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Allen Bradley PLC V/S Siemens PLC

Er. Suneet Gupta

Department of Electronics and Communication Engineering, DAV University,
Jalandhar - Pathankot National Highway, NH 44, Sarmastpur, Punjab 144012, India

Abstract: **This paper outlines the difference between the two brands of PLCs on the basis of their features and their applications. Over the years of demand for high quality and greater efficiency and automated machines has increased in the globalized area. The initial phase of this paper focus on the relativity on which the user can be easily justify their needs. This paper shows that the modelling techniques and design practices of software engineering can be combined with the traditional ways to of thinking in the automation system.**

General terms **- Automation, Role of PLC and SCADA in automation and types of PLC used.**

Keywords: **Difference between Allen Bradley and Allen Bradley on the basis of their flowchart, applications, addressing and features.**

1. INTRODUCTION

Over the years of demand for high quality and greater efficiency and automated machines has increased in the industrial sector. In the industrial sector, continuous monitoring, measurement and inspection were required which causes the error at various stages with human workers and also due to lack of few features of microcontroller. Thus, the PLC system was evolved from the conventional computers in late 60s and early 70s. These first PLCs were installed primarily in automotive plants because these plants had to be shut down for up to a month at model changeover time. But the earlier PLCs were used with other new automation techniques to shorter the changeover time. The PLC helps us to reduce the changeover time to a matter of few days. Now days, the innovative engineers and technicians have been actively seeking new applications for PLC in substations and SCADA system. SCADA system helps us to continuous monitoring and controlling the plant without any human workers help. SCADA also have the ability to perform operations at an unattended location from an attended station or operating centers and to have a definite indication that the operations have been successfully carried out can provide significant cost saving in the operation of a system. This is actually what is achieved through SCADA the system (definition recommended by IEEE). PLCs are very cost competitive with traditional RTUs and have many benefits in substation automation and their use in substation applications will grow. As the use of substation automation applications increases and the demand for substations and distribution automation increases, the utility engineer are seeking ways to implement the applications. Selection of an outside firm is the important task of the utility Engineer and their selection can determine the success or failure of a project.

2. OBJECTIVE OF THIS PAPER

The main objective of this paper is to elaborate the difference between the two brands of PLCs on the basis of their features and their use in different applications. This paper can be helpful to find the best PLC used for different applications in different areas.

A. What is Automation?

Automation is combination of mechanization & intelligence. Making products under the control of computers and programmable controllers is known as Industrial Automation. Manufacturing assembly lines as well as stand-alone machine tools (CNC machines) and robotic devices fall into this category. Automation is delegation of human control

functions to technical equipment for increasing productivity, better quality, increasing safety in working conditions reducing manpower & cost.

B. Role of PLC in Industrial automation:

PLC (Programmable Logic Controller) is basically a solid state device that performs discrete or sequential logic in a factory environment. It was originally developed to replace the mechanical relays, timers, counters and to reduce the number of wires complexity in the industrial plants. PLCs are used to execute the complicated control systems very reliably.

C. Role of SCADA in Industrial automation:

SCADA is a SUPERVISORY CONTROL and DATA ACQUISITION system. It tells us what is happening inside the plant while sitting inside the control room or thousands of miles away from the plant with the help of internet. SCADA system operation involves real time data exchange from the field device as well as with other control system like DCS (Distributed Control System) and PI(Plant Information) system.

D. Types of PLCs we used and their specifications:

Parameters	***Allen bradley***	***Siemens***	***Allen Bradley***	***Siemens***	***Allen Bradley***
PLC Name	Micrologix	S7 200	SLC	S7 300	Compact Logix
CPU No.	1000	222	5/03	312C	1769L23E
Comm. Port	RS232	RS485	RS232 & DH485	RS485	RS232 & RJ45
Comm. Cable	PM02	PPI	CP03	MPI	CP03
Comm. S/W	RS Linx Classic	Inbuilt in Cable S/W	RS Linx Classic	Inbuilt in Cable S/W	RS Linx Classic
Programming. S/W	RS Logix 500	Microwin	RS Logix 500	Siemetic Manager	RS Logix 5000
Timers & Counters	40 T & 32C	256 T & C	256 & Expandable	128 T & 64 C	1024 & Expandable
Type	Non Modular	Modular	Modular	Modular	Modular

3. DIFFERENCE BETWEEN ALLEN BRADLEY AND SIEMENS ON THE BASIS OF THEIR ADDRESSING

Addressing format of both the PLCs are almost same.

File Name : Slot Number . Word/Bit Number:

If we have 4 slots in Allen Bradley PLC then address may be I:4.0

S. NO.	***PARAMETER***	***ALLEN BRADLEY***	***SIEMENS***
1.	**INPUT**	I: 4.0, I: 4.1,……	I 124.0, I 124.1, ……
2.	**OUTPUT**	O: 4.0, O: 4.1,……	Q 124.0, Q 124.1, ……
3.	**MEMORY/ BINARY**	B4:0.0, B4:0.1,…….	MB0,MB1,……. MW0,MW2,……., MD0,MD4,MD8……

MB- Memory bit, MW- Memory word,
MD- Memory double word

Acc. to this, Allen Bradley is best because it has a function block in which all the addresses of the timers, counters, Inputs, Outputs and Memories etc. are stored. So, no need of learning the addresses is required. Whereas in Siemens function block is absent, so it is difficult to remind each address of the component used.

