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OPTAMS

OPTimized All Monitor System

An activity within the:

Integrated Machine Vision Cluster

D19.7.4
Final Prototype of the resource planner in action

Version: 1.1
Date: 10/09/2003
Responsible: SHELBOX

Project Number: Project Title: Optimizer All Monitoring System Deliverable Type: public

Deliverable Number: DE 19.7.4 Contractual Date of Delivery: 30/04/03 Actual Date of Delivery: 10-09-2003 Title of Deliverable: Final prototype of the resource planner in action Work-Package contributing to the Deliverable: WP19.7 Nature of the Deliverable: public Author(s): SHELBOX, DSI

Abstract: a deliverable describing the functionality of final prototype in action, this description is characterized by the presence in this deliverable of many photos to view the installation of the final prototype in action in SHELBOX. For technical details about the behaviour of OPTAMS please see the deliverable on system validation.

Table of content

1 Summary of the Document

This document consists of a description of the final prototype of the resource planner, in terms of number of resources, type, productivity, location, timelines, phase description, ecc. The work is intended mainly to view the model for the resource configuration and to view the effective utilization of the optimisation engine. In this document, there are mainly showed photos that show the final prototype of OPTAMS utilized in SHELBOX for the validation tests. Video tape has been also realized, this video is very important to see the production of SHELBOX, and to see the use of OPTAMS solution. For technical details about the behaviour of OPTAMS please see the deliverable on system validation.

2 The SHELBOX end user

2.1 Company profile

SHELBOX s.r.l. is present on the market since July 1996.

Initially the production was addressed to the realization of “monoblocks” and premanufactured buildings; successively started the production of mobile houses that gradually is become the principal product of the company.
The company was constituted in origin of two plants: one in Certaldo (FI) where monoblocks were realized and one in Castelnuovo (AL) devoted to the construction of premanufactured buildings. The increased request of mobile houses has led to the constitution of a new productive plant in Verona and to a new subdivision of tasks among the different plants in order to satisfy the commitments. Currently in the plant of Certaldo an assembly line for the assemblage of mobile houses produces 4 houses per day. The same result is reached in the new plant in Verona and in other plants located in the provinces of Siena, Perugia and Latina. The production is therefore of about 13/14 mobile houses per day. Every mobile house has a cost for the final consumer of about 11.460-14.460 euro.
In the plant of Castelnuovo, besides the premanufactured buildings, also a part of the monoblocks are realized that before were exclusively produced in Certaldo.
The general and commercial administrations and the planning and productive organizations of the company are located in the plant of Certaldo. The total amount of sales is about 25.850.000 euro per year.
In the technical office equipped with modern computer for CAD programming, is realized the technological research and the development of new products, their engineering and the documentation for their production.
According to the rule ISO 9002 the acquirement office, in collaboration with the technical office, looks for suppliers of both materials and work, controlling both the quality of supplies and the service. In order to

obtain the certification related to the above mentioned rule, SHELBOX is instructing its personnel to conform it to the operative procedures that consent the control of the prefixed quality "standards".

The commitments arrive to the location of Certaldo that, after controlling them, plans the production and decentralizes it to the different plants. A continuous dialog between the central location and the other plants permits a monitoring of the advancement of the production and controls the efficiency and the global and singular productivity.

Such control is performed by comparing the objectives (economical, productive and commercial) that are reached with those that have been prefixed in the general budget that the direction plans each year and verifies each month. SHELBOX is certified ISO 9000.

2.2 SHELBOX organization

SHELBOX build mobile house, motor-homes, caravans. In that case, most of the work is performed manually and the productions consist of few pieces. This means that a strong flexibility in changing the configuration of the production process and in managing the resources is needed. More recently they have presented in the market new mobile houses, motor-homes and big caravans. In this case, the personalization aspects are very important but constrain to be very carefully and efficient during the production, to be competitive. In several cases their working people are distributed in different locations and outside of the SHELBOX plant and resources are shared among different production pipelines. SHELBOX production is growing fast. Their demand of personalization, automation and optimization is really high. Typically they present several products that pass on the same production line at the same time. Some of them may differ for some details, other for relevant aspects. The personnel have to be very careful in reading the working sheet in order to perform the right work.

SHELBOX produces about 600 mobile houses per year. Sometimes clients request variations on standard products of SHELBOX. The effort of the firm to produce one mobile house is estimated in about 60-70 hours. The production process consists of assembly phases as reported in the table below. The final year balance of the costs outlines how the hours needed during the year are sensibly more than what have been planned in advance on the basis of the average hours needs per house. The delay and pauses are a large percentage. SHELBOX has estimated a lack of productivity of about 15% of the total production time: this time is lost somewhere in the production process. *The production process is strongly inefficient.* SHELBOX objective is to reduce the hours lost: this could be done by optimizing the production process and the resources management. Optimization is complex because the production process is composed of many tasks that consist of single parts handling and small piece assembly.
For a yearly production of about 600 mobile houses, and since the production of a mobile house takes about 60 hours, the global hours needed are estimated to be about 36000.
The working days are 239 in a year. The working capacity of the SHELBOX firm, net of a 15% of loss productivity calculated and accepted by the firm, is 48756 man-hours per year.

12.756 man-hours are lost because of the inefficiency of the production process.

The current high inefficiency of the production process is the reason for SHELBOX to set-up an integrated, flexible and on-line optimized control process. The insertion of an on-line automatic tool for optimizing the production and the management of the resources will increase the safeness, reliability and productivity of the production process of SHELBOX.

SHELBOX play the role of tester of the functionality of the system in the application field , as a manufacturing industry, and final validator. SHELBOX will also contribute to the dissemination of the project results. The project will help SHELBOX, in a more and more internationalized market, to dispose in real time of certain data as support for decisions in order to broaden the market area of its products and to face competitors with greater security.
SHELBOX would like to control and optimize its production process with an integrated system for both on-line optimization and resource management. The management of registers and the trace of materials permits to obtain automatically all the necessary data for the quality control system.

This will be performed by installing an OPTAMS solution in its plant and testing the system against real problems.

In the following table, the typical list of the phases that lead to the construction of a mobile house in the SHELBOX plants are outlined.

CODE	***DESCRIPTION PHASE***
1	Realization chassis for the base
2	Application plan and linoleum for the ground
3	Assembly external walls
4	Assembly internal walls and furniture with ground anchorage
5	Positioning bathroom services
6	Assembly internal roof
7	Preparation wires for electrical plant
8	Assembly frames for doors and windows
9	Set-up of electrical plant and of the water and gas plant
10	Assembly hangings, doors, tunings – assembly curtains
11	Assembly roof

In SHELBOX, the production is mainly manual, since the production consists mainly of mobile-houses assembly. The machines in the factory are mainly elevators to lift the mobile house, tools used by workers, etc.. There are not expensive hourly rate machines.
SHELBOX production process in highly inefficient. Human resources perform work in the line without a time monitor. SHELBOX needs to use its resources in a more productive manner. This time monitoring and time optimization in the resource management will lead SHELBOX to control more precisely its costs. Controlling costs will allow them also to make more precise final balances and estimated budget for the future production.

Currently the assembly phases are documented and monitored through an Excel worksheet, called working sheet or production sheet. The working sheet is also used to evaluate the volume of material to purchase and/or to verify the availability of the material in the store during the production

N. progr.vo	Codice	Addetto	Fase	H. inizio	H. fine	Data	Tempo realizzato
51	CIPRO 800X300-U-EUROCAMP	32	1	8.00	11.00	11/10/2002	180
51	CIPRO 800X300-U-EUROCAMP	6	2	11.30	12.00	11/10/2002	30
51	CIPRO 800X300-U-EUROCAMP	6	2	13.30	14.00	11/10/2002	30
51	CIPRO 800X300-U-EUROCAMP	6	2	15.30	17.30	11/10/2002	120
51	CIPRO 800X300-U-EUROCAMP	26	3	15.00	17.30	11/10/2002	150
51	CIPRO 800X300-U-EUROCAMP	22	3	9.12	9.18	07/10/2002	06
51	CIPRO 800X300-U-EUROCAMP	22	3	9.06	9.12	08/10/2002	06
51	CIPRO 800X300-U-EUROCAMP	22	3	8.55	9.00	09/10/2002	05
51	CIPRO 800X300-U-EUROCAMP	22	3	13.38	13.43	09/10/2002	05
51	CIPRO 800X300-U-EUROCAMP	22	3	9.00	9.06	10/10/2002	06
51	CIPRO 800X300-U-EUROCAMP	26	3	9.00	10.00	14/10/2002	60
51	CIPRO 800X300-U-EUROCAMP	13	3	8.00	12.00	14/10/2002	240
51	CIPRO 800X300-U-EUROCAMP	15	3	8.00	12.00	14/10/2002	240
51	CIPRO 800X300-U-EUROCAMP	26	3	15.15	15.28	14/10/2002	13
51	CIPRO 800X300-U-EUROCAMP	35	4	16.15	16.52	14/10/2002	37
51	CIPRO 800X300-U-EUROCAMP	35	4	11.00	11.37	16/10/2002	37
51	CIPRO 800X300-U-EUROCAMP	8	4	15.45	18.00	14/10/2002	135
51	CIPRO 800X300-U-EUROCAMP	8	4	8.00	9.30	15/10/2002	90

51	CIPRO 800X300-U-EUROCAMP	35	4	9.38	10.15	14/10/2002	37
51	CIPRO 800X300-U-EUROCAMP	35	4	16.45	17.08	21/10/2002	23
51	CIPRO 800X300-U-EUROCAMP	25	5	15.14	15.16	07/10/2002	02
51	CIPRO 800X300-U-EUROCAMP	12	5	15.30	16.45	15/10/2002	75
51	CIPRO 800X300-U-EUROCAMP	25	5	15.30	16.30	15/10/2002	60
51	CIPRO 800X300-U-EUROCAMP	25	5	8.00	9.30	16/10/2002	90
51	CIPRO 800X300-U-EUROCAMP	12	6	16.45	17.30	15/10/2002	45
51	CIPRO 800X300-U-EUROCAMP	24	6	11.15	12.00	17/10/2002	45
51	CIPRO 800X300-U-EUROCAMP	24	6	13.30	15.45	17/10/2002	135
51	CIPRO 800X300-U-EUROCAMP	24	6	11.15	12.00	17/10/2002	45
51	CIPRO 800X300-U-EUROCAMP	24	6	13.30	15.45	17/10/2002	135
51	CIPRO 800X300-U-EUROCAMP	36	7	14.52	15.45	11/10/2002	53
51	CIPRO 800X300-U-EUROCAMP	20	7	15.00	17.30	14/10/2002	150
51	CIPRO 800X300-U-EUROCAMP	20	7	8.00	8.30	15/10/2002	30
51	CIPRO 800X300-U-EUROCAMP	8	8	15.30	16.15	11/10/2002	45
51	CIPRO 800X300-U-EUROCAMP	34	8	8.00	10.00	17/10/2002	120
51	CIPRO 800X300-U-EUROCAMP	25	8	9.30	9.45	16/10/2002	15
51	CIPRO 800X300-U-EUROCAMP	30	8	8.00	11.30	17/10/2002	210
51	CIPRO 800X300-U-EUROCAMP	1	8	8.00	11.30	17/10/2002	210
51	CIPRO 800X300-U-EUROCAMP	14	8	8.00	11.30	17/10/2002	210
51	CIPRO 800X300-U-EUROCAMP	8	8	14.45	15.45	14/10/2002	60
51	CIPRO 800X300-U-EUROCAMP	29	8	14.00	17.30	21/10/2002	210
51	CIPRO 800X300-U-EUROCAMP	21	8	14.30	17.30	21/10/2002	180
51	CIPRO 800X300-U-EUROCAMP	7	8	13.30	15.30	21/10/2002	120
51	CIPRO 800X300-U-EUROCAMP	27	9	8.55	9.00	07/10/2002	05
51	CIPRO 800X300-U-EUROCAMP	11	9	10.23	11.00	08/10/2002	37
51	CIPRO 800X300-U-EUROCAMP	11	9	14.30	17.30	16/10/2002	180
51	CIPRO 800X300-U-EUROCAMP	27	9	15.00	18.00	16/10/2002	180
52	CIPRO 800X300-U-EUROCAMP	8	4	10.00	12.00	15/10/2002	120
52	CIPRO 800X300-U-EUROCAMP	8	4	13.30	15.15	15/10/2002	105
52	CIPRO 800X300-U-EUROCAMP	35	4	17.08	17.30	21/10/2002	22
52	CIPRO 800X300-U-EUROCAMP	25	5	15.16	15.17	07/10/2002	01
52	CIPRO 800X300-U-EUROCAMP	25	5	11.00	12.00	16/10/2002	60
52	CIPRO 800X300-U-EUROCAMP	25	5	13.30	14.45	16/10/2002	75
52	CIPRO 800X300-U-EUROCAMP	25	5	8.00	8.15	17/10/2002	15
52	CIPRO 800X300-U-EUROCAMP	12	6	8.00	10.30	16/10/2002	150
52	CIPRO 800X300-U-EUROCAMP	35	6	16.45	17.30	15/10/2002	45
52	CIPRO 800X300-U-EUROCAMP	24	6	15.45	17.30	17/10/2002	105
52	CIPRO 800X300-U-EUROCAMP	24	6	15.45	17.30	17/10/2002	105
52	CIPRO 800X300-U-EUROCAMP	32	6	8.00	9.45	21/10/2002	105
52	CIPRO 800X300-U-EUROCAMP	24	6	8.00	9.45	21/10/2002	105
52	CIPRO 800X300-U-EUROCAMP	35	7	10.15	11.10	14/10/2002	55
52	CIPRO 800X300-U-EUROCAMP	20	7	10.00	12.00	15/10/2002	120
52	CIPRO 800X300-U-EUROCAMP	34	8	11.30	12.00	17/10/2002	30
52	CIPRO 800X300-U-EUROCAMP	34	8	13.30	13.45	17/10/2002	15
52	CIPRO 800X300-U-EUROCAMP	30	8	11.30	12.00	17/10/2002	30
52	CIPRO 800X300-U-EUROCAMP	30	8	13.30	16.00	17/10/2002	150
52	CIPRO 800X300-U-EUROCAMP	1	8	11.30	12.00	17/10/2002	30
52	CIPRO 800X300-U-EUROCAMP	1	8	13.30	16.00	17/10/2002	150

CIPRO 800X300-B- 2002 / SELECT							
	cat.	**Materiale**	**Fornitore**	**U.M.**	**PREZZO U.**	**Quant.**	**Costo T.**
2MPCOLLA	2	colla poliplex 230	ind. chimica lechner	Kg	2.400	6	14.400
4	2	linoleum standard manon 3369 O TOSCA 4174	forcep	mq	5.300	24	127.200
GUARNTETTO	2	guarnizione 40x40	novaxpren	ml	1.300	16	20.800
GUARNTETTO	2	guarnizione 20x40	novaxpren	ml	520	16	8.320
SOLENE 4 mm	2	isolene antracite non adesivato sp. 3 mm rotolo h 1000	novaxpren	mq	5.000	24	120.000
CORAN42X15	2	cornice angolare 15X42X2300 VERNICIATA	casa della cornice	ml	2.300	10	23.000
10	2	lastra polistirolo sp. 20 D 20 100x134,5x2	espansi tecnici	n.	2.152	16	34.432
REGBAS68X34	2	regolo per base 68x34	FJ LAMELLARE	ml	1.780	26	46.280
REGINF59X34	2	regolo per infissi 59x34	FJ LAMELLARE	ml	1.560	8	12.480
ROSLEGAR	2	cornice circolare per areazione garda+materiale	cmp	n.	14.500	2	29.000
66	4	sedia pieghevole arno lucida art. 63	funari sesto	n.	17.000	2	34.000
0	4	serie cuscini dinette ad L da 2000x1420	crippa campeggio	n.	155.000	1	155.000
24	4	materasso a molle 140x190	nefi italia	n	88.500	1	88.500
28	4	materasso a molle 70x190	nefi italia	n	46.500	2	93.000
23	4	resinato in rotolo	crippa campeggio	kg	4.000	0,3	1.200
MOB8X3-B-2001	4	serie mobilio 8x3/B -2001	GLOBALE	n.	1.579.948	1	1.579.948
0	4	serie pensili per camera 800X300-B-2002	GLOBALE	n	400.000	1	400.000
72	4	rete matrimoniale 140x190 doghe f.	nefi italia	n.	91.800	1	91.800
76	4	rete singola 70x190 doghe f.	nefi italia	n.	48.450	2	96.900
78	4	sopraporta tamburato	f.lli naldini	n.	8.090	3	24.270
79	4	stoffa per rivestimento	fagnani	mq	8.000	3,5	28.000
80	4	tenda leggera cm. 100x116h	crippa campeggio	n.	7.750	9	69.750
81	4	tenda pesante cm. 140x117h	crippa campeggio	n.	17.400	9	156.600

.....

0	10	pannello osb 3 cp. 20x1220x2830 levigato	comeco	mq	9.000	22,5	202.500	
29	10	pannello truciolare idrofugo V 100 sp.18	forcep	mq	6.500	1	6.500	
25	10	pannello TRUCIOLARE V 100 nobil fantasia sp. 22	sia	mq	11.000	14,8	162.800	
60	4	lavorazione tramezze mod. 8x3/B	chimenti	n.	100.000	1	100.000	
PANNCM	10	pann est. lam-lam pr-pl sp.35 c/regol	polistamp	mq	33.500	38,76	1.298.460	
PANNCM	10	pann est. lam-lam pr-pl sp.35 c/regol	polistamp	mq	33.500	4,5	150.750	
100	6	mensola nervata 20-25	bartalini marcello e c. sdf	n.	2.250	0	-	
0	10	pannello soffitto pr-zn sp. 35 mm incastri in legno	polistamp	mq	19.000	23,2	440.800	
45	10	pannello osb sp.12 mm 1250 x 2500	comeco	mq	5.460	20	109.200	
EGOSTILLASTI	10	lastra tegostil " solo lamiera " cm. 1500x1060	tegostil	mq	17.010	24	408.240	
26	3	set 4 martinetti in alluminio	gepacar	n.	60.000	1	60.000	
					TOTALE MAT.		11.507.661	
1	1	manodopera costo / minuto SHELBOX	shelbox s.r.l.	n.	1.000	3900	3.900.000	65 ore
			MATERIALE + MANODOPERA				15.407.661	
			RICARICO UTILE			0,85	18.126.660	
			RICARICO PROVVIGIONE			0,95	19.080.694	
					VENDITA ESCLUSO TRASPORTO			
					TRASPORTO		-	
					MONTAGGIO IN OPERA		-	
						TOT,		

COSTO INDUSTRIALE		15.407.661	80,75%
PROVVIGIONE	5%	954.035	5,00%
TRASPORTO		-	0,00%
MONTAGGIO IN OPERA		-	0,00%
RICARICO		2.718.999	14,25%

LISTINO	**31.801.157**

The above figure is an example of the base production sheet adopted in SHELBOX. The prices are expressed in Italian liras since their software for producing them have never been updated to Euros. The production sheet is not formalized and not linked to the management software of the plant. Automation and formalization is needed for this aspect in the SHELBOX plant.

3 Analysis of production process of SHELLBOX

The production process is composed of many tasks that consist of single parts handling and small piece assembly.

The mobile houses, to be produced, have to through into production line. Production line is constituted by eleven main workplaces, in each workplace a precise task is executed (e.g., Chassis realization for the base or Assembly mobile-house walls). The tasks represent the elementary phases of production.

SHELBOX receives orders from the customers, each order is characterized by number of mobile houses to be produces within a delivery date.

The Job is represented by single mobile house, for each order there are number of jobs equal at the mobile house to produce to satisfy the order.
Each job is composed of eleven of elementary tasks or phases that have to be executed in sequence.
Jobs, belonging at the same order are characterized to have the same delivery date.
The elementary tasks are executed by skilled resource. The resource of SHELBOX has been divided in eleven group, each group can work to the specific elementary task. A single resource can belong to one or more groups.

3.1 Description of cycle work

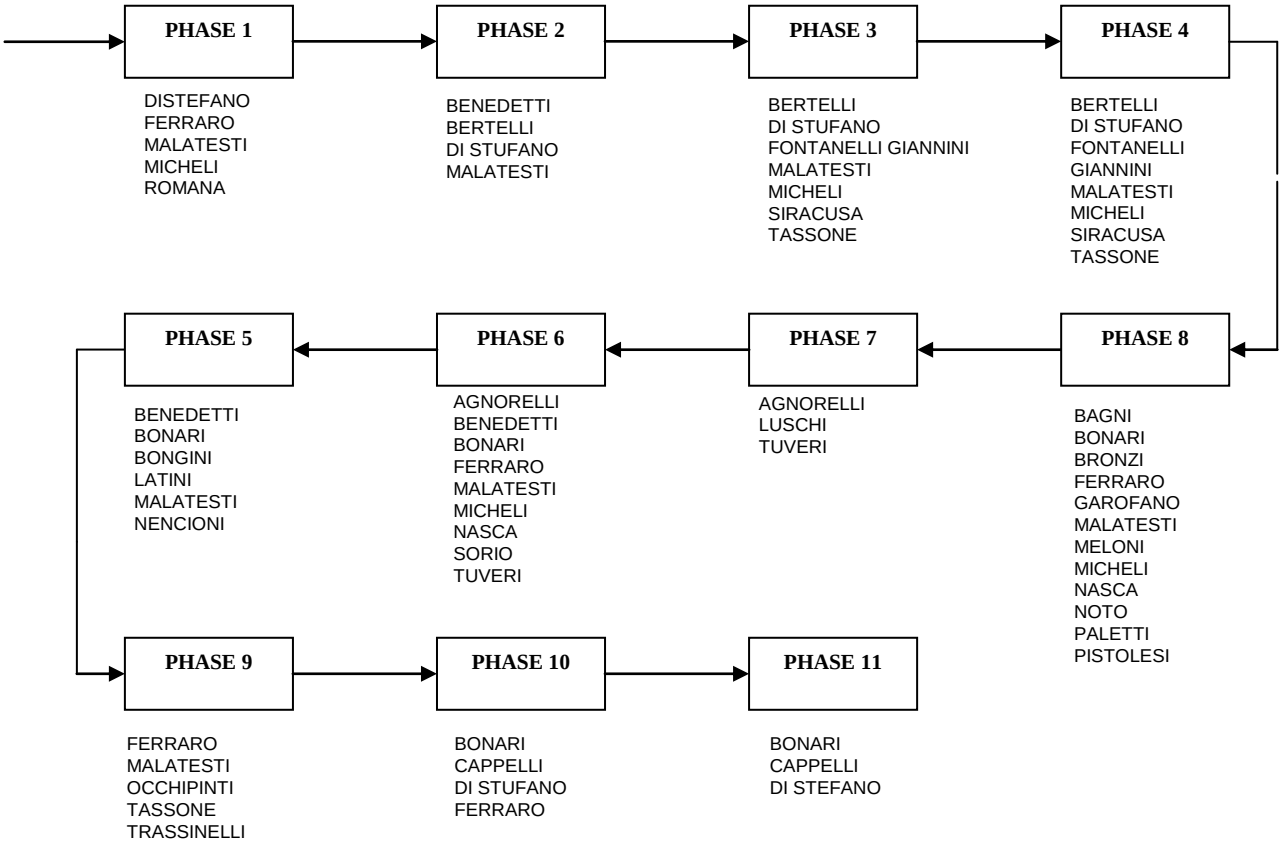

Figure 1 view of production line

Elementary tasks have to execute on specific platform, (e.g. the tasks 10 must to execute on platform 10), to schedule one specific tasks for its execution need availability of platform and availability of resource able to execute the task. In some case more resources have to collaborate to execute elementary tasks (e.g. phase 10 need availability of platform 10 and availability of 2 resources chosen in group of resource that can execute phase 10).
The chosen algorithm has to schedule the elementary tasks on the resource to guarantee the production of all mobile house as soon possible.

Figure 2 Microterminal for monitoring the work of resources

3.2 Interchange file utilized by module Optams

This file has been written by Planner, exit to the initial solution

[RESOURCES]
GPos_1 pos_01 ;
GPos_2 pos_02 ;
GPos_3 pos_03_1 pos_03_2 ;
GPos_4 pos_04 ;
GPos_5 pos_05_1 pos_05_2 ;
GPos_6 pos_06_1 pos_06_2 ;
GPos_7 pos_07 ;
GPos_8 pos_08 ;
Group_01 DISTEFANO FERRARO MALATESTI MICHELI ROMANA ;
Group_02 BENEDETTI BERTELLI DI STEFANO MALATESTI ;
Group_03 BERTELLI DI STEFANO FONTANELLI GIANNINI MALATESTI MICHELI SIRACUSA TASSONE ;
Group_04 BERNACCHINI BONGINI BRONZI LATINI MALATESTI POLI SIRACUSA TUVERI ;
Group_05 BENEDETTI BONARI BONGINI LATINI MALATESTI NENCIONI ;
Group_06 AGNORELLI BENEDETTI BONARI FERRARO MALATESTI MICHELI NASCA SORIO TUVERI ;
Group_07 AGNORELLI LUSCHI TUVERI ;
Group_08 BAGNI BONARI BRONZI FERRARO GAROFANO MALATESTI MELONI MICHELI NASCA NOTO PAOLETTI PISTOLESI TUVERI ;
Group_09 FERRARO MALATESTI OCCHIPINTI TASSONE TRASSINELLI ;
Group_10 BONARI CAPPELLI DI STEFANO FERRARO ;
Group_11 BONARI CAPPELLI DI STEFANO ;
;
[NUMBER OF JOBS]
25
[JOB]
03COM00003#0 09/09/2003 18:04 30/07/2003 00:00 15/07/2003 08:00
0 -1 ;
[NUMBER OF PHASES]
11

```
03COM00003#0_8295_01_0 0 1
15/07/2003 08:00 15/07/2003 09:40
100  % MAPPED
0
GPos_1 Group_01 %& ;

03COM00003#0_8295_02_0 1 1
15/07/2003 09:40 15/07/2003 11:20
100 0& % MAPPED
0
GPos_2 Group_02 %& ;

03COM00003#0_8295_03_0 2 2
15/07/2003 11:20 15/07/2003 14:40
140 1& % MAPPED
0
GPos_3 Group_03 Group_03 %& GPos_3 Group_03 Group_03 Group_03 %& GPos_3 Group_03 Group_03 Group_03 Group_03 %& ;

03COM00003#0_8295_04_0 3 2
15/07/2003 14:40 15/07/2003 17:00
140 2& % MAPPED
0
GPos_3 Group_04 Group_04 %& GPos_3 Group_04 Group_04 Group_04 %& GPos_3 Group_04 Group_04 Group_04 Group_04 %& ;

03COM00003#0_8295_05_0 4 2
15/07/2003 17:00 16/07/2003 08:40
100 3& % MAPPED
0
GPos_4 Group_05 Group_05 %& ;

03COM00003#0_8295_06_0 5 2
16/07/2003 08:40 16/07/2003 11:00
140 4& % MAPPED
0
GPos_5 Group_06 Group_06 %& GPos_5 Group_06 Group_06 Group_06 %& GPos_5 Group_06 Group_06 Group_06 Group_06 %& ;

03COM00003#0_8295_07_0 6 1
16/07/2003 12:40 16/07/2003 16:00
140 5& % MAPPED
0
GPos_5 Group_07 %& GPos_5 Group_07 Group_07 %& GPos_5 Group_07 Group_07 Group_07 %& ;

03COM00003#0_8295_08_0 7 2
16/07/2003 16:00 16/07/2003 18:00
120 6& % MAPPED
0
GPos_6 Group_08 Group_08 %& GPos_6 Group_08 Group_08 Group_08 %& GPos_6 Group_08 Group_08 Group_08 Group_08 %& ;

03COM00003#0_8295_09_0 8 2
17/07/2003 08:20 17/07/2003 10:20
120 7& % MAPPED
0
GPos_6 Group_09 Group_09 %& GPos_6 Group_09 Group_09 Group_09 %& GPos_6 Group_09 Group_09 Group_09 Group_09 %& ;

03COM00003#0_8295_10_0 9 2
17/07/2003 10:40 17/07/2003 12:00
80 8& % MAPPED
0
GPos_7 Group_10 Group_10 %& ;

03COM00003#0_8295_11_0 10 2
17/07/2003 12:00 17/07/2003 13:30
90 9& % MAPPED
0
GPos_8 Group_11 Group_11 %& ;

[JOB]
03COM00003#1 09/09/2003 18:04 30/07/2003 00:00 15/07/2003 09:40
0 -1 ;
[NUMBER OF PHASES]
11
03COM00003#1_8295_01_1 0 1
15/07/2003 09:40 15/07/2003 11:20
100  % MAPPED
0
GPos_1 Group_01 %& ;

03COM00003#1_8295_02_1 1 1
15/07/2003 11:20 15/07/2003 13:00
100 0& % MAPPED
0
GPos_2 Group_02 %& ;

03COM00003#1_8295_03_1 2 2
15/07/2003 13:00 15/07/2003 16:20
140 1& % MAPPED
0
GPos_3 Group_03 Group_03 %& GPos_3 Group_03 Group_03 Group_03 %& GPos_3 Group_03 Group_03 Group_03 Group_03 %& ;
```

