

TermoCAD

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MONITORIZARE SCADA

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CIMPLICITY Plant edition - GE-Fanuc (USA)



SCADA

Supervisory Control and Data Acquisition



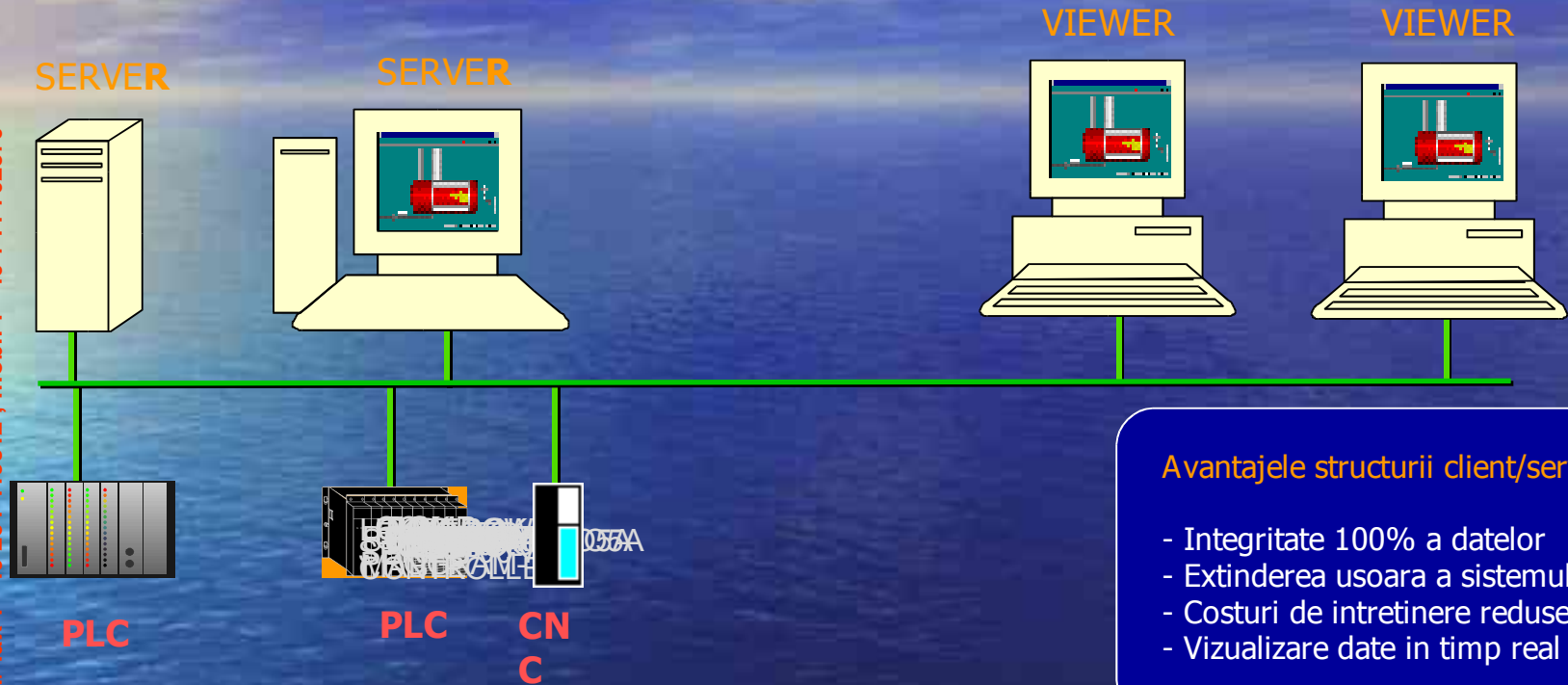
- sistem de control industrial cu arhitectură de tip client / server
- flexibilitate deosebită : de la nivel aparate câmp , la nivel managerial
- conexiuni cu baze de date : Acces, SQL Server, Oracle etc
- conexiuni cu majoritatea tipurilor de PLC-uri



STRUCTURA CLIENT/SERVER

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Avantajele structurii client/server :

- Integritate 100% a datelor
- Extinderea usoara a sistemului
- Costuri de intretinere reduse
- Vizualizare date in timp real

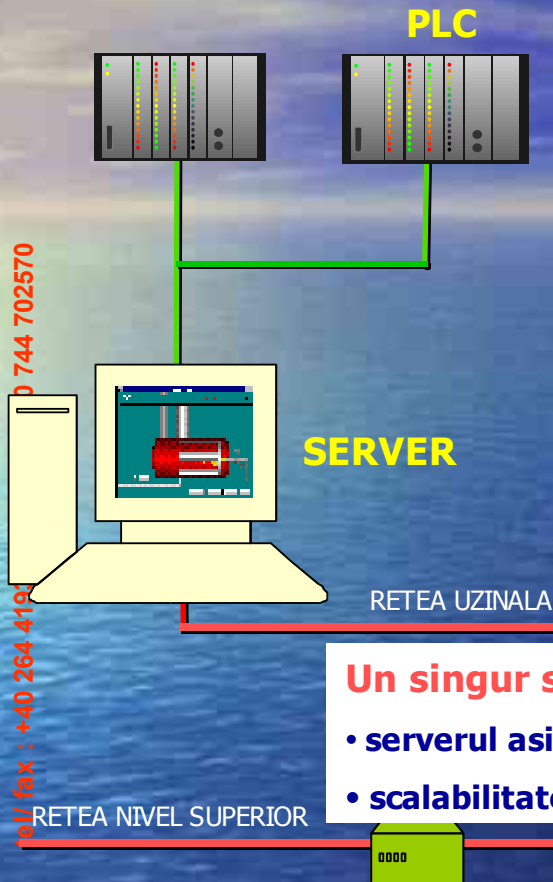
SERVERE - colecteaza datele de la PLC-uri si le distribuie in sistem

VIEWERE – permit utilizatorilor sa vada si sa interactioneze cu datele distribuite de servere; in plus, permit actiuni de control (comenzi)

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Sistem – faza 1



Un singur server conectat la automatele (PLC) din proces

- serverul asigura si functia viewer
- scalabilitate (extindere sistem) facila si cu costuri minime

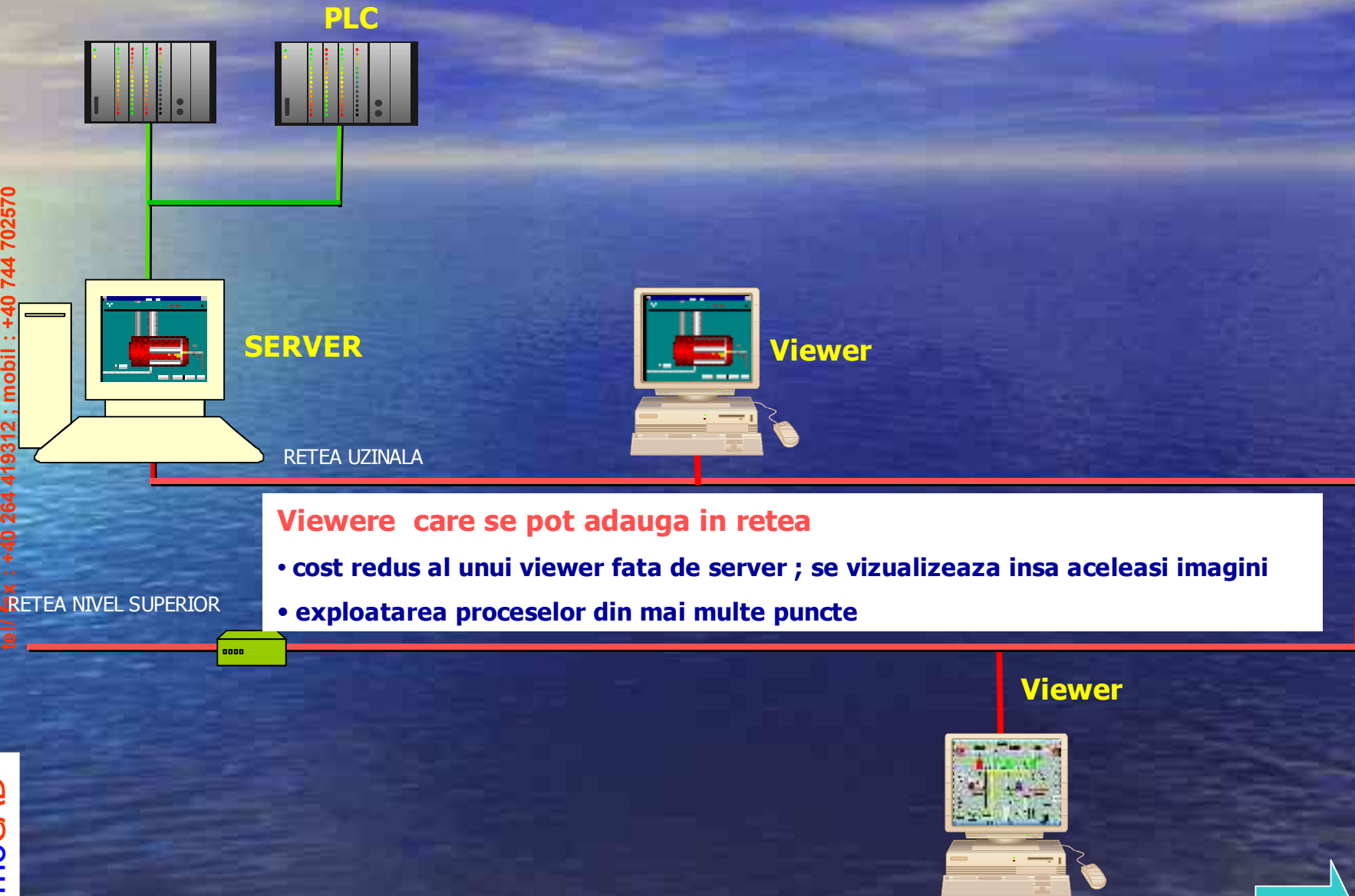


Sistem – faza2

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Viewere care se pot adauga in retea

- cost redus al unui viewer fata de server ; se vizualizeaza insa aceleasi imagini
- exploatarea proceselor din mai multe puncte

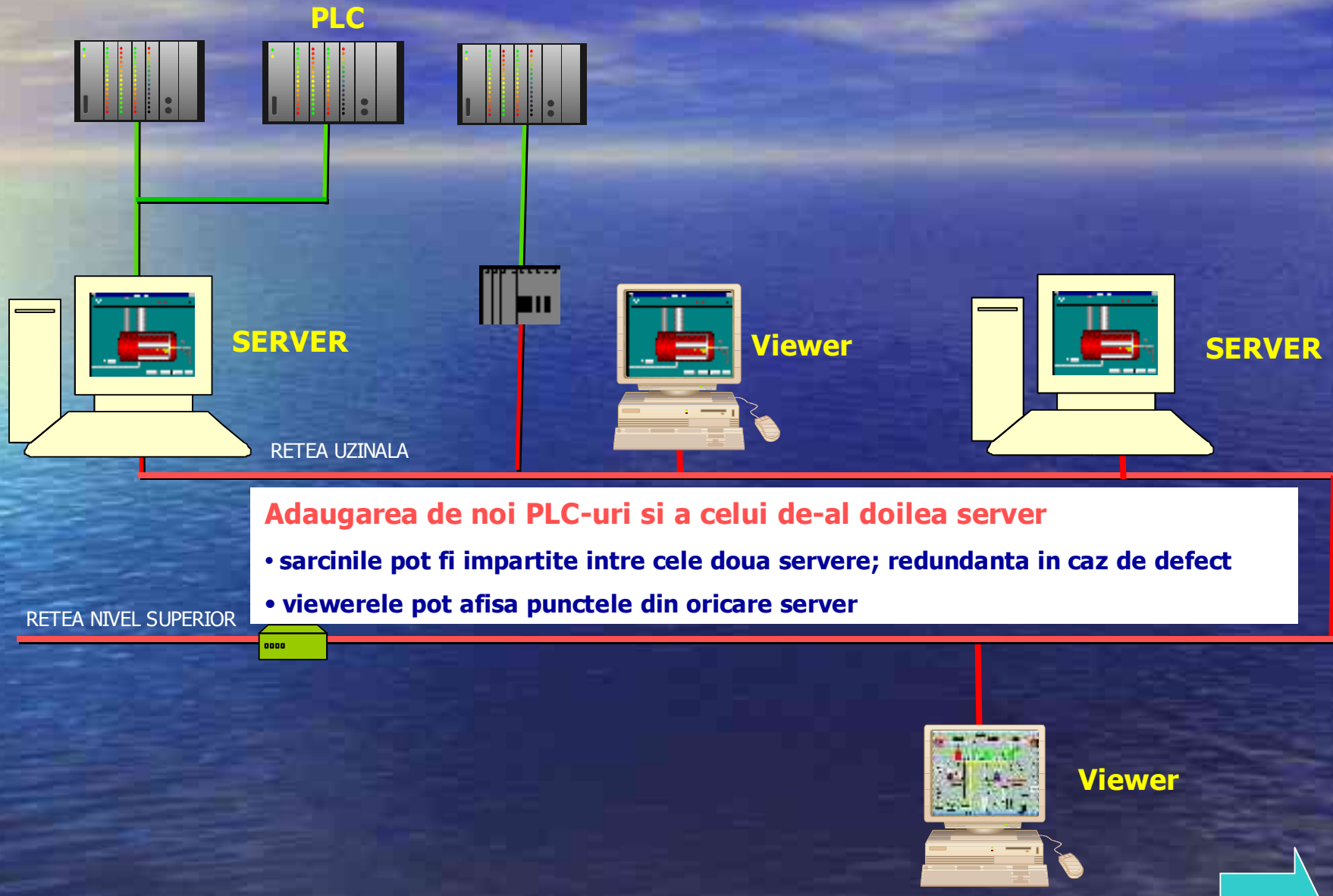


Sistem – faza3

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Adaugarea de noi PLC-uri si a celui de-al doilea server

- sarcinile pot fi impartite intre cele doua servere; redundanta in caz de defect
- viewerele pot afisa punctele din oricare server



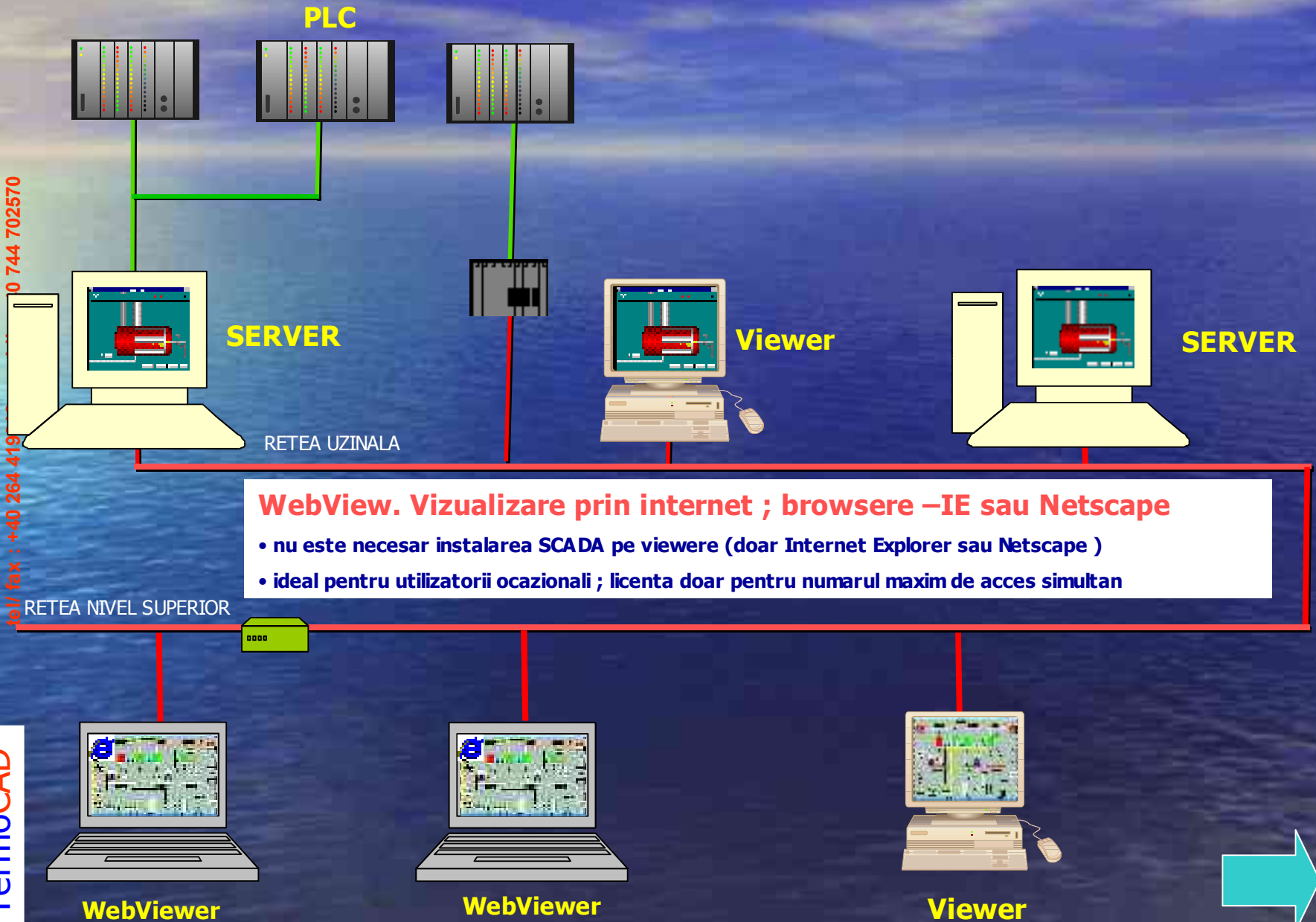
Sistem – faza4

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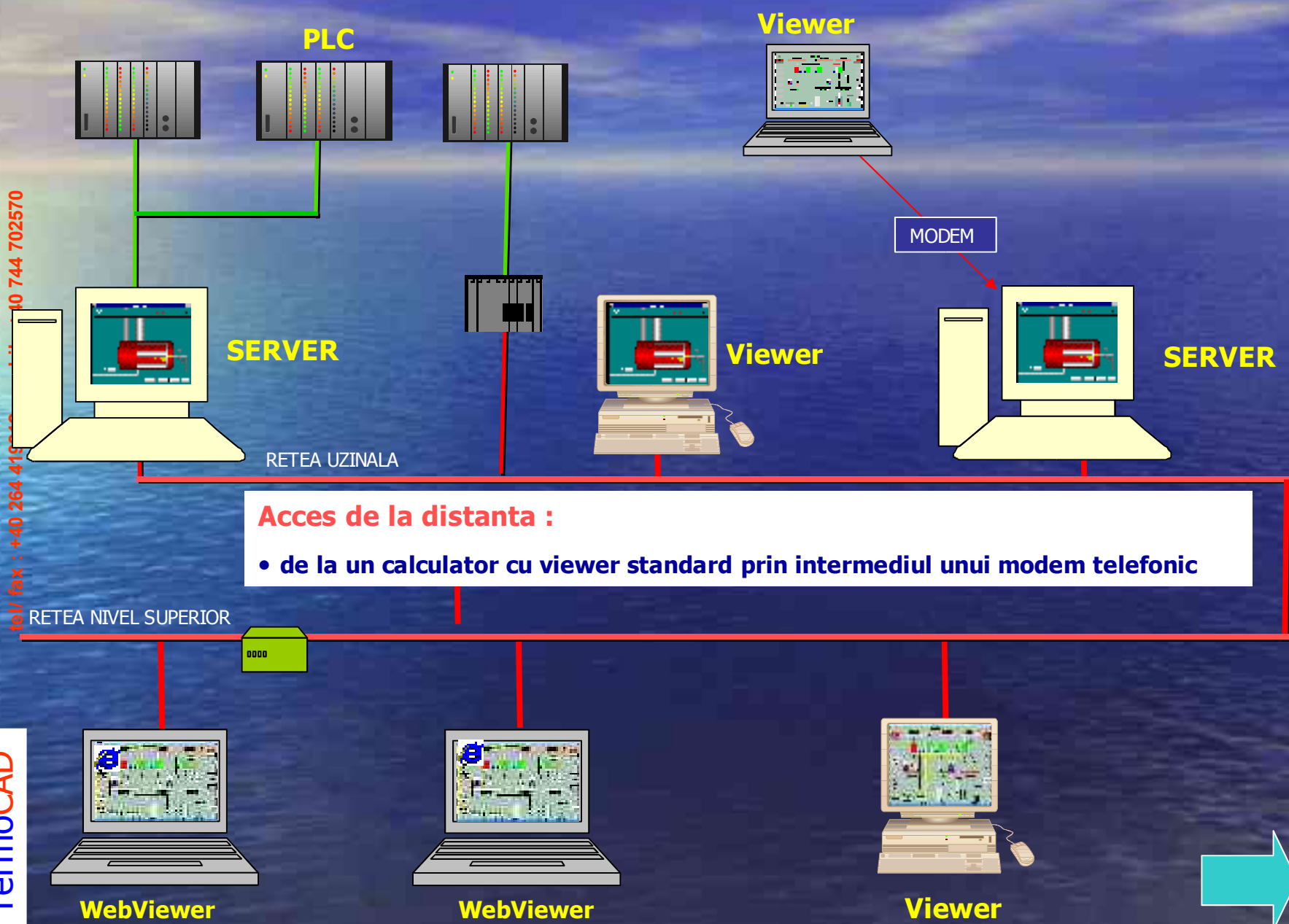


Sistem – faza5

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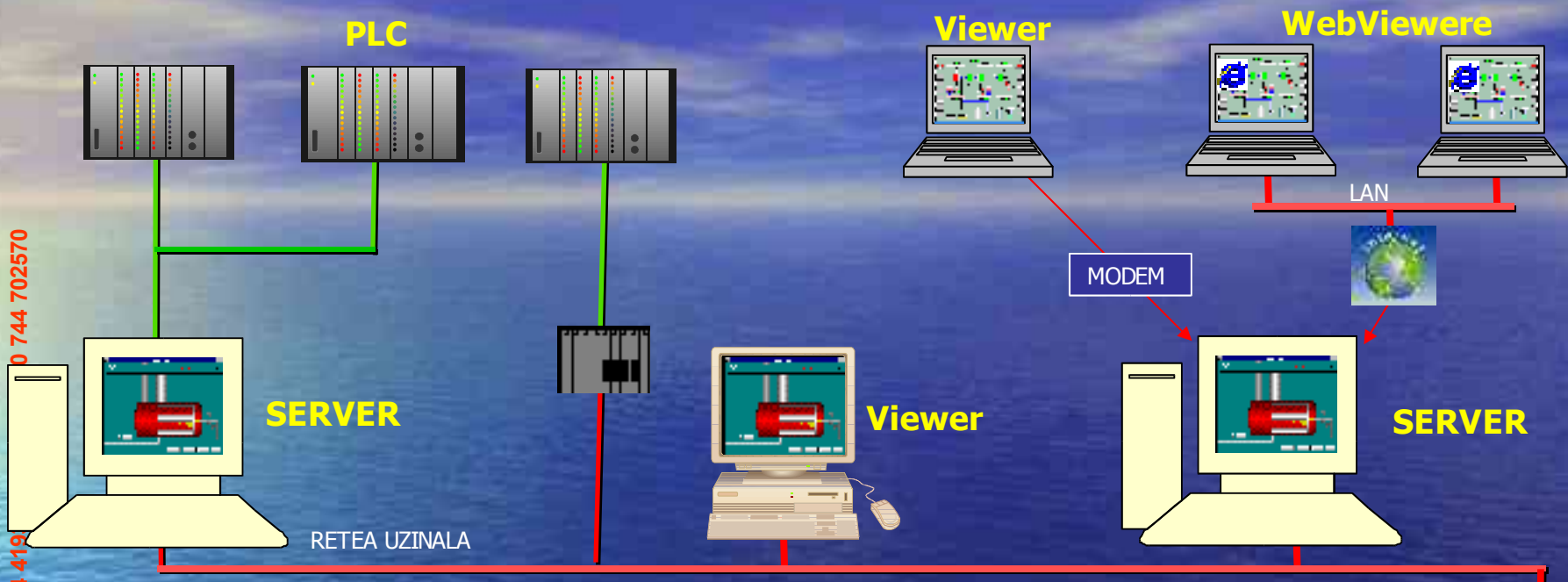
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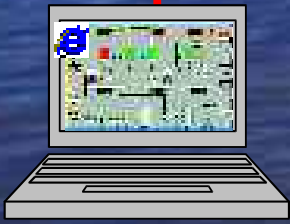
Sistem – solutia completa

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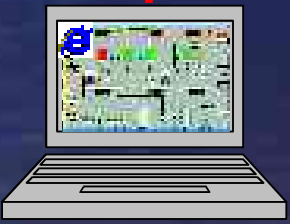


Acces de la distanta...
• prin retea internet, de la un PC fara SCADA instalat

RETEA NIVEL SUPERIOR



WebViewer



WebViewer



Viewer



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Protocoloale de comunicație cu PLC

- ABB
- Allen-Bradley
- Analog Devices
- CANOpen
- Conitel
- DeviceNet
- Endres Hauser
- Echelon
- Eurotherm
- Festo
- Fieldbus
- Fische-Rosemont
- Foxboro
- GE Fanuc
- Harris
- DeviceNet
- Hitachi
- Hewlwr Packard
- Honeywell
- Johnson
- Control
- Moeller
- IDEC
- Interbus-S
- Intermec
- Koyo
- Landis & Staefa
- LONWorks
- Magnetek
- Merlin Gerin
- Mitsubishi
- Modicon
- Moore
- Motorola
- National
- Omron
- Open
- Philips
- Phoenix
- PLC Direct
- Profibus
- Redac
- Reliance
- SAIA
- Sartorius
- SATT Control
- Schlumberger
- SECS II
- Seriplex
- Sharp
- Siemens
- Landis Division
- Square D
- Tasnet
- Telemecanique
- Toshiba
- Total Control
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- TRW
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Domenii de aplicație

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- Chimie
- Celuloza și hârtie
- Industria farmaceutică
- Automatizarea clădirilor

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Companii celebre care utilizează CIMPLICITY

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- Chrysler
- Dell
- Duracell
- Exxon
- Ford
- Fujitsu
- General Motors
- Intel
- Kodak
- Land Rover
- NASA
- NBC
- Nissan
- Pillsbury
- Raytheon
- Revlon
- UPS
- U.S. Post

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AVANTAJE SCADA

- **Controlul funcțional deplin al procesului monitorizat**
- **Creșterea sensibilă a productivității**
- **Siguranță, robustețe, eforturi și cheltuieli minime de exploatare**
- **Scalabilitate (extindere) extrem de facilă**
- **Posibilitatea conectării cu sisteme diferite**

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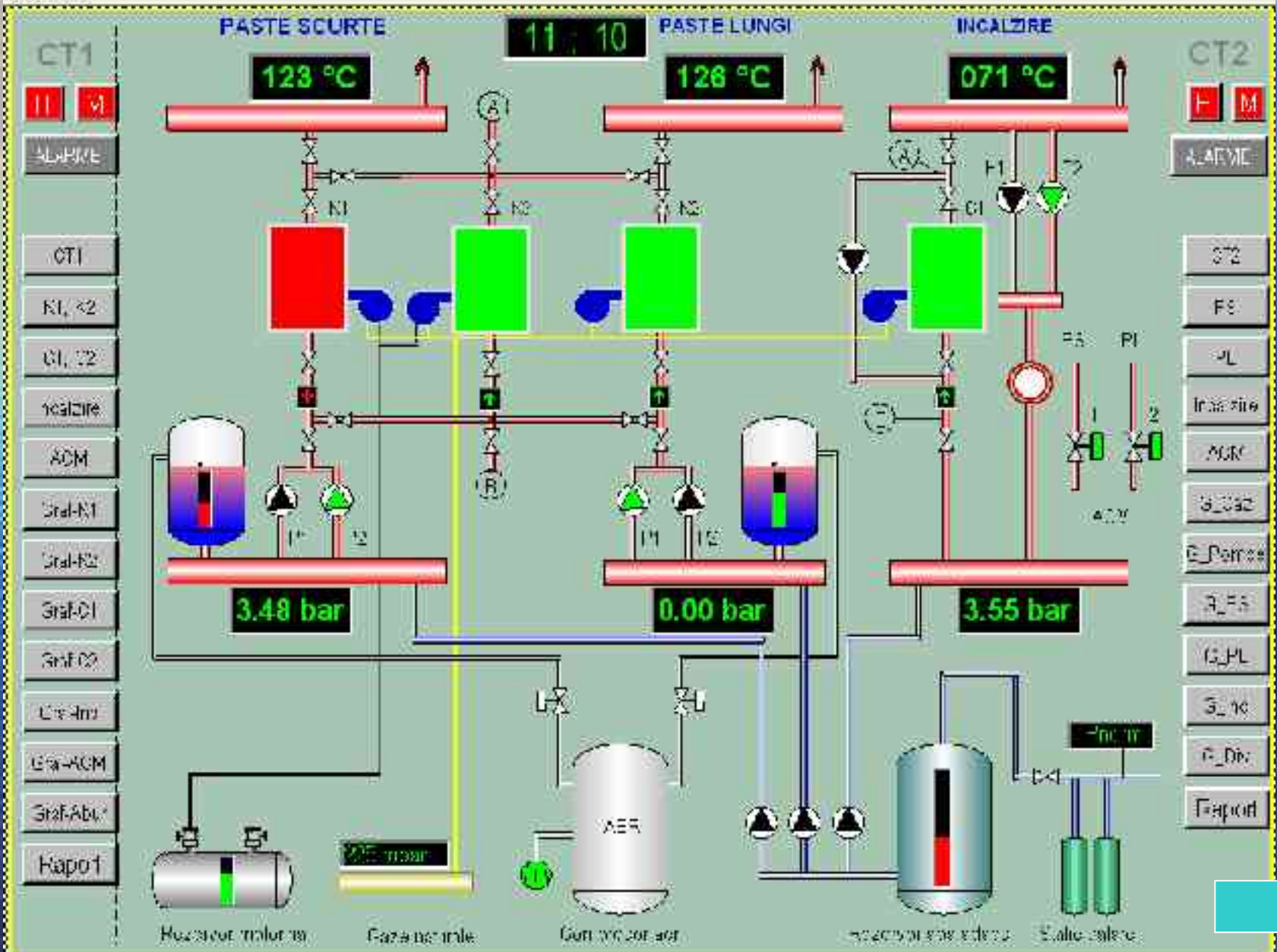


VIZUALIZARE SCHEME TEHNOLOGICE

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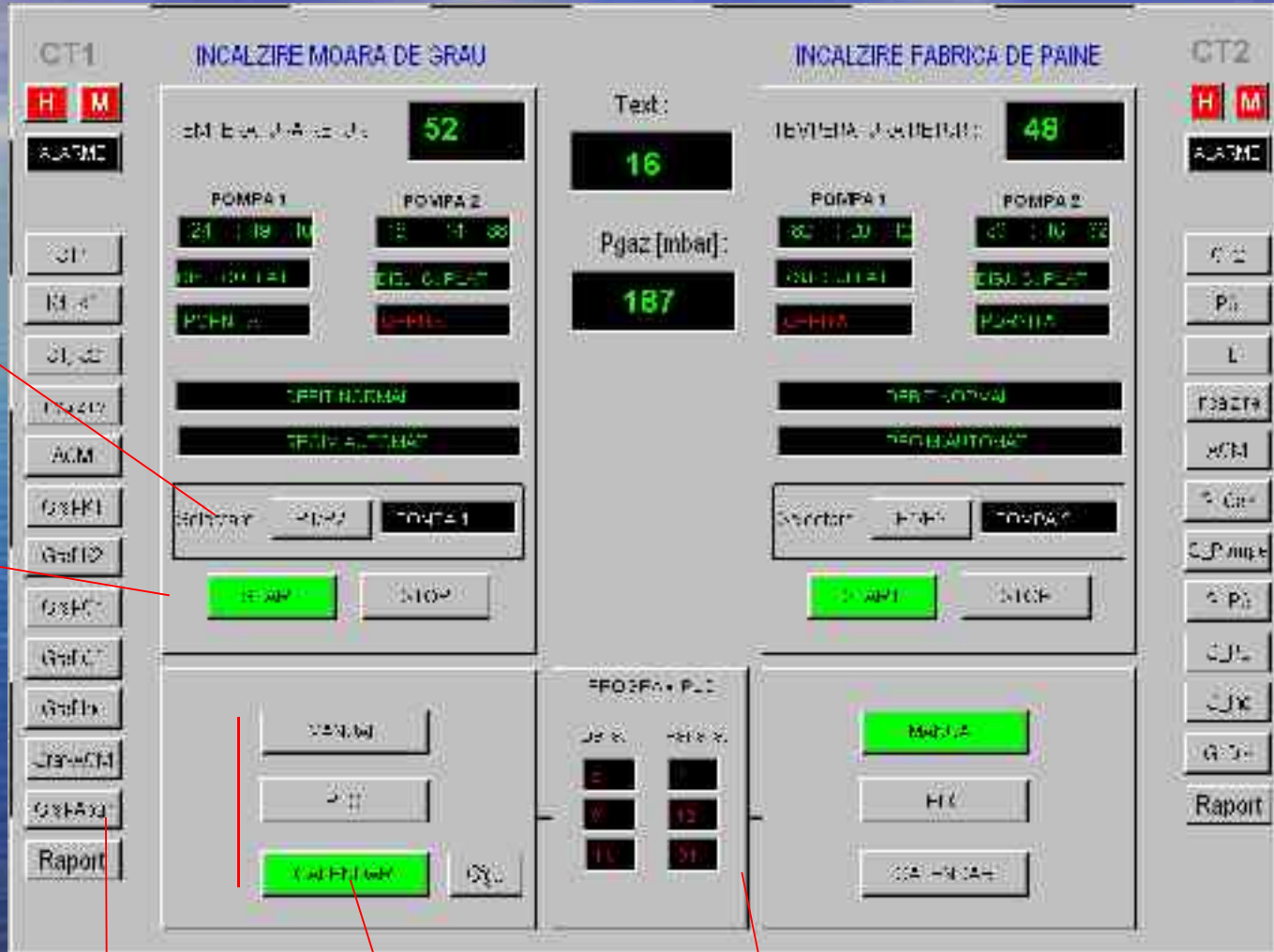


COMENZI ȘI MODIFICĂRI PARAMETRI

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Buton selectare Pompa 1/2

Buton START pompe

Butoane selectie regim incalzire

Buton modificare program incalzire memorat in PC

Program de incalzire memorat in PLC (automat programabil) care poate fi modificat de operator



ACTIUNI de tip CALENDAR

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Calendar

Comenzi executate automat la intervale definite de timp (orare, zilnice, lunare , anuale).
Optiuni : program pentru zile de week end , vacanta.



Alarmer

Alarm ID	Resursa	Clasa	Data	Timp	Stare	Conf	Comentariu
Tdistr_HH	CT1	HH	12.07.03	14:22	A	N	Temperatura distribuitor CT1 maxima!
Pgaz_L	CT2	H	16.06.03	5:01	A	N	Presiune scazuta gaz metan!
Tacc_L	CT1	M	13.06.03	14:30	A	N	Temperatura scazuta apa menajera!
pH_H	CT2	L	14.05.05	12:24	A	Y	pH apa alimentare!
CSH_H	CT2	L	14.05.05	12:20	A	Y	Conductibilitate apa alimentare!
Pabur_HH	CT1	HH	12.04.03	18:22	A	Y	Presiune abur maxima!
Paer_L	CT2	H	12.04.03	15:01	A	N	Presiune scazuta aer!
Lmin_LL	CT1	HH	12.04.03	4:22	A	N	Nivel minim-minim cazan K1!

Confirmare

Stergere

Refresh

Comentarii

Confirma tot

Filtre

Parametrizare

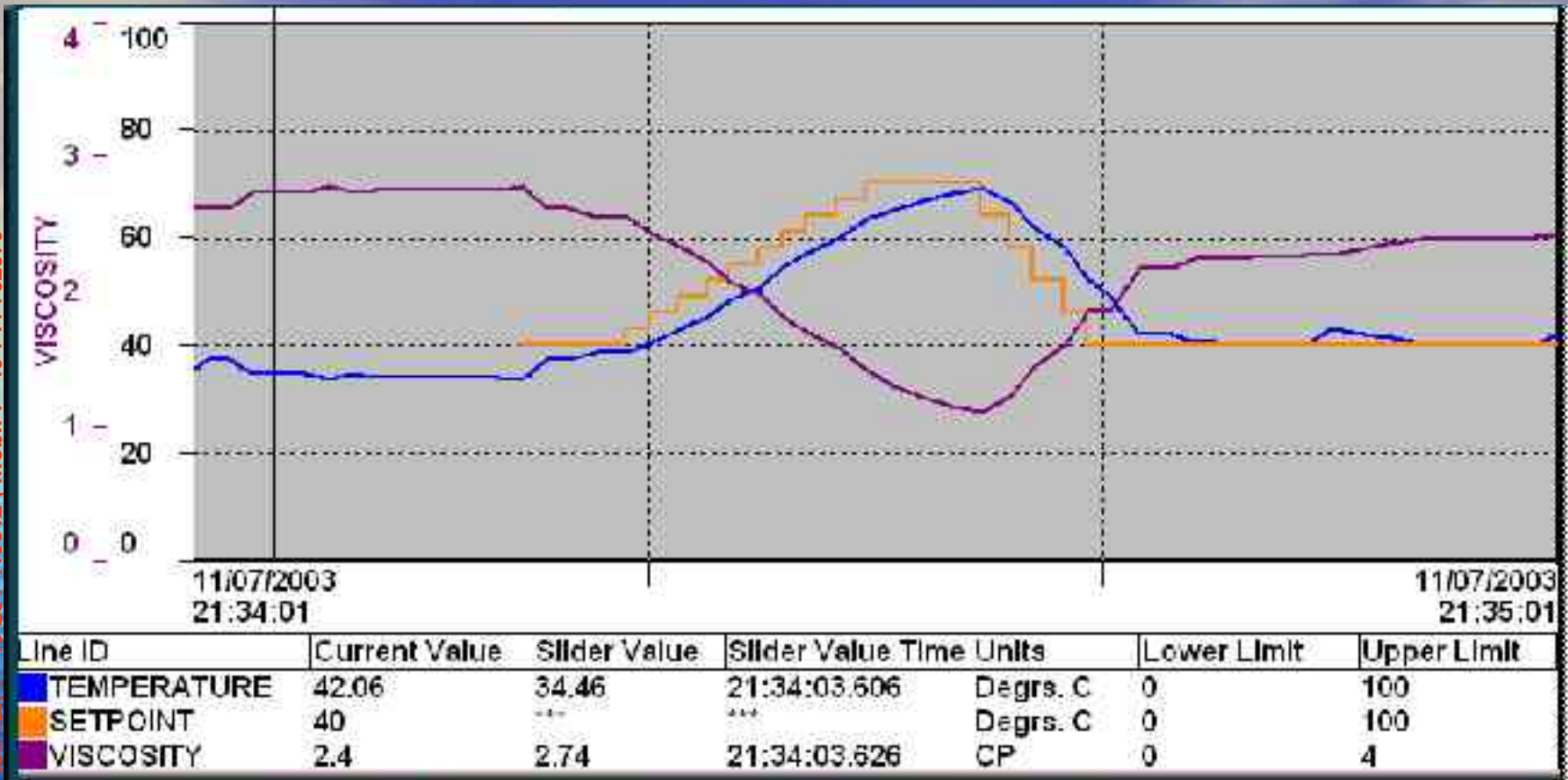
Help

Static

Dinamic

- modificarea ferestrei (campuri, culori etc)
- mod de functionare static sau dinamic
- confirmare si ştergere alarme
- filtre pentru afişarea doar a anumitor categorii de alarme

Grafice



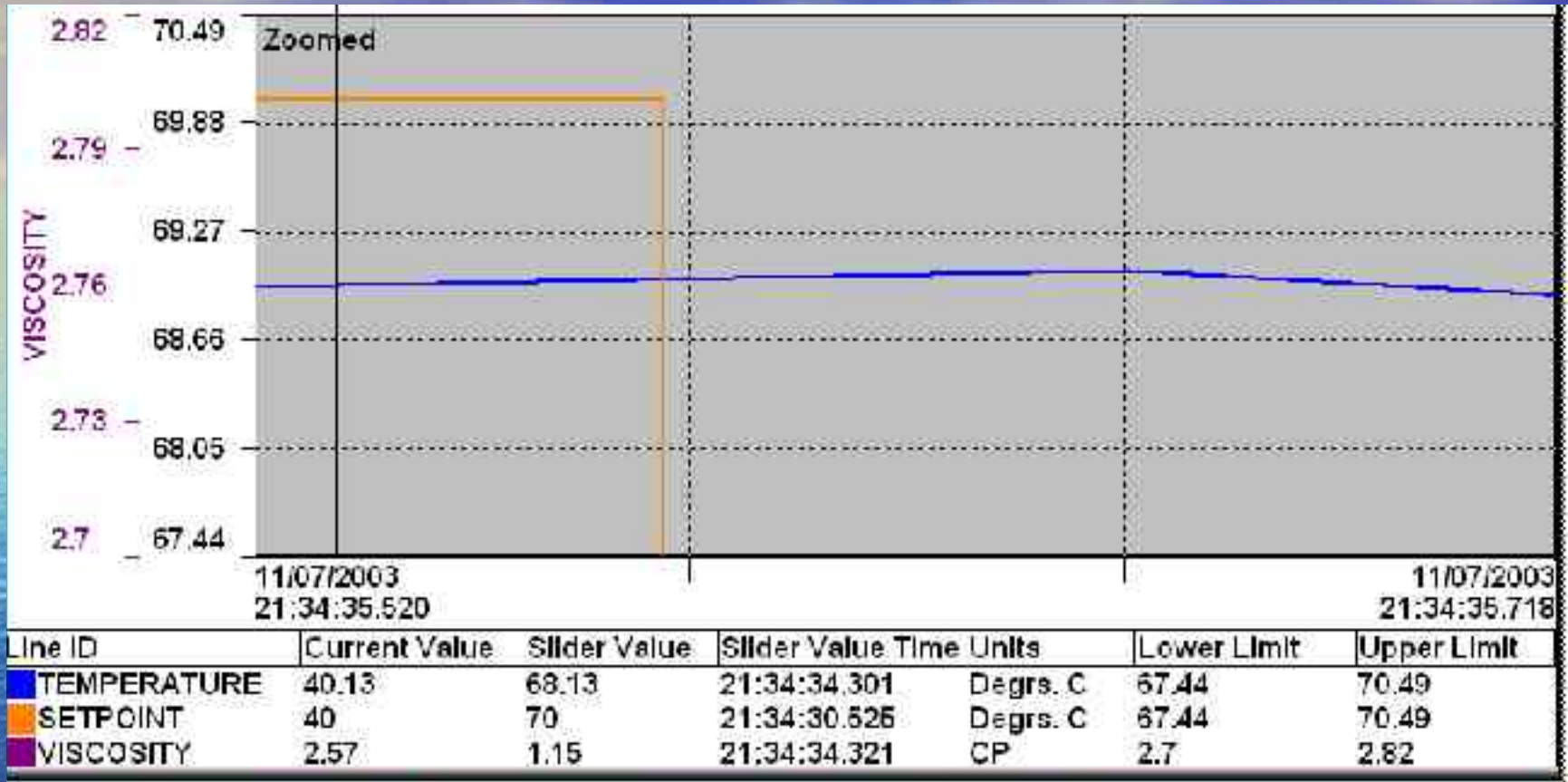
- multiple grafice in același ecran
- număr nelimitat de linii în același grafic
- culori, fonturi, stiluri, legende și scale configurabile
- reprezentări de date din timp real sau din baza de date
- grafice de tip XY