Difference between Allen Bradley And Siemens On The Basis Of Their Feature Level:

S.No.	*Parameter*	*Allen Bradley*	*Siemens*
1.	**Bit memory**	32 bit words (SLC)	2048
2.	**Interface**	1000Mbps(Ethernet rate) 38.4 Kbps(DF1 rate)	upto 12 mega baud(MPI interface)
3.	**Counters**	Min. =32 Max. =64	Min. =128 Max. =256
4.	**Timers**	Min. =40 Max. = 1024+ expandables	Min. =64 Max. =512
5.	**Expandable modules**	10,000 bits (guard logix)	32 bits
6.	**High speed countes modules**	Less than 50KHz range	Upto 100 KHz range
7.	**I/O cards**	Analog I/Os = 1800 Digital I/Os = 10,000	Analog I/Os = 16 (S7-200) Digital I/Os = 256 (S7-200)
8.	**Programming Language conversion**	No	Yes
9.	**Programming Language support**	1(Without DCS) 4(With DCS)	3(Without DCS) 6(With DCS)
10.	**Communication port used**	RS 232, RJ 45(Compact logix)	RS485(S7-300)
11.	**Graphical representation of tags**	For this trace function is present in it.	No trace function is present so no graphical representation of tags present.
12.	**Compiler**	Have to attach externally.	Inbuilt
13.	**Scaling**	It is done by using math blocks which is a complex process. (RS logix 500)	It is done smoothly with the help of scale block. (S7-300)
14.	**Feedback symbol[-(#)-]**	Not present	Present, it gives us the feedback about whether the previous system is working or not.
15.	**Support protocols**	North American protocols like DeviceNet, ControlNet and EthernetIP	European protocols like Profibus, A.S.I. etc.

Due to the large number of features the Siemens PLC is much costlier than the Allen-Bradley's PLC.

- **Pictorial representation of the difference between the timers of both the PLCs**

The difference between the Siemens and A. Bradley's on-delay timer is the use of reset pulse. In Siemens reset pulse is required to reset the output whereas in Allen Bradley the on-delay timer automatically gets reset after a certain period of time.

a. T-on timer difference:

	Enable(EN)	*Done(DN)*	*Timer timing(TT)*
Start	High	Low	High
Preset=Acc.	High	High	Low
Stop	Low	Low	Low

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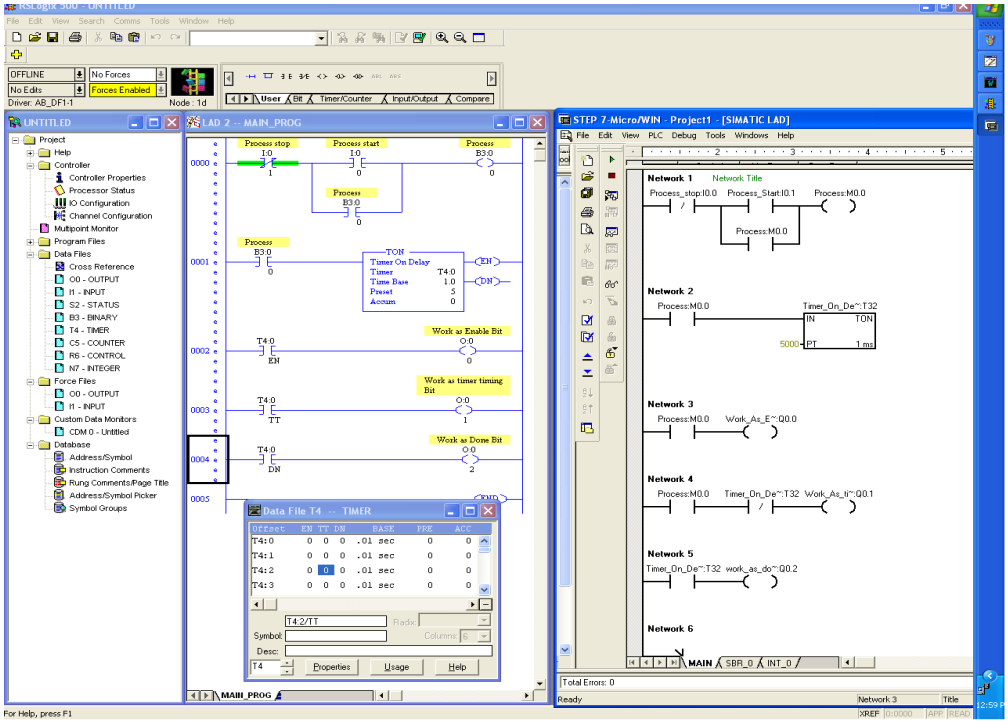
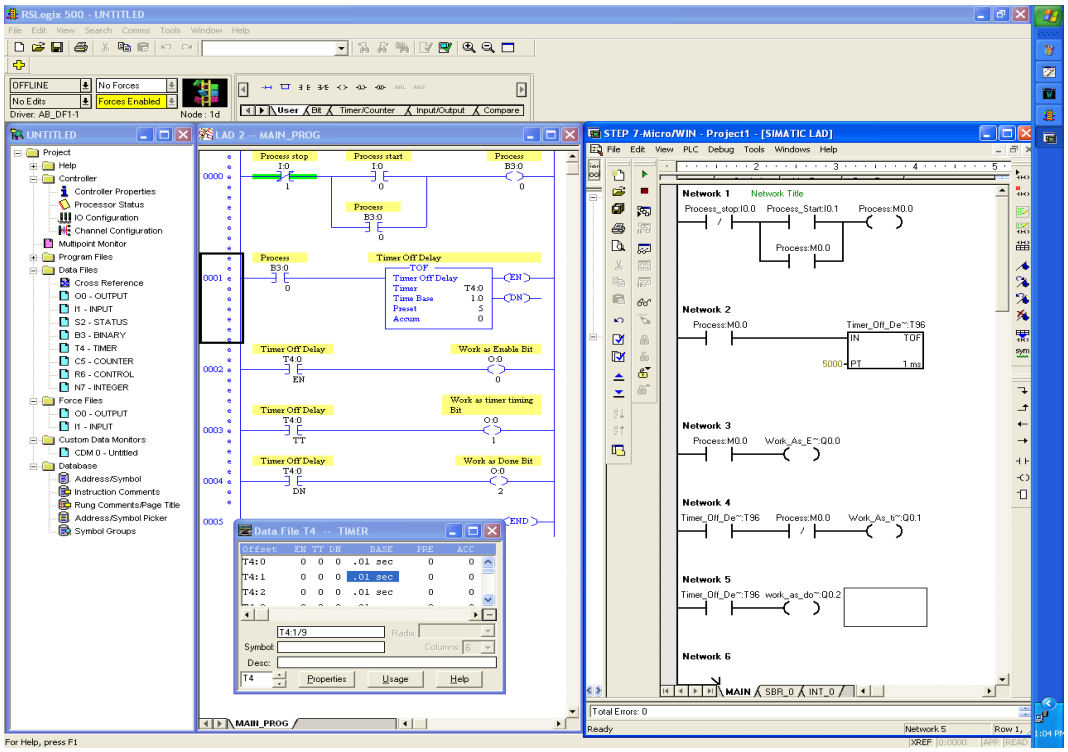


b. T-off timer difference:

	Enable(EN)	*Done(DN)*	*Timer timing(TT)*
Start	High	High	Low
Stop	Low	Low	High
Preset=Acc.	Low	Low	Low



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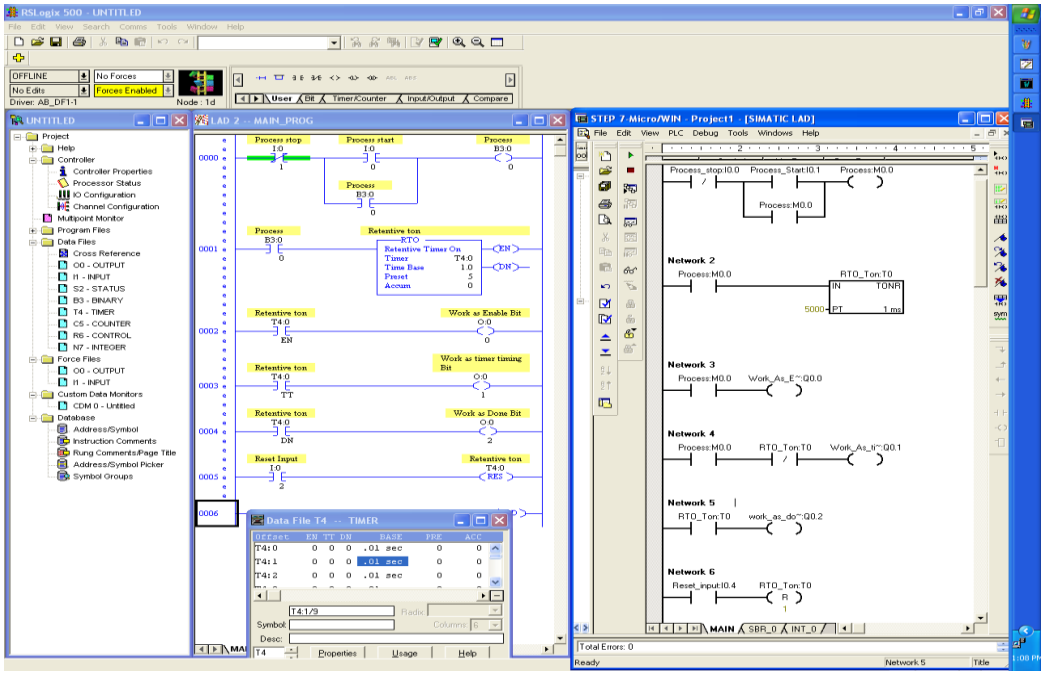
c. RTO timer difference:

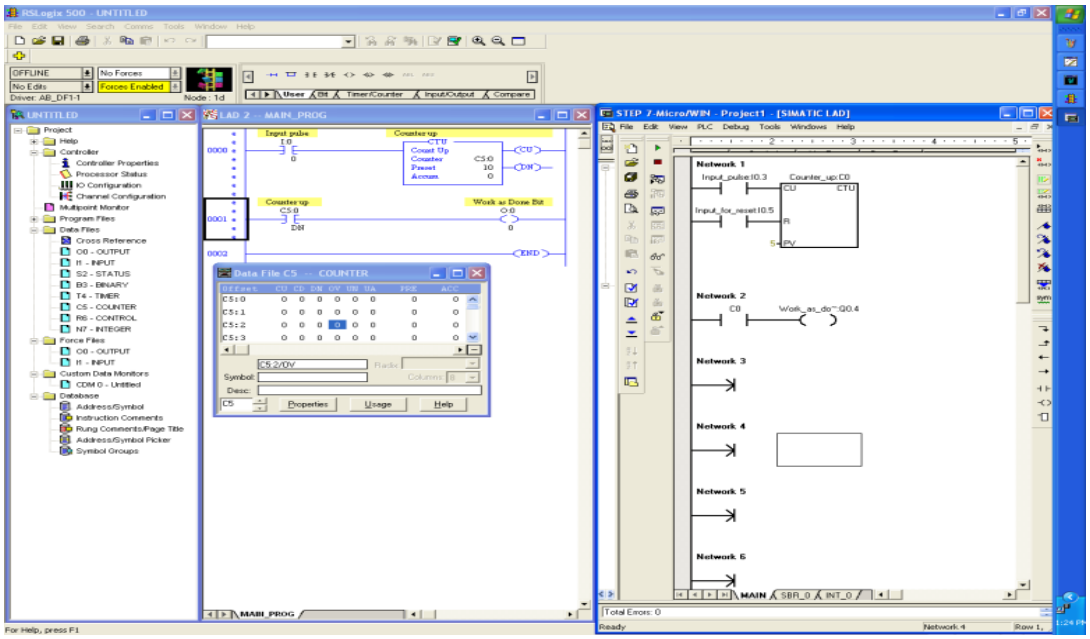
	Enable(EN)	*Done(DN)*	*Timer timing(TT)*
Start(Preset=/Acc.)	High	Low	High
Preset=Acc.	High	High	Low
Stop	Low	High	Low



➢ **Pictorial representation of the difference between the counters of both the PLCs**

In Siemens PLC, counter need a reset pulse to reset their input but in A. Bradley's PLC the counter automatically get reset. So, extra pulse is not required in it. Basic difference between the A. Bradley and Siemens PLC is the Up down counter, which is not present in the A. Bradley's PLC, so we need to add multiple math blocks in it.

a. Up counter:



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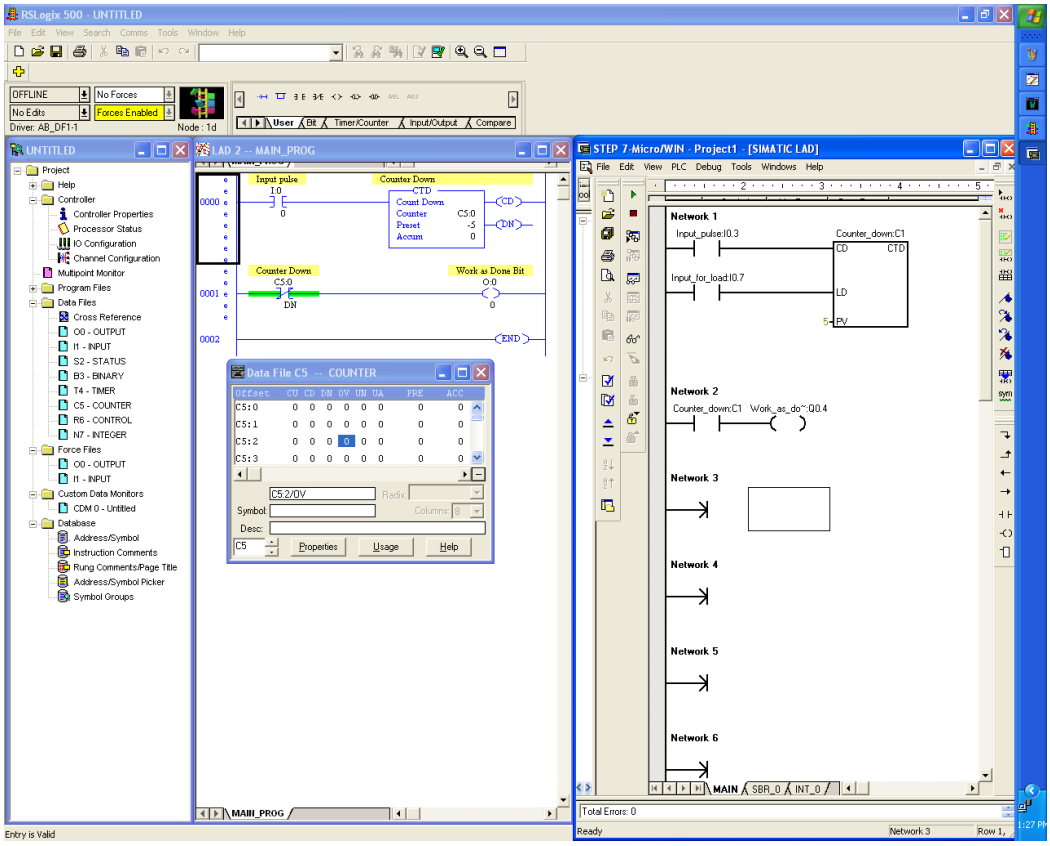
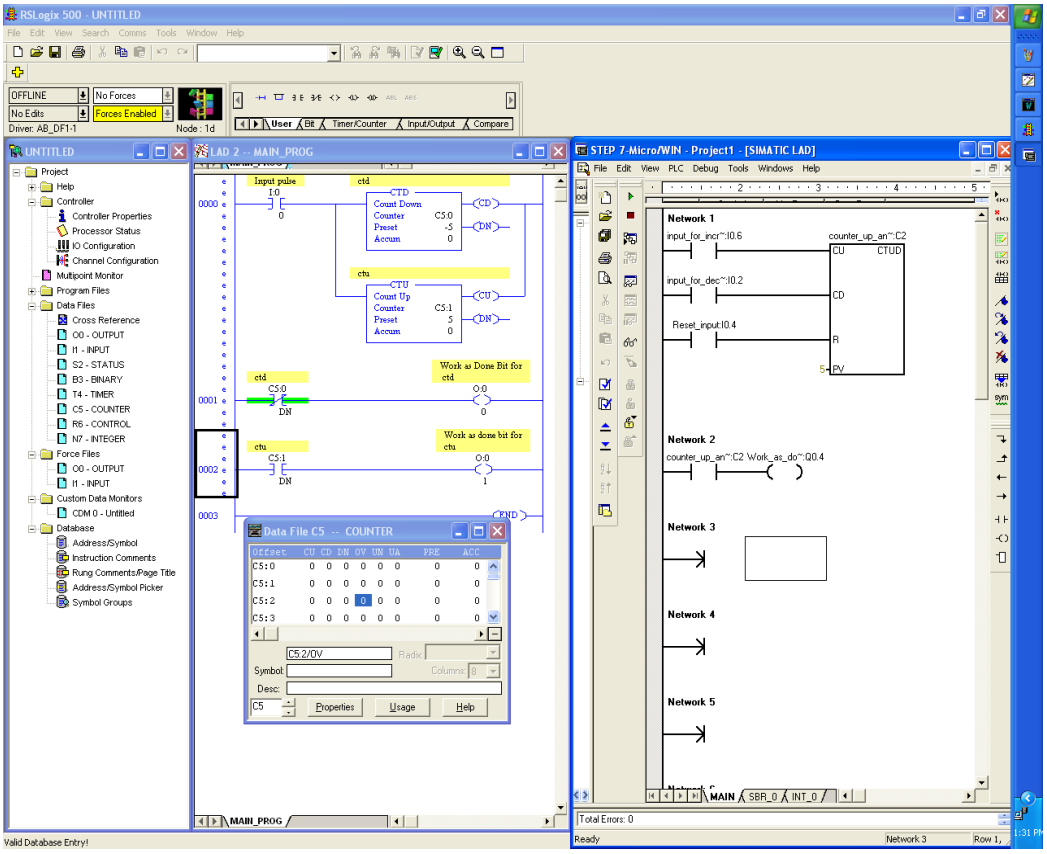
b. Down counter:



c. Up-down counter:



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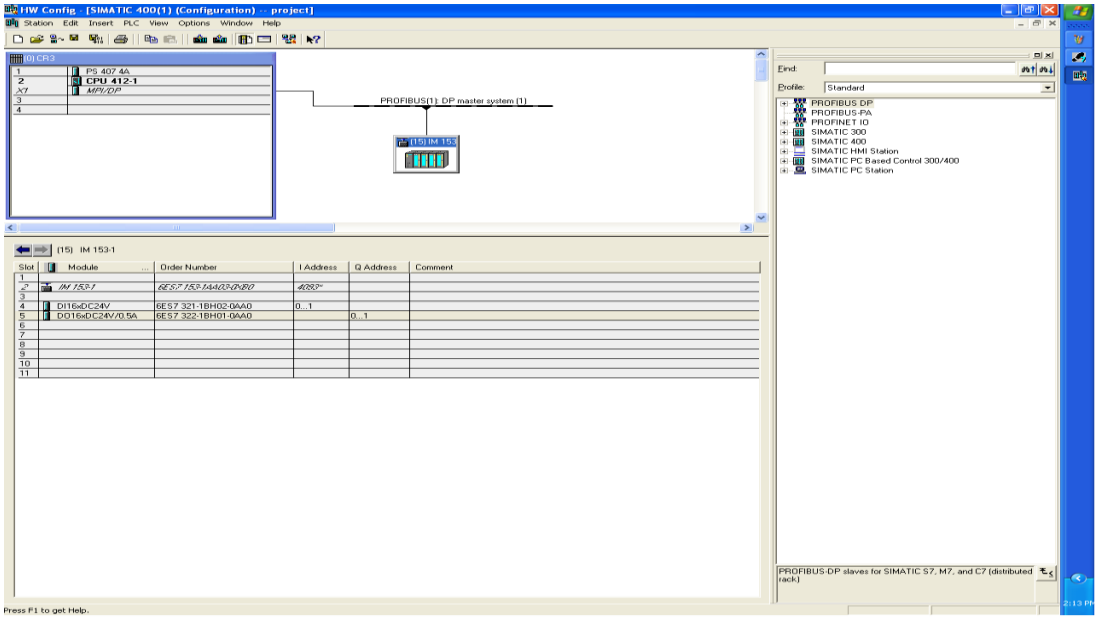
From counter point of view Siemens is better than the A. Bradley because in Allen Bradley's PLC the Up-down counter is not present. So, we need to use two counters in it which makes the ladder busy and the circuit complexity increases.

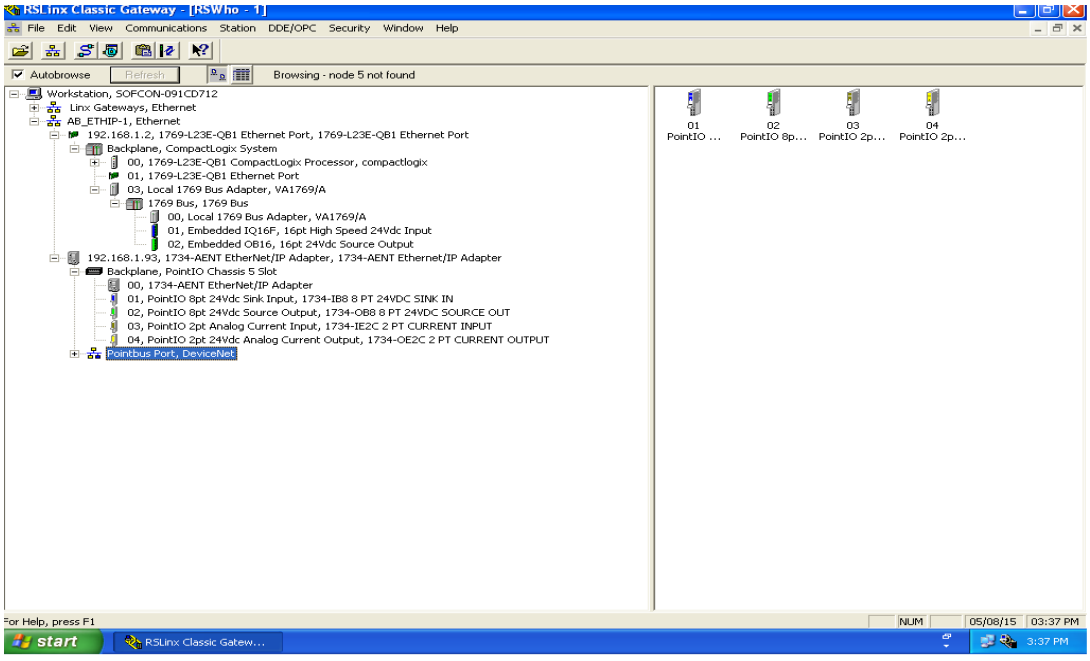
- **Pictorial representation of the difference between the remote I/Os hardware configuration of both the PLCs**

In the Siemens remote I/O hardware configurations, the separate rack is required for the remote I/Os and their hardware configuring is not so easy because it require different parameters for this whereas in A. Bradley remote configuring is easy but it take long time to be configured. In Siemens 4 racks are added whereas in Allen Bradley only one rack with no. of I/Os are added in it.

I. Siemens remote I/O configuration screen is:



II. Compact Logix remote I/O configuration screen is:



For the remote hardware configuring, Siemens is best because of their universal cards used which gives us universal area for controlling the PLC.

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III. Difference between Allen Bradley and Siemens on the basis of their languages:

Siemens (S7-200) support only 3 languages whereas Allen Bradley (RS logix 500) supports only one language that is ladder logics.

If we add DCS in Siemens PLC then it support all 6 languages (like CFC, SFC, LD, FBD, IL, ST) whereas in Allen Bradley RS logix 5000 supports only 4 languages.

So as a result Siemens is best because of the use of DCS (Distributed control system).

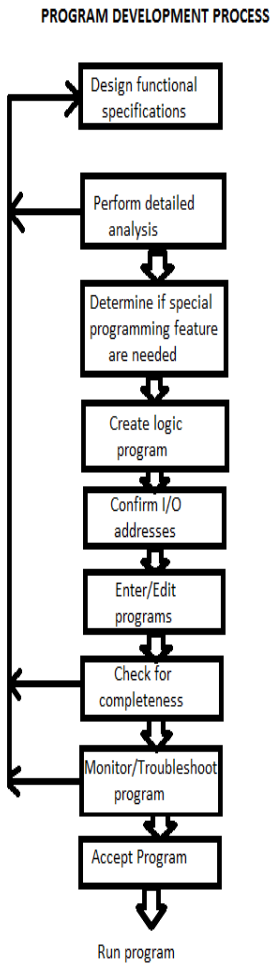
DCS is required to adjust the quality of system, controlling of temperature, pressure and water level etc.

IV. Difference between Allen Bradley and Siemens on the basis of their SCADA system:

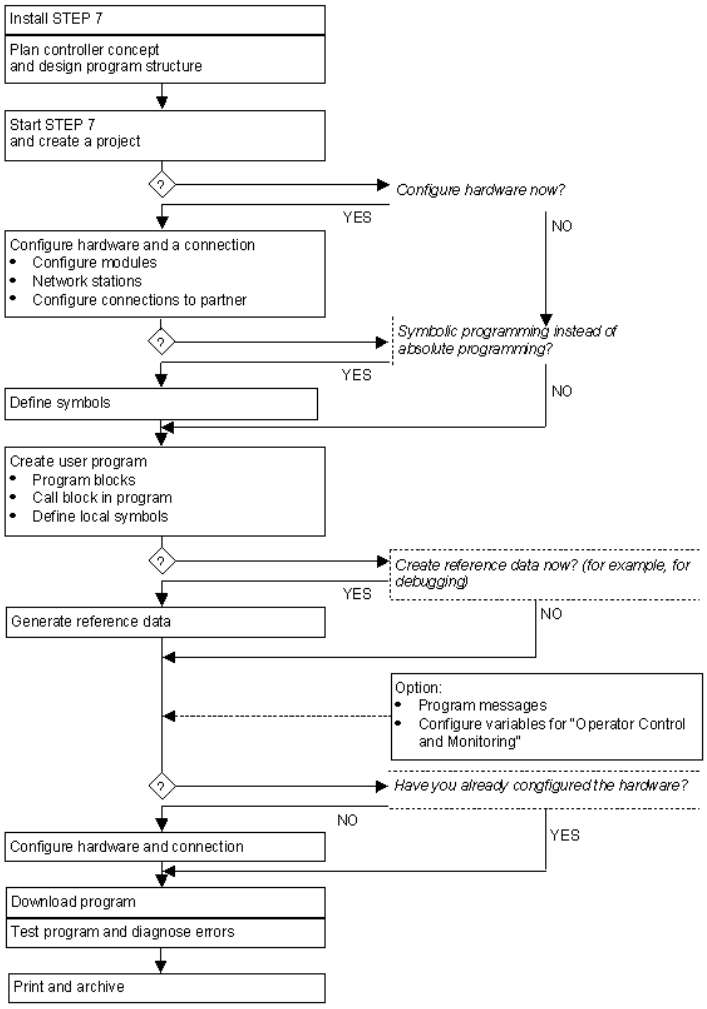
S.No.	*Allen Bradley's SCADA*	*Siemens SCADA*
1.	RS view 32	Wincc
2.	Less features.	More features.
3.	Less complicated and less costly.	More complicated and costly.
4.	Not used for visual basic.	Used for visual basic.
5.	It can be used for many type of PLCs.	Generally used for Siemens.
6.	Protocol used are DDE OPC,DD.	Only MPI OPC server is used.

V. Difference between Allen Bradley and Siemens on the basis of their flowchart:

Allen Bradley's



Siemens



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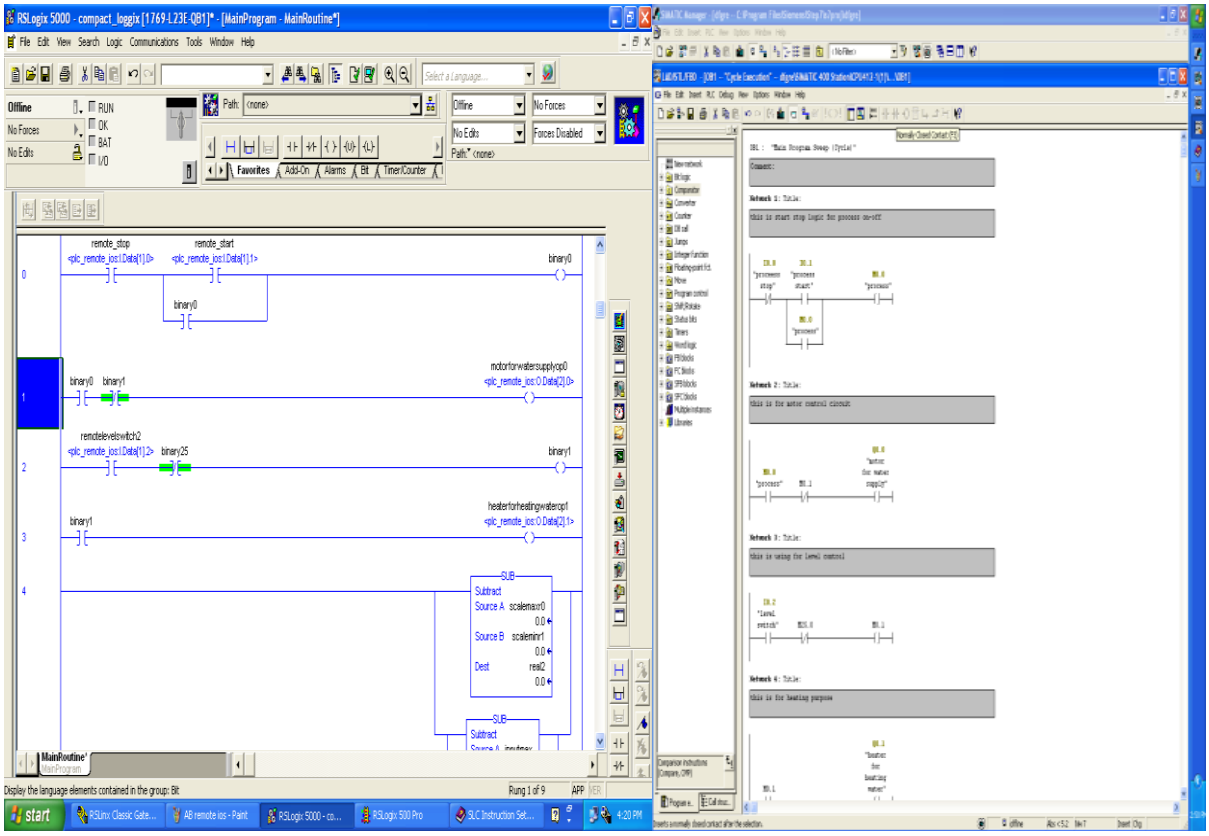
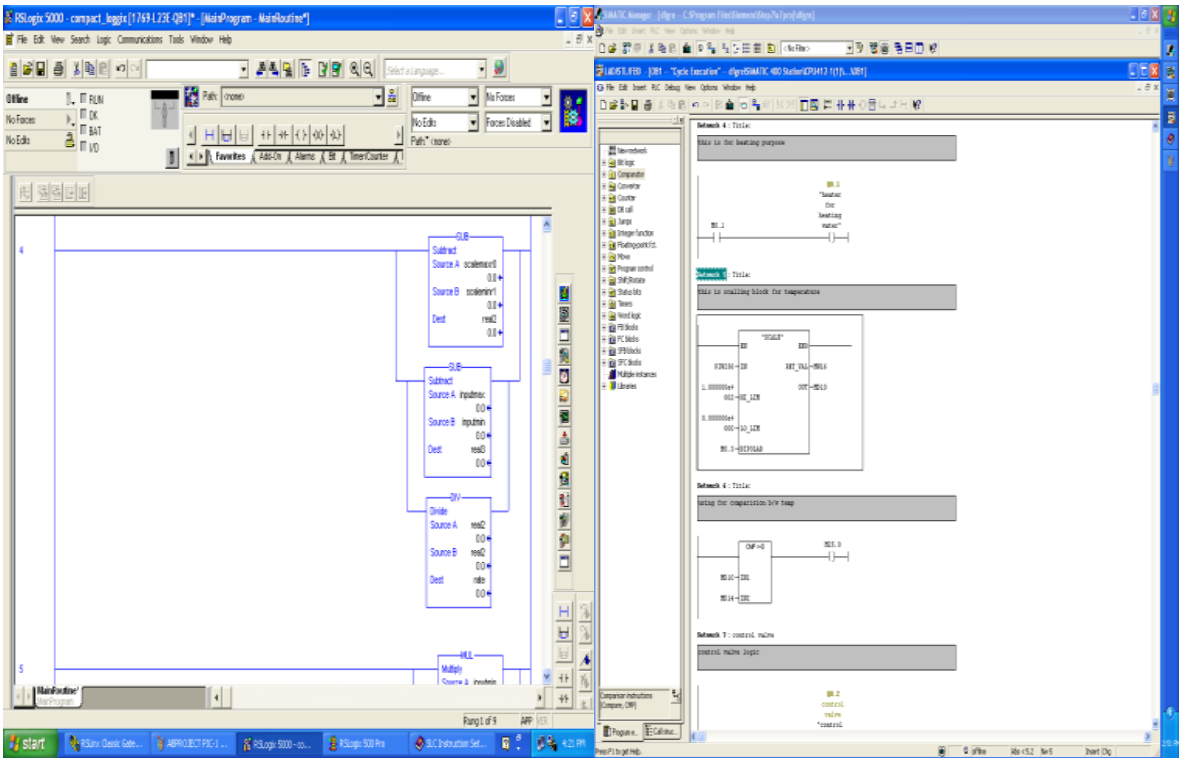
VI. Difference between Allen Bradley and Siemens on behalf of their applications

We have consider the industrial application like Water treatment plant in which the motor rotation , temperature controlling and Valve opening is done by the use of remote I/Os and is also shown in the SCADA system.

PLC programming representation





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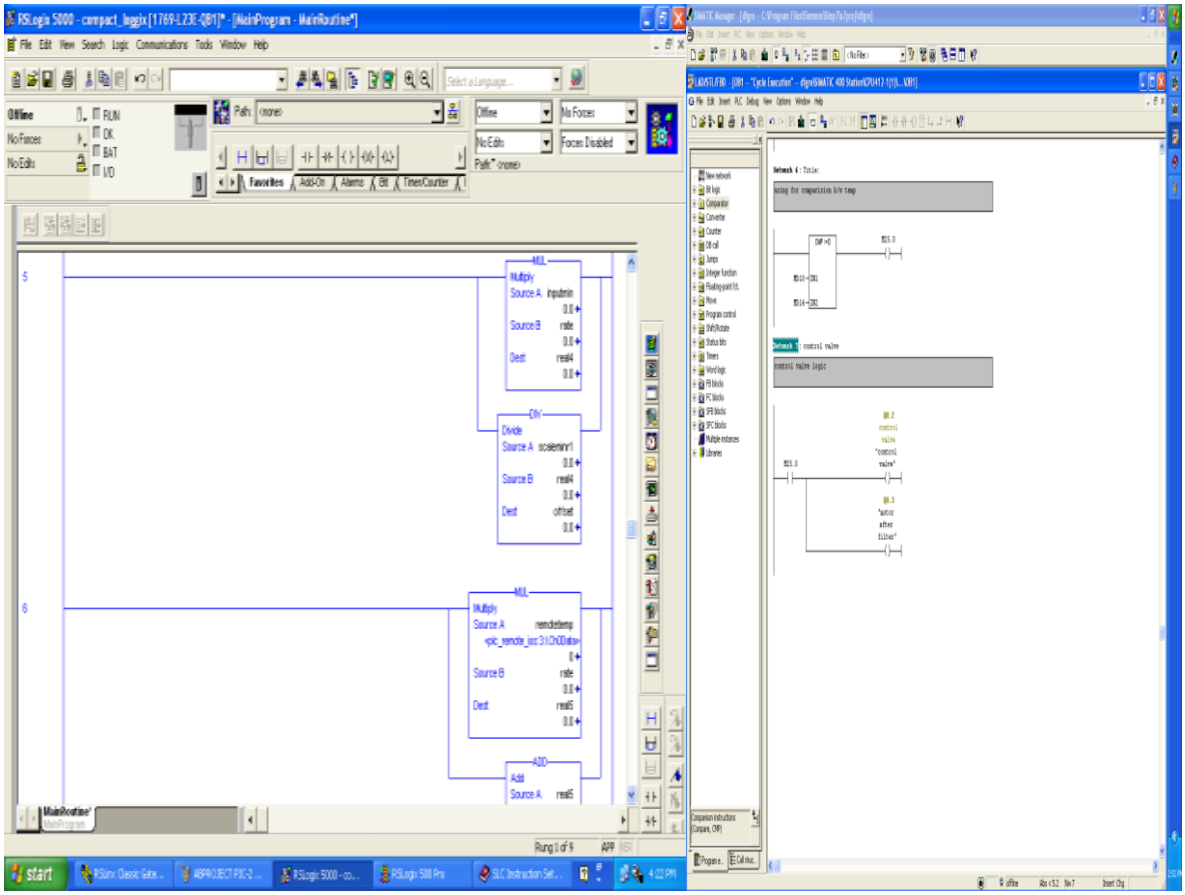