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03COM00003#1_8295_04_1 3 2
15/07/2003 16:20 16/07/2003 08:40
140 2& % MAPPED
0
GPos_3 Group_04 Group_04 %& GPos_3 Group_04 Group_04 Group_04 %& GPos_3 Group_04 Group_04 Group_04 Group_04 %& ;

03COM00003#1_8295_05_1 4 2
16/07/2003 08:40 16/07/2003 10:20
100 3& % MAPPED
0
GPos_4 Group_05 Group_05 %& ;

03COM00003#1_8295_06_1 5 2
16/07/2003 10:20 16/07/2003 12:40
140 4& % MAPPED
0
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3.3 Resource sheet with the operation to carried out

CALENDARIO LAVORO PIANIFICATO

CODICE RISORSA AGNORELLI Pag 1

	Dalle	Alle	Commessa	Rigo	Fase	
16-lug-03	08:40	10:10	03COM00003	0	06	COSTRUZIONE TETTO
16-lug-03	10:10	10:20	03COM00003	0	07	MONTAGGIO BAGNO
16-lug-03	10:20	11:50	03COM00003	1	06	COSTRUZIONE TETTO
16-lug-03	11:50	12:00	03COM00003	1	07	MONTAGGIO BAGNO
16-lug-03	12:00	12:30	03COM00003	0	07	MONTAGGIO BAGNO
16-lug-03	12:40	13:20	03COM00003	1	07	MONTAGGIO BAGNO
16-lug-03	13:20	13:30	03COM00003	10	06	COSTRUZIONE TETTO
16-lug-03	14:30	15:50	03COM00003	10	06	COSTRUZIONE TETTO
16-lug-03	15:50	16:40	03COM00003	11	06	COSTRUZIONE TETTO
16-lug-03	16:40	18:00	03COM00003	10	07	MONTAGGIO BAGNO
17-lug-03	08:00	08:10	03COM00003	10	07	MONTAGGIO BAGNO
17-lug-03	08:10	08:20	03COM00003	12	06	COSTRUZIONE TETTO
17-lug-03	08:20	09:50	03COM00003	11	07	MONTAGGIO BAGNO
17-lug-03	09:50	10:00	03COM00003	13	06	COSTRUZIONE TETTO
17-lug-03	10:00	10:40	03COM00003	12	07	MONTAGGIO BAGNO
17-lug-03	10:40	11:20	03COM00003	14	06	COSTRUZIONE TETTO
17-lug-03	11:20	12:10	03COM00003	12	07	MONTAGGIO BAGNO
17-lug-03	12:10	13:30	03COM00003	13	07	MONTAGGIO BAGNO

CALENDARIO LAVORO PIANIFICATO

CODICE RISORSA AGNORELLI

Pag 1

	Dalle	Alle	Commessa	Rigo	Fase	
16-lug-03	08:40	10:10	03COM00003	0	06	COSTRUZIONE TETTO
16-lug-03	10:10	10:20	03COM00003	0	07	MONTAGGIO BAGNO
16-lug-03	10:20	11:50	03COM00003	1	06	COSTRUZIONE TETTO
16-lug-03	11:50	12:00	03COM00003	1	07	MONTAGGIO BAGNO
16-lug-03	12:00	12:30	03COM00003	0	07	MONTAGGIO BAGNO
16-lug-03	12:40	13:20	03COM00003	1	07	MONTAGGIO BAGNO
16-lug-03	13:20	13:30	03COM00003	10	06	COSTRUZIONE TETTO
16-lug-03	14:30	15:50	03COM00003	10	06	COSTRUZIONE TETTO
16-lug-03	15:50	16:40	03COM00003	11	06	COSTRUZIONE TETTO
16-lug-03	16:40	18:00	03COM00003	10	07	MONTAGGIO BAGNO
17-lug-03	08:00	08:10	03COM00003	10	07	MONTAGGIO BAGNO
17-lug-03	08:10	08:20	03COM00003	12	06	COSTRUZIONE TETTO
17-lug-03	08:20	09:50	03COM00003	11	07	MONTAGGIO BAGNO
17-lug-03	09:50	10:00	03COM00003	13	06	COSTRUZIONE TETTO
17-lug-03	10:00	10:40	03COM00003	12	07	MONTAGGIO BAGNO
17-lug-03	10:40	11:20	03COM00003	14	06	COSTRUZIONE TETTO
17-lug-03	11:20	12:10	03COM00003	12	07	MONTAGGIO BAGNO
17-lug-03	12:10	13:30	03COM00003	13	07	MONTAGGIO BAGNO

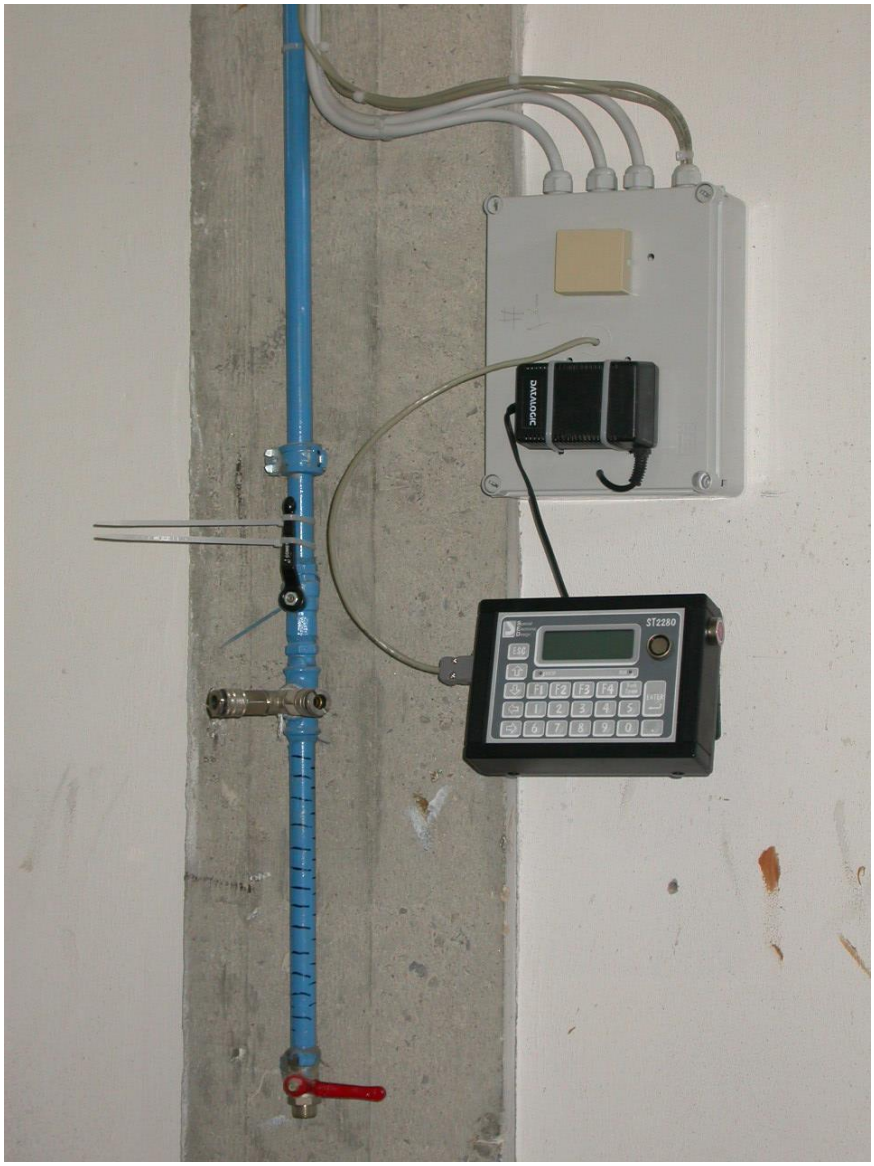

Figura 3 Microterminal for monitoring the work of resources

Figure 4 Server where the software of system OPTAMS