



INSTITUTO
SUPERIOR
TÉCNICