free Float

Free Float can be defined as the amount of time that a schedule activity can be delayed without delaying the early start date of any successor or violating a schedule constraint. In mathematical terms we can consider the free float of a task as the minimum free time between the task and its immediately successors. XchedPro calculates two kinds of Free Floats, first one considers the Tasks offsets (Legs or Leads) as part of the calculations, the second one is calculated without offsets, i.e., considering the legs as free times between the tasks. The free float for all tasks in the critical path is zero (this may not be true for the without offsets calculation).

## b) Total Float

Total Float can be defined as the amount of time that a schedule activity can be delayed or extended from its early start date without delaying the project finish date or violating a schedule constraint (Based on PMBOK® Guide Sixth Edition). In mathematical terms we can consider the total float of a task as the summation of the free times for all successor tasks. The total float for all tasks in the critical path is zero (this may not be true for the without offsets calculation).

## c) Path Float

Path float is defined as the amount of time that an entire path can be delayed without delaying the project finish date. In mathematical terms we can consider the path float of a task as the minimum free time of the last task in the same path. The path float for all tasks in the critical path is zero.

The following example helps to clarify these concepts.

Let's considering a schedule with 7 tasks (A, B, C, D, E, F, and G) with the durations, precedence relationships and Legs detailed in the table below.

TASK	DURATION (t.u)	PRECEDENCE RELATIONSHIP	LEG (t.u.)	CODIFICATION (*)
A	1	-	0	
B	2	Starts when Task A finishes	0	A SE 0
C	2	Starts when Task B finishes	2	B SE 2
D	3	Starts when Task C and Task F finish	0	C SE 0; F SE 0
E	2	Starts when Task F finishes	1	F SE 1
F	2	Starts when Task G finishes	-1	G SE -1
G	3	Starts when Task A finishes	0	A SE 0

(\*) XchedPro codification, as detailed in section 4.3.

Table A.3 – Data for Free Times computation example

This schedule can also be represented by a simplified Gantt chart as showed by next figure.

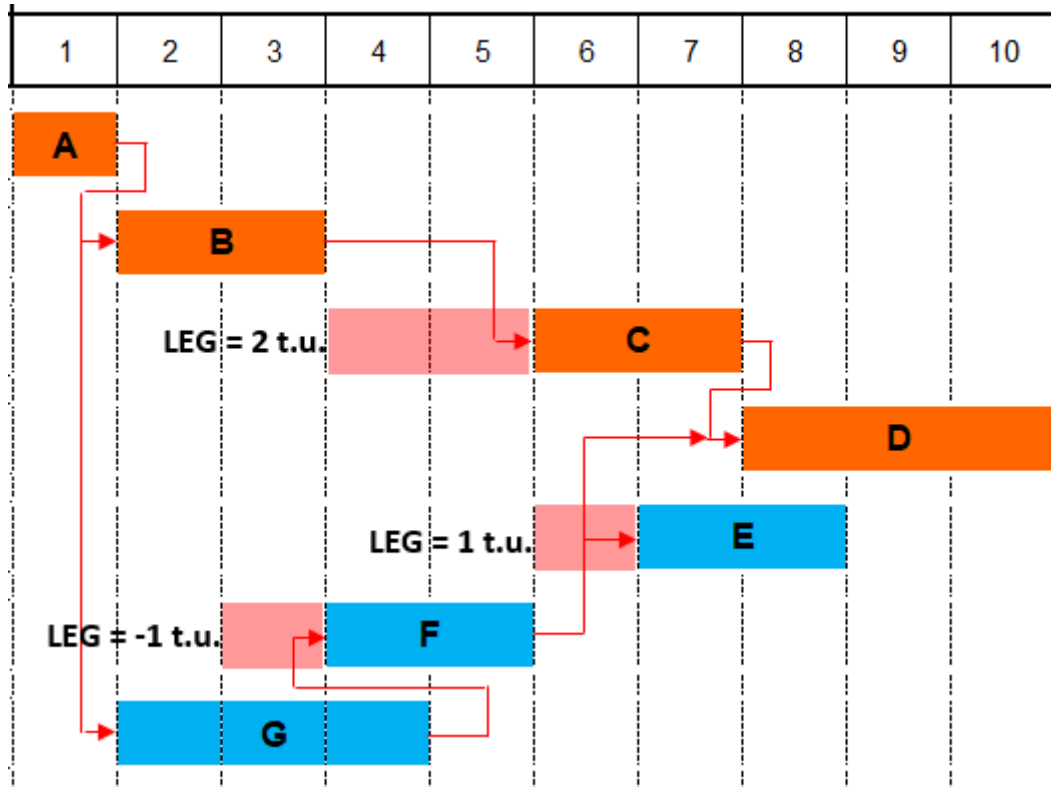


Figure A.1 – Gantt representation for free times computation example

The table below resumes the results for different “free times” calculation performed by XchedPro.

TASK	FREE FLOAT	TOTAL FLOAT	PATH FLOAT	FREE FLOAT (w/o LEG)	TOTAL FLOAT (w/o LEG)
A	0	0	0	0	1
B	0	0	0	2	2
C	0	0	0	0	0
D	0	0	0	0	0
E	2	2	2	2	2
F	0	2	0	1	2
G	0	2	0	-1	1

Table A.4 – Free Times calculation results

In order to simplify its interpretation, these results above were generated considering the duration in calendar days, i.e., no weekends or holidays.

A more realistic calculation considers the concept of work days, i.e., with interruptions in weekends and holidays (if configured). The next example has the same tasks, precedence and duration of the previous one, but considers the duration of each task in work days (t.u. = work days) and a week of 5 work days plus a weekend. These considerations result in a total schedule duration of 12 calendar days (assuming that this schedule starts on a Monday) with an interruption on the weekend. As a consequence the “calendar” free floats values will be different from the previous example. Of course the “work free floats” will be the same in both examples.

The graphical representation and results for free times calculations with work days, are present bellow.

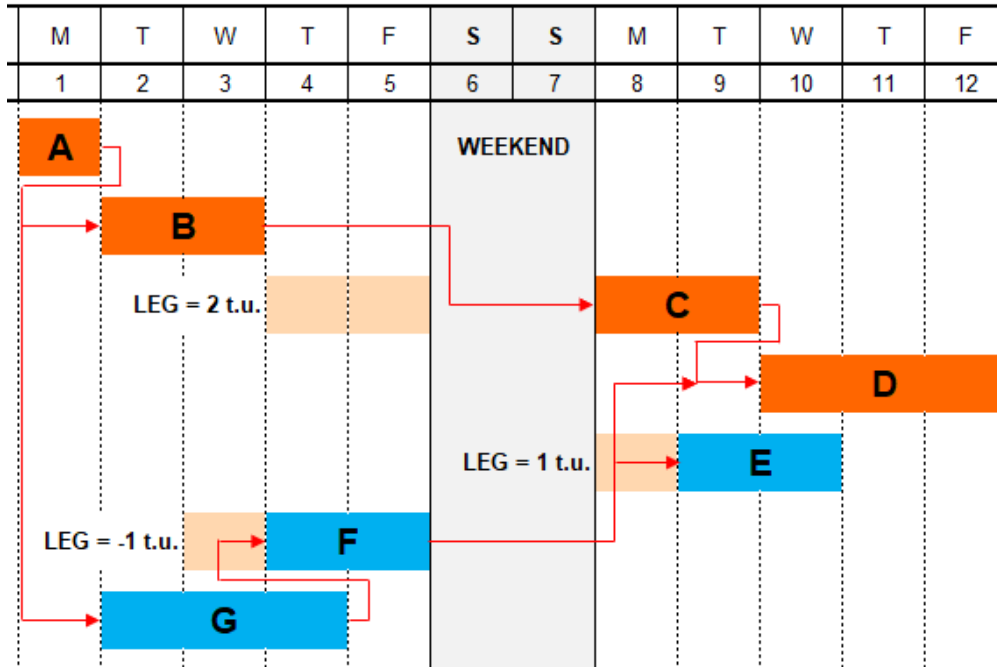


Figure A.2 – Gantt representation for free times computation example (considering work days)

The table below resumes the results for different “free times” calculation performed by XchedPro.

TASK	FREE FLOAT	TOTAL FLOAT	PATH FLOAT	FREE FLOAT (w/o LEG)	TOTAL FLOAT (w/o LEG)
A	0	0	0	0	1
B	0	0	0	4	4
C	0	0	0	0	0
D	0	0	0	0	0
E	4	4	4	4	4
F	0	2	0	1	2
G	0	2	0	-1	1

Table A.5 – Free Times calculation results (considering work days)

## APPENDIX B – PERFORMANCE FIGURES

XchedPro calculation engine is very efficient, robust and fast. The majority of time to execute the schedule calculations is associated to open, read, write and save the Excel input and report files, the schedule computation itself demand few processing time even in computers with entry-level CPUs and few RAM.

In order to give the user an idea about XchedPro limits and performance for large schedule problems, the following presents some figures related to execution times for different hardware specifications. It is important to note that these tests weren't performed under full controlled conditions, like computer temperature or co-processing internal tasks so, some results may appear inconsistent. The results should be considered just as gross reference, and not as a benchmark.

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HARDWARE		
CPU	RAM (GB)	DISK
i5-8265U	8	SSD SATA Rev.3.0 – 480GB

SCHEDULE SIZE/COMPLEXITY Schedule duration = 35 months Number of ≠ Resources = 60			STEP	EXECUTION TIME (hr:min:sec.ms)
Nr. Tasks	Input File Size (KB)	Report File Size (KB)		
1,000	156	5,099	Reading Input File	2.329
			Input Data Validation	0.172
			Schedule Calculations	1.892
			Report File Generation <sup>(1)</sup>	25:12.891
			Saving Report File	1.109
10,000	739	32,860	Reading Input File	1.516
			Input Data Validation	0.312
			Schedule Calculations	10.628
			Report File Generation <sup>(2)</sup>	22.050
			Saving Report File	5.453
100,000	6,171	339,527	Reading Input File	3.563
			Input Data Validation	2.297
			Schedule Calculations	1:40.282
			Report File Generation <sup>(2)</sup>	40:26.902
			Saving Report File	54.752
250,000	15,193	843,843	Reading Input File	3.938
			Input Data Validation	5.141
			Schedule Calculations	4:13.563
			Report File Generation <sup>(2)</sup>	11:01:28.376
			Saving Report File	2:18.458
500,000	29,572	236,865	Reading Input File	7.047
			Input Data Validation	10.689
			Schedule Calculations	8:11.657
			Report File Generation <sup>(3)</sup>	4:26.489
			Saving Report File	42.924
1,000,000	53,052	474,667	Reading Input File	12.750
			Input Data Validation	21.766
			Schedule Calculations	16:51.053
			Report File Generation <sup>(3)</sup>	10:37.715
			Saving Report File	1:28.958

Table B.1 – Performance figures for i5 CPU / 8GB RAM

HARDWARE		
CPU	RAM (GB)	DISK
i7-10510U	16	SSD SATA Rev.3.0 – 256GB

SCHEDULE SIZE/COMPLEXITY Schedule duration = 35 months Number of ≠ Resources = 60			STEP	EXECUTION TIME (hr:min:sec.ms)
Nr. Tasks	Input File Size (KB)	Report File Size (KB)		
1,000	156	5,099	Reading Input File	1.072
			Input Data Validation	0.111
			Schedule Calculations	1.754
			Report File Generation <sup>(1)</sup>	20:09.262
			Saving Report File	1.484
10,000	739	32,860	Reading Input File	2.811
			Input Data Validation	0.274
			Schedule Calculations	9.796
			Report File Generation <sup>(2)</sup>	32.441
			Saving Report File	8.409
100,000	6,171	339,527	Reading Input File	3.993
			Input Data Validation	1.957
			Schedule Calculations	1:46.294
			Report File Generation <sup>(2)</sup>	57:04.022
			Saving Report File	1:27.595
250,000	15,193	843,843	Reading Input File	19.899
			Input Data Validation	5.382
			Schedule Calculations	4:16.511
			Report File Generation <sup>(2)</sup>	14:21:56.550
			Saving Report File	3:35.236
500,000	29,572	236,865	Reading Input File	16.493
			Input Data Validation	9.982
			Schedule Calculations	8:09.600
			Report File Generation <sup>(3)</sup>	5:35.510
			Saving Report File	1:03.390
1,000,000	53,052	474,667	Reading Input File	33.982
			Input Data Validation	21.526
			Schedule Calculations	16:16.004
			Report File Generation <sup>(3)</sup>	12:19.772
			Saving Report File	2:13.398

Table B.2 – Performance figures for i7 CPU / 16GB RAM

## NOTES:

- (1) About 99,9% of the processing time was consumed to draw the connectors in the Gantt chart report.
- (2) The Gantt chart report was generated without the connectors. About 99,5% of the processing time was consumed to generate the Gantt chart.
- (3) The report was generated without the Gantt chart.