Grafice - explorare detaliată (zoom)

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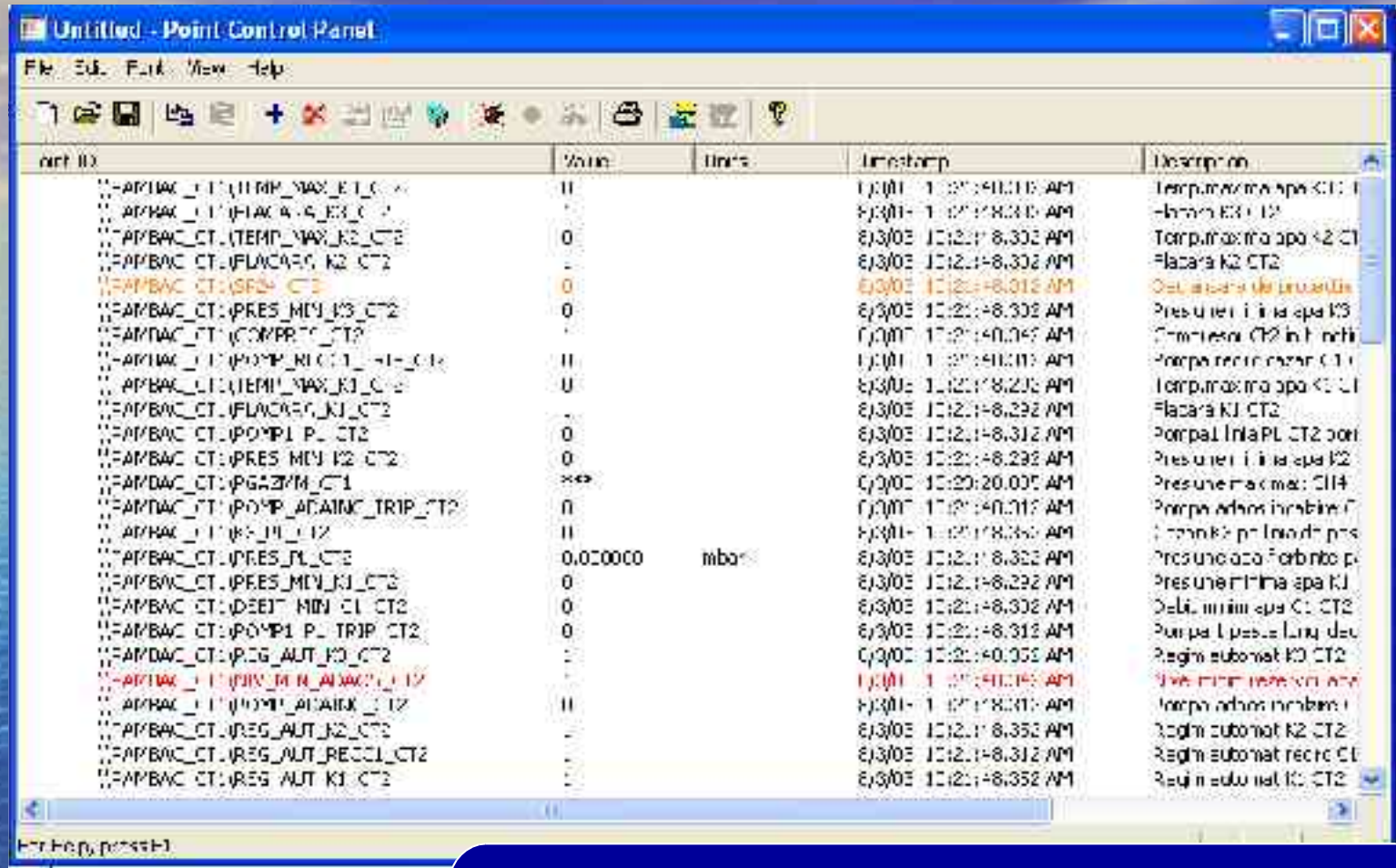
Rapoarte

RAPORT ZILNIC												
Data raportu : 10 October 2002 7:00:07 AM												
Time	Presiune Căli mbar	Temp °C	Temperatur °C	Putere mbar	Ref C1 °C	Ref C2 °C	Temper °C	Postect bar	Temper °C	TIPline °C	TAcnM °C	TAcnP °C
08:00:00	118.0	5.8	15.0	8.0	79.0	80.0	88.0	2.1	22.0	22.0	60.0	119.0
08:10:00	116.0	5.8	15.0	8.0	79.0	80.0	88.0	2.1	22.0	22.0	60.0	119.0
08:20:00	110.0	5.8	15.0	8.0	79.0	80.0	88.0	2.1	22.0	22.0	60.0	119.0
08:30:00	112.0	5.8	15.0	8.0	79.0	80.0	88.0	2.1	22.0	22.0	60.0	119.0
08:40:00	113.0	5.8	15.0	8.0	79.0	80.0	88.0	2.1	22.0	22.0	60.0	119.0
08:50:00	124.0	5.8	15.0	8.0	79.0	80.0	88.0	2.1	22.0	22.0	60.0	119.0
09:00:00	120.0	5.8	15.0	8.0	79.0	80.0	88.0	2.1	22.0	22.0	60.0	119.0
09:10:00	125.0	4.8	15.0	8.0	79.0	80.0	88.0	2.1	22.0	22.0	60.0	119.0
09:20:00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
09:30:00	163.0	12.8	22.0	8.0	79.0	80.0	88.0	2.1	47.0	20.0	47.0	149.0
09:40:00	164.0	12.8	24.0	8.0	79.0	80.0	88.0	2.1	49.0	20.0	47.0	149.0
09:50:00	159.0	12.8	25.0	8.0	79.0	80.0	88.0	2.2	52.0	20.0	47.0	149.0
10:00:00	150.0	12.8	20.0	8.0	79.0	80.0	88.0	2.2	54.0	20.0	47.0	149.0
10:10:00	150.0	12.8	20.0	8.0	79.0	80.0	88.0	2.3	58.0	20.0	47.0	149.0
10:20:00	156.0	11.8	22.0	8.0	79.0	80.0	88.0	2.3	60.0	20.0	47.0	149.0
10:30:00	154.0	11.8	24.0	8.0	79.0	80.0	88.0	2.4	62.0	20.0	47.0	149.0
10:40:00	154.0	11.8	29.0	8.0	79.0	80.0	88.0	2.4	65.0	20.0	47.0	149.0
10:50:00	159.0	11.8	27.0	8.0	79.0	80.0	88.0	2.4	64.0	20.0	47.0	149.0
10:59:00	159.0	11.8	29.0	8.0	79.0	80.0	88.0	2.4	66.0	20.0	47.0	149.0
11:00:00	154.0	11.8	40.0	8.0	79.0	80.0	88.0	2.5	67.0	20.0	47.0	149.0
11:00:00	159.0	11.8	42.0	8.0	79.0	80.0	88.0	2.5	68.0	20.0	47.0	149.0
11:10:00	162.0	11.8	44.0	8.0	79.0	80.0	88.0	2.5	68.0	20.0	47.0	149.0
11:20:00	154.0	11.8	46.0	8.0	79.0	80.0	88.0	2.5	68.0	20.0	47.0	149.0
11:30:00	154.0	12.8	47.0	8.0	79.0	80.0	88.0	2.5	67.0	20.0	47.0	149.0
11:40:00	154.0	12.8	49.0	8.0	79.0	80.0	88.0	2.5	67.0	20.0	47.0	149.0

- sunt liste cu principalii parametri culeși direct din proces (nu din baza de date).
- intervalele la care se culeg datele sunt configurabile
- arhiva de rapoarte este salvată în format ASCII



Lista cu parametrii din proces



The screenshot shows a software window titled "Untitled - Point Control Panel" with a menu bar (File, Edit, Point, View, Help) and a toolbar. Below the toolbar is a table with the following columns: "point ID", "Value", "Units", "timestamp", and "Description". The table lists various parameters such as temperatures, pressures, and pump statuses for different parts of a system (e.g., K1, K2, K3). Some rows are highlighted in red, indicating alarm conditions.

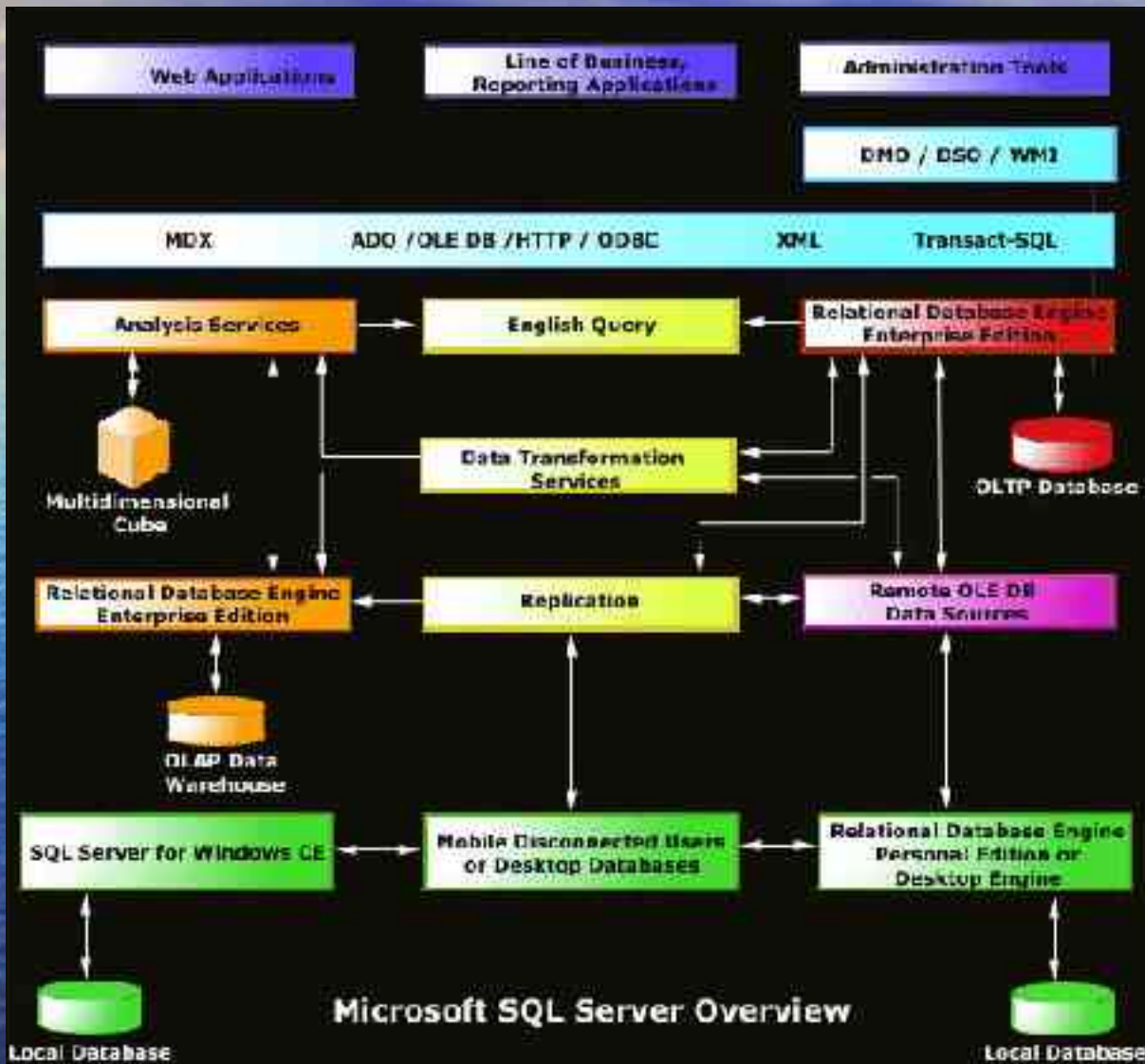
point ID	Value	Units	timestamp	Description
==AMBAC_CT:TEMP_MAX_E1_C1	11		8/3/03 11:21:40.318 AM	Tempur maxima apa K1 C1
==AMBAC_CT:TEMP_MAX_E1_C2	11		8/3/03 11:21:40.318 AM	Tempur maxima apa K1 C2
==AMBAC_CT:TEMP_MAX_K2_C1	0		8/3/03 11:21:40.302 AM	Tempur maxima apa K2 C1
==AMBAC_CT:FLACAR_K2_C1	-		8/3/03 11:21:40.302 AM	Flacara K2 C1
==AMBAC_CT:SEPS_C1	0		8/3/03 11:21:40.312 AM	Debit maxima de unu arata
==AMBAC_CT:PRES_MIN_K3_C1	0		8/3/03 11:21:40.302 AM	Presurii minima apa K3
==AMBAC_CT:COMPRT_C1	-		8/3/03 11:21:40.302 AM	Completarea C1 in inch
==AMBAC_CT:PUMP_R1_C1	11		8/3/03 11:21:40.318 AM	Pompa recirculazie C1
==AMBAC_CT:TEMP_MAX_K1_C1	0		8/3/03 11:21:40.292 AM	Tempur maxima apa K1 C1
==AMBAC_CT:FLACAR_K1_C1	-		8/3/03 11:21:40.292 AM	Flacara K1 C1
==AMBAC_CT:PUMP1_PL_C1	0		8/3/03 11:21:40.312 AM	Pompa linia PL C1 porn
==AMBAC_CT:PRES_MIN_K2_C1	0		8/3/03 11:21:40.292 AM	Presurii minima apa K2
==AMBAC_CT:PGAZM_C1	***		8/3/03 11:21:20.000 AM	Presurii maxima C1H
==AMBAC_CT:PUMP_ADAMC_TRIP_C1	0		8/3/03 11:21:40.318 AM	Pompa adams intrabita
==AMBAC_CT:TEMP_MIN_C1	11		8/3/03 11:21:40.318 AM	Tempur minima apa
==AMBAC_CT:PRES_PL_C1	0.020000	mbars	8/3/03 11:21:40.302 AM	Presurii maxima forbita p
==AMBAC_CT:PRES_MIN_K1_C1	0		8/3/03 11:21:40.292 AM	Presurii minima apa K1
==AMBAC_CT:DEBIT_MIN_C1_C1	0		8/3/03 11:21:40.302 AM	Debit minima apa C1 C1
==AMBAC_CT:PUMP1_PL_TRIP_C1	0		8/3/03 11:21:40.312 AM	Pompa linia PL C1 intr
==AMBAC_CT:REG_AUT_K3_C1	-		8/3/03 11:21:40.302 AM	Regim automat K3 C1
==AMBAC_CT:TEMP_MIN_ADAMC_C1	11		8/3/03 11:21:40.318 AM	Tempur minima apa
==AMBAC_CT:TEMP_MIN_ADAMC_C2	11		8/3/03 11:21:40.318 AM	Tempur minima adams C
==AMBAC_CT:REG_AUT_K2_C1	-		8/3/03 11:21:40.352 AM	Regim automat K2 C1
==AMBAC_CT:REG_AUT_RECCL_C1	-		8/3/03 11:21:40.312 AM	Regim automat recirc C1
==AMBAC_CT:REG_AUT_K1_C1	-		8/3/03 11:21:40.352 AM	Regim automat K1 C1

Point Control Panel este un instrument foarte util pentru depanare. Lista cu valorile reale ale tuturor punctelor este prezentată sub forma de tabel.

Punctele in alarmă sunt colorate în roșu. Se pot modifica valorile parametrilor , limitele și generarea alarmelor.



Baza de date – Microsoft SQL Server



Analiza bazei de date



Optiunea Historical Data Analyzer este un formidabil instrument de examinare a bazei de date de a le analiza si a face calcule pe baza datelor inregistrate. Asta, fara sa stiti programare "C" si fara Interogari sau comenzi tip SQL!

Cu HDA puteti rezolva probleme de genul :

"care a fost azi media presiunii gazului metan?"

"care a fost saptamana trecuta temperatura maxima in procesul X?"

"care a fost luna trecuta totalul productie?"



Vizualizare prin internet

- costuri reduse; nu se instaleaza SCADA pe PC-ul Web
- conectare la servere prin LAN, WAN sau direct dial-in
- multipli clienti web ; licenta se acorda pentru numarul maxim de clienti care acceseaza simultan
- webview este ideal pentru clientii ocazionali

The screenshot displays a web-based SCADA interface for a compressor system. The main area features a 3D diagram of a compressor with various parameters and control elements.

Parameters and Controls:

- Compressor Inlet Temp: ?? deg C
- Displacement: 22 mm/s
- Air Inlet System: 10 bar
- Doors: Filter CLOSED, Plenum CLOSED
- Fuel System: 88 %
- Compressor Discharge Pressure: 12 bar
- Vibration: 34 mm/s
- CONTROL MODE: LOCAL, REMOTE
- MANUAL: 17785 rpm
- LOCAL CONTROL: START, STOP
- Back button

Table of System Status:

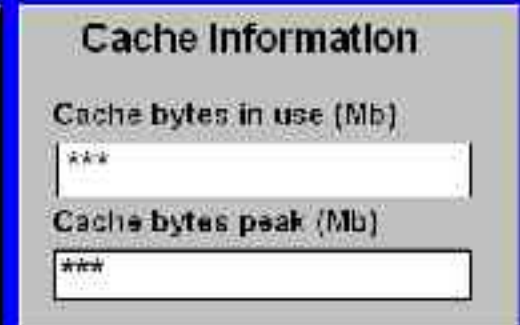
FLAME	??
NORMAL	??
STATUS FLD	??
MAX HP VIB	?? mm/s
MAX LP VIB	?? mm/s
FUEL VALVE DMC	?? %
FUEL VALVE POS	?? %
SC43	AUTO

Monitorizarea sistemului

Sentry

System Sentry

**Computerul Dvs este cheia sistemului de monitorizare
De ce sa nu-l monitorizam si pe el..?**



Cu System Sentry se poate :

- Monitoriza sistemul de operare al PC-ului**
- Monitoriza parametrii programului SCADA**
- Monitoriza starea altor PC-uri din retea**
- Preveni caderile de sistem**

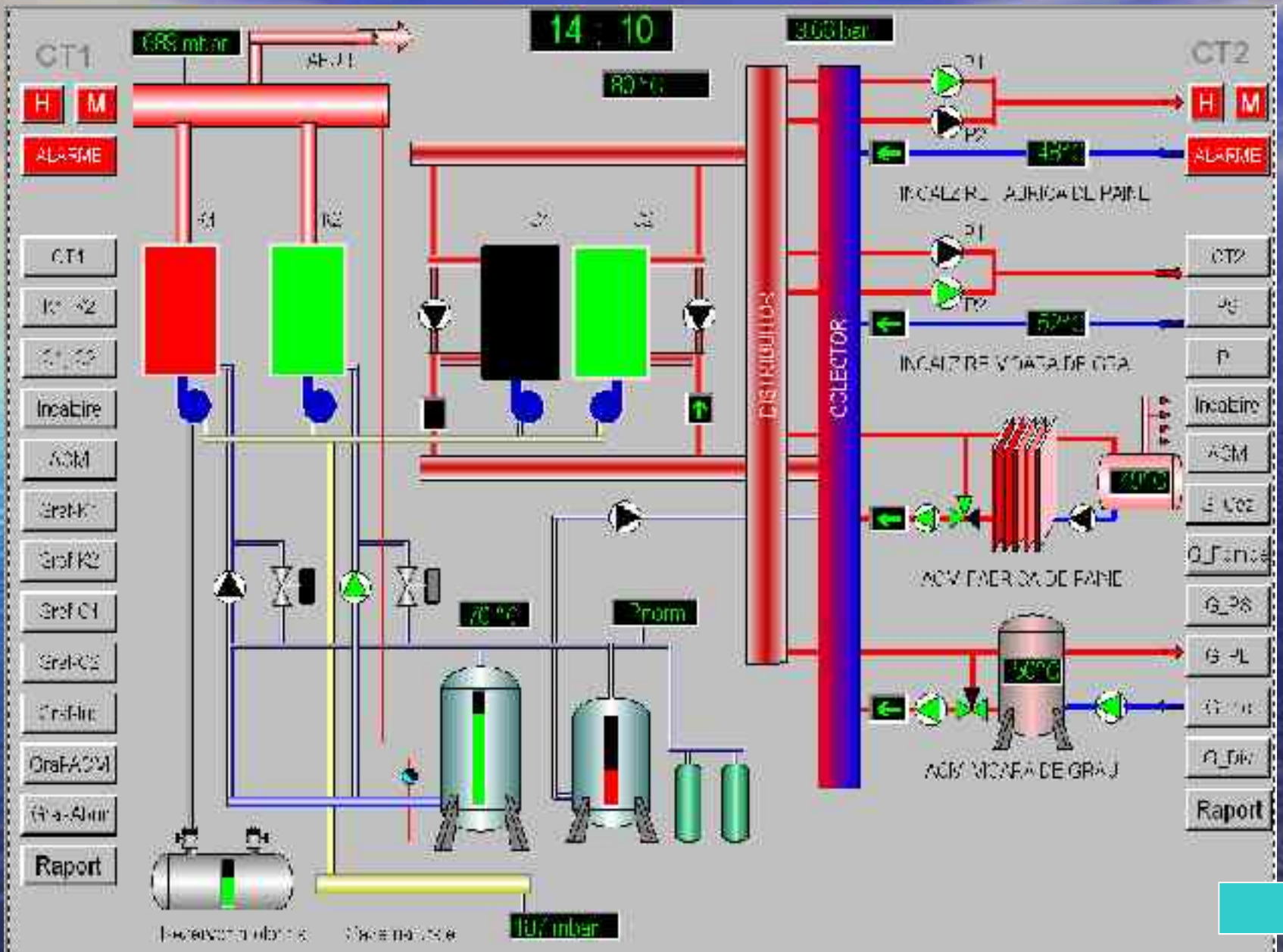


Exemplu: Schemă tehnologică centrală

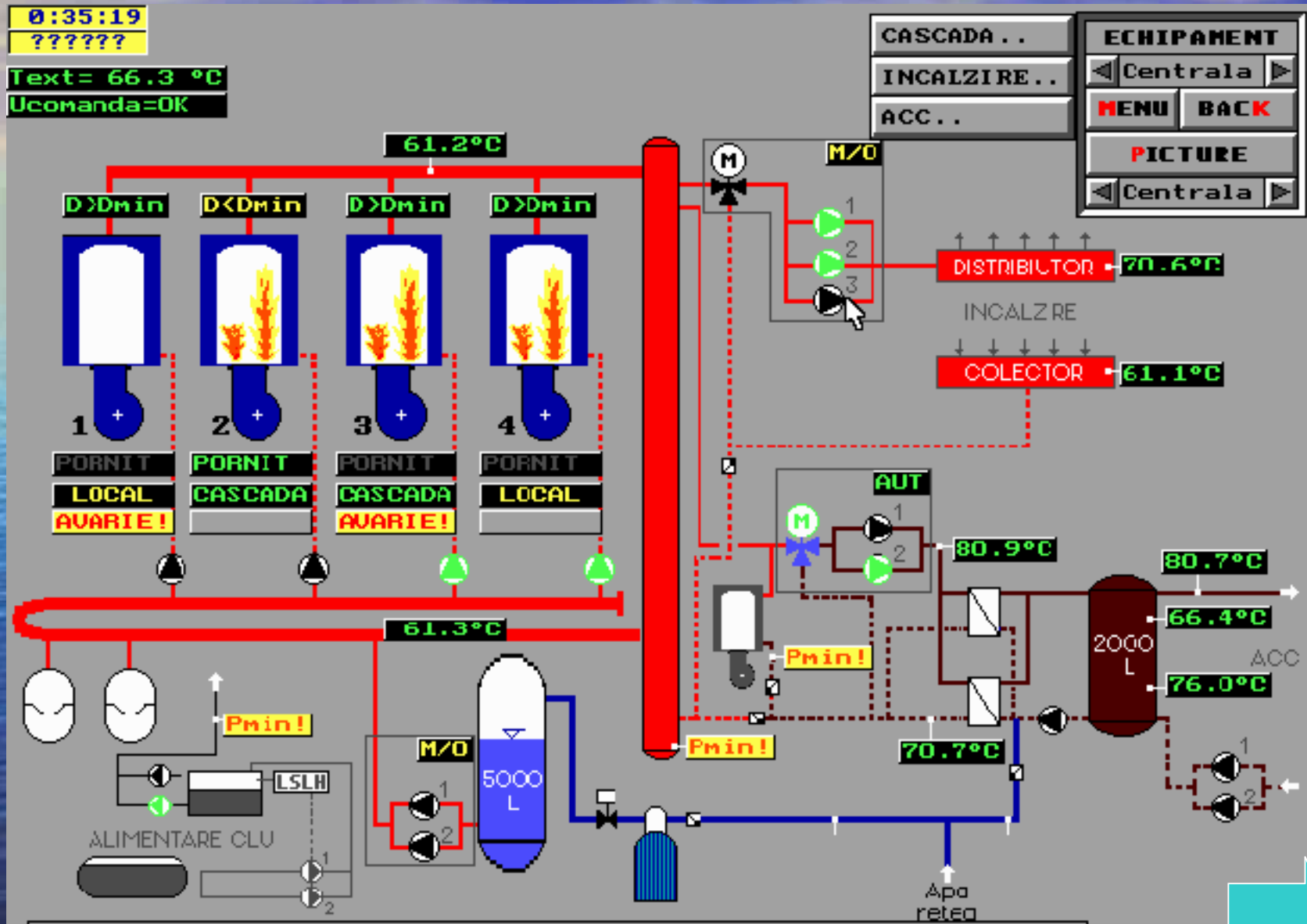
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Exemplu : Centrală termică 4 cazane



Exemplu : Proces tehnologic înghețată

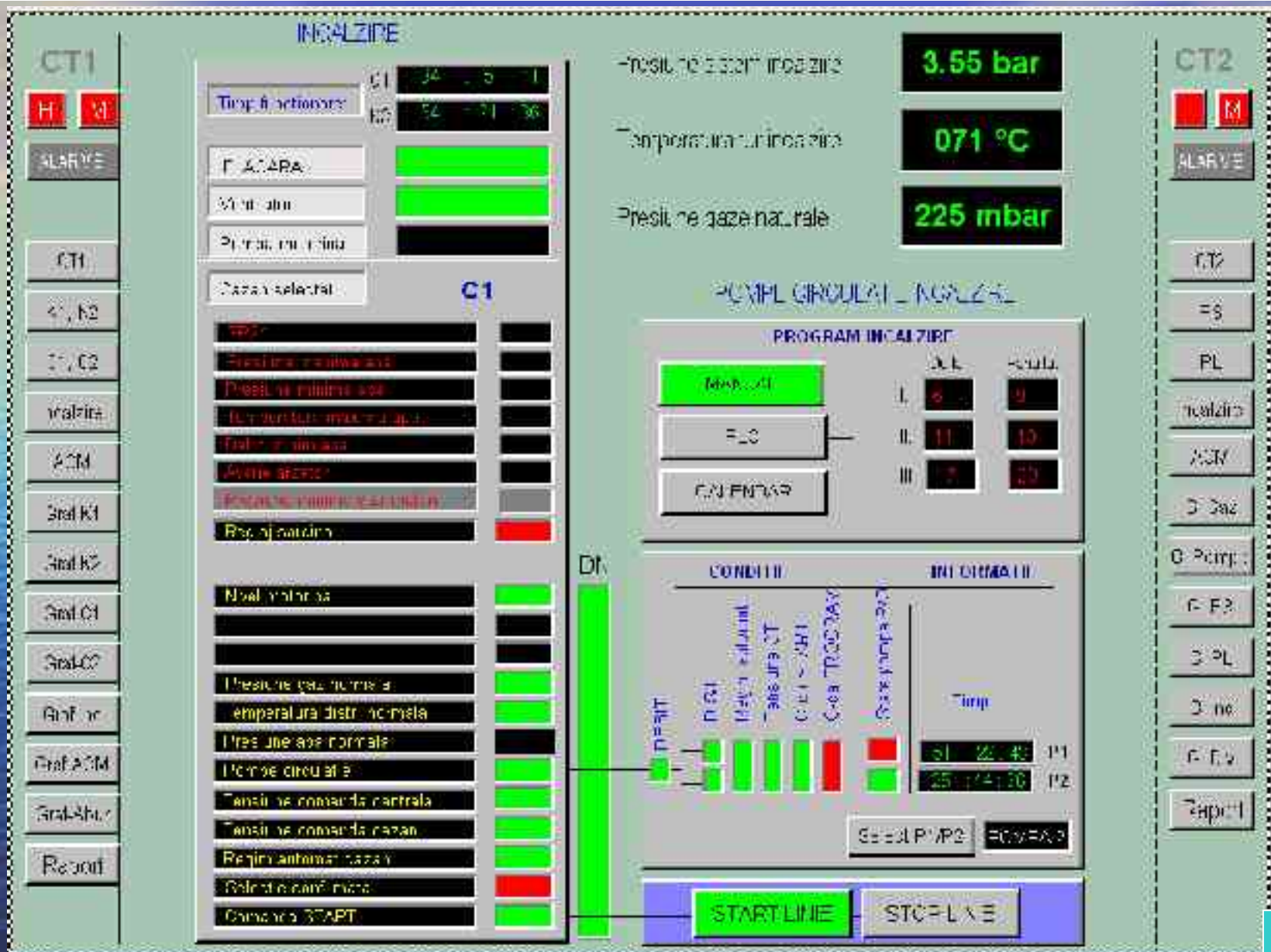
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Exemplu: Circuit tehnologic



Exemplu: Control circuit incalzire f(T_{exterior})

0:27:41
Incalzire circui
Universitatea Cantemir

Schema Centrala 1 2 3 4 5 6 7 8 H ALL

PLC<<OPRIRE AUTOMATA

PLC<<TUR INCALZIRE

COMANDA

REGIM

MANUAL	<input type="radio"/>
AUTOMAT	<input type="radio"/>
SCALA	<input type="radio"/>

VENTIL

OPEN	<input type="radio"/>
STOP	<input type="radio"/>
CLOSE	<input type="radio"/>

Actionare pompa

FAZA

COMANDA	SEM
<input checked="" type="radio"/> START 1	<input type="radio"/>
<input type="radio"/> START 2	<input type="radio"/>
<input type="radio"/> STOP	

PARAMETRIZARE

TUR INCALZIRE

	2	3	4
	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
	Text [°C]	Tur [°C]	
P ₁	-20	85	
P ₂	-15	75	
P ₃	0	58	
P ₄	20	20	

OPRIRE AUTOMATA

Tur <	40.0
Time >	3600

Text = -2.35
Tsec. = 60.63
Ts calc = 60.62

PROGRAM ZILNIC

Text [°C]	Tur [°C]
-10	85
-5	75
0	60
5	45
10	20



Exemplu: Comanda în cascadă a cazanelor

0:26:43
??????