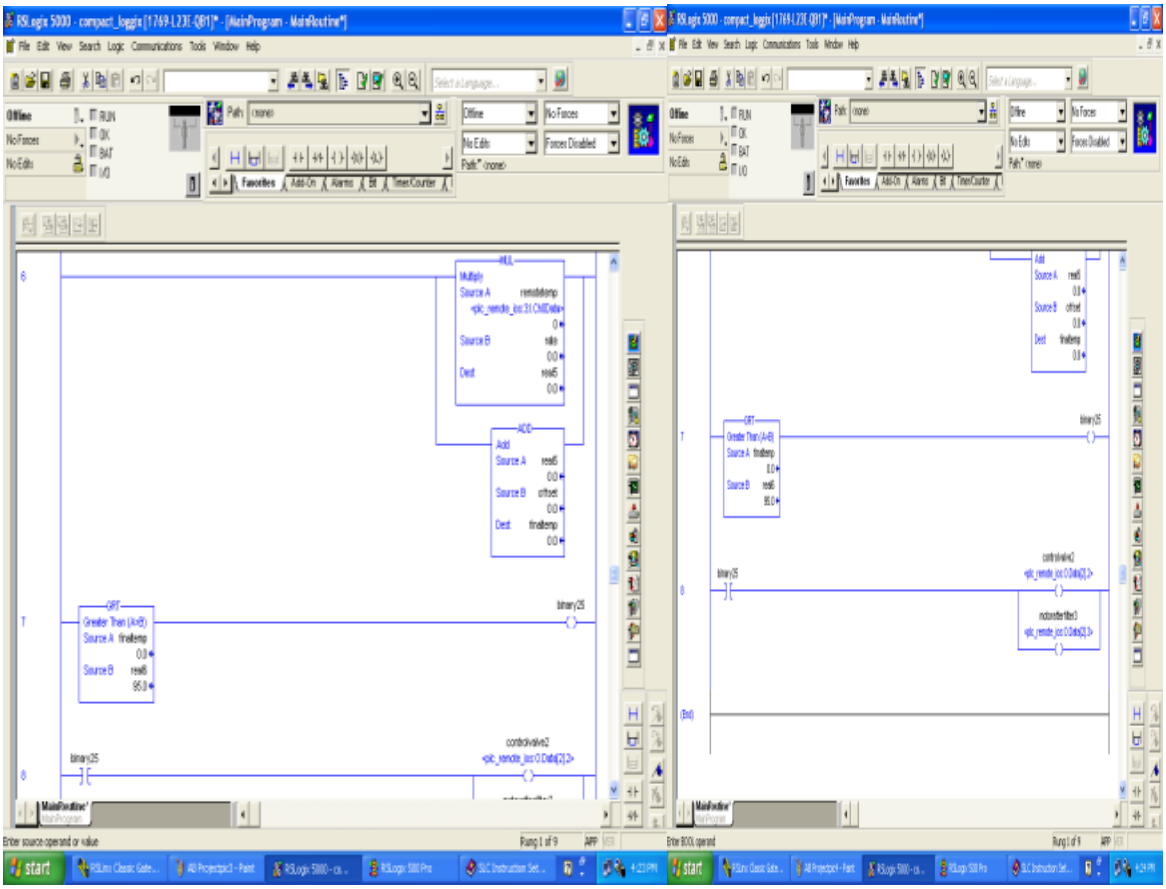

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SCADA representation

RS view 32 **Wincc**

For this projects point of view Allen Bradley PLC is the best because of the presence of scale block which complete the program in less no. of rungs due to which less complexity occur in the program and the program become more accurate.

4. RESULT

S.No.	***Parameter***	***Allen Bradley***	***Siemens***
1.	Cost	Less	More due to more no. of features
2.	Memory	Less than Siemens PLC	More than the Allen Bradley
3.	Latest HMI's Features	Less	More
4.	Online modifications	Not done	Done with the use of DCS
5.	Programming tool	RS Logix is simpler	TIA portal(VIX) is tough than the RS Logix
6.	Synchronization	Time	Pulse
7.	Safe connectivity	In this we need to hardwire the same connection.	It includes the safe connectivity of drives and devices over the network.
8.	Software comfort level	Less than Siemens	More than the Allen Bradley
9.	Safety	Requires additional cards.	Inbuilt
10.	No. of safety runtime groups	One	two

5. CONCLUSION

A review of Allen Bradley v/s Siemens from user point of view is described in this paper. This paper show the comparison between the different techniques used in it. In this paper several points are taken on the basis of which it is concluded that Siemens PLC is better than the Allen Bradley in every point either they are costly due to their advance features in SCADA, PLC, Drives and also in HMI. Now days Allen Bradley is also trying to improve their software versions but as the time continues may be in future Allen Bradley's PLC will compete with the Siemens PLC so far.

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