Cascada cazane

SCHEMA Centrala 1 2 3 4 5 6 7 B ALL M PLC ← PARAMETRI PLC ← PRAGURI H

COMANDA CASCADA

REGIM		COMANDA	STARE
MAN	<input type="radio"/>	1. IN/OUT	<input type="radio"/>
AUT	<input type="radio"/>	2. IN/OUT	<input type="radio"/>
		3. IN/OUT	<input checked="" type="radio"/>
		4. IN/OUT	<input checked="" type="radio"/>
		5. IN/OUT	<input checked="" type="radio"/>
		6. IN/OUT	<input checked="" type="radio"/>
		7. IN/OUT	<input checked="" type="radio"/>

PARAMETRIZARE CASCADA

CAZANE		TIMPUL DE INERTIE AL CAZANELOR	ORDINE IN CASCADA	
Nr	Valid		NR.	CAZAN NR.
1.	<input checked="" type="radio"/> ✓	600	1.	2
2.	<input checked="" type="radio"/> ✓	600	2.	1
3.	<input checked="" type="radio"/> ✓	720	3.	3
4.	<input checked="" type="radio"/> ✓	720	4.	4
5.	<input checked="" type="radio"/> ✓	720	5.	5
6.	<input checked="" type="radio"/> ✓	720	6.	6
7.	<input checked="" type="radio"/> ✓	720	7.	7

PRAG DE INTRARE	70.0	PRAG DE IESIRE	85.0	PRAG DE AVARIE SUPERIOR	93.0
TEMPORIZARE INTRARE (SEC)	100	TEMPORIZARE IESIRE (SEC)	60	PRAG DE AVARIE INFERIOR	55.0



Exemplu : Fabricare metal

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Fabricare otel

Detail Screens

- temperatura
- hidraulica
- schimb role

Caracteristici	Valori	Unitate
Temperatura	200	°C
Presiune	20	MPa
Debit	1500	l/min
Viteza	10	m/min
Putere	10	kW
Cilindri	1	
Accelerații	10	m/s²

Parametrii	Valori	Unitate
Temperatura	100	°C
Presiune	10	MPa
Debit	100	l/min

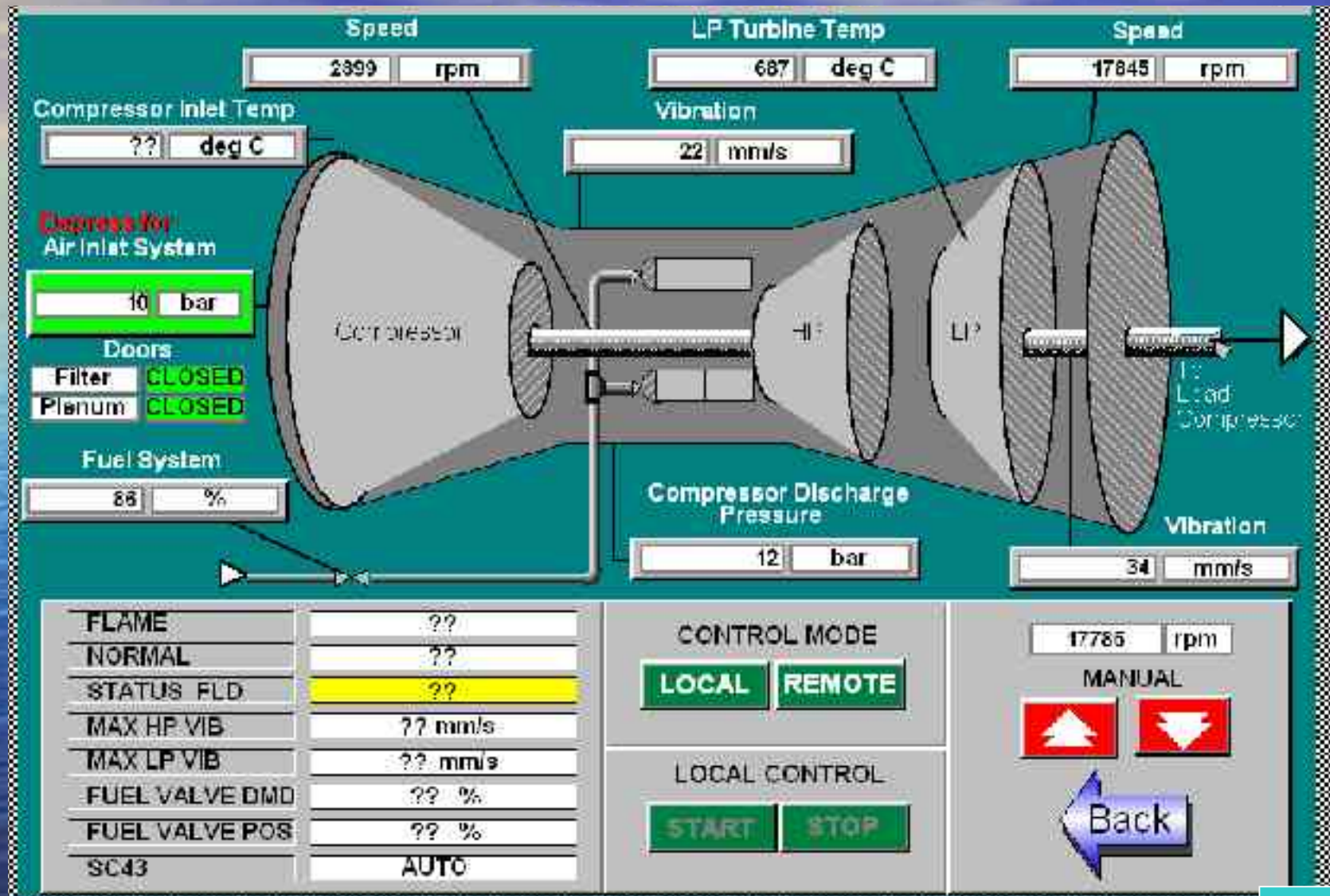
Taiere lungime

R1 F1 F2

Back



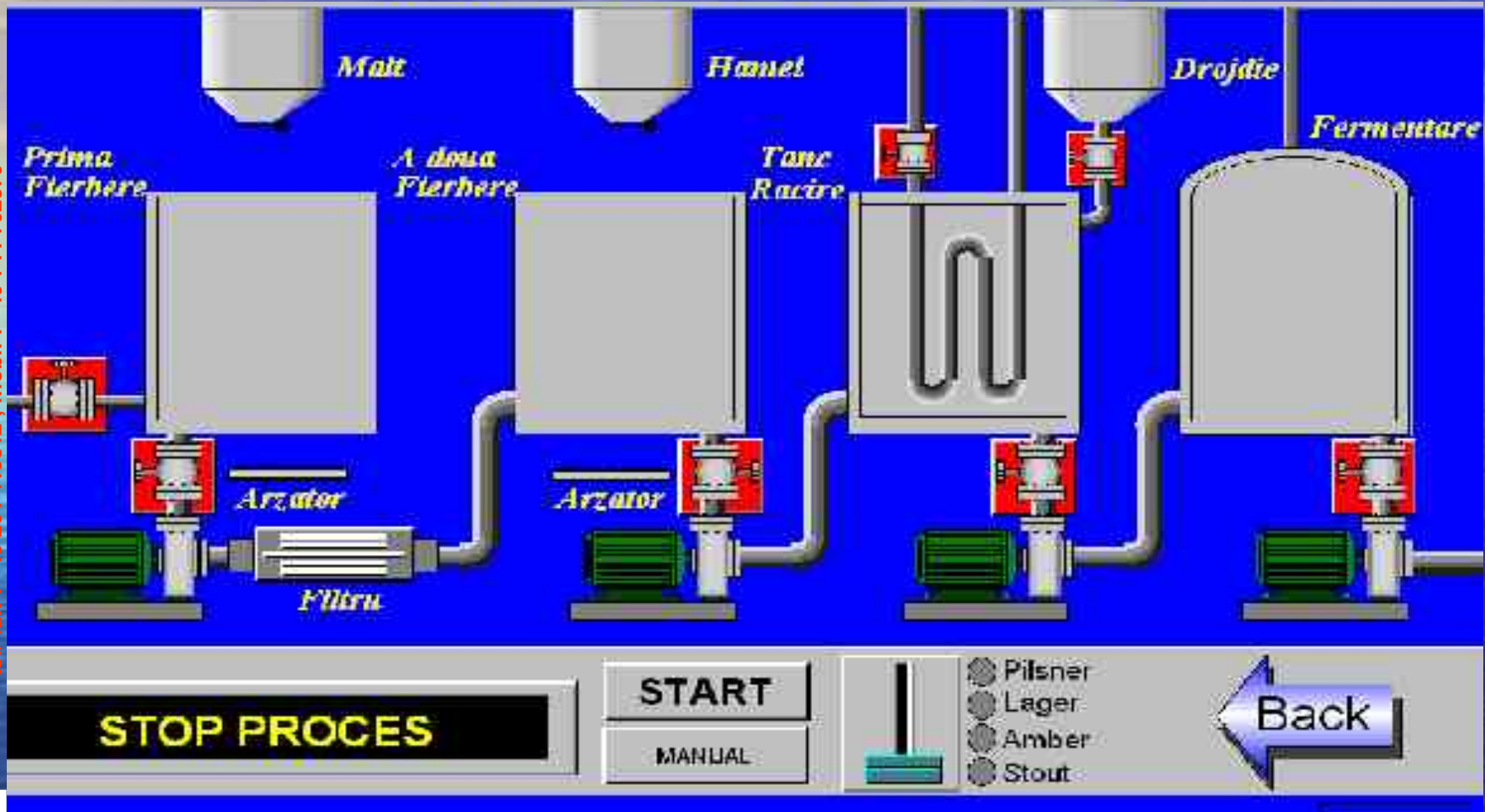
Exemplu : Control turbină



Exemplu : Proces fabrica de bere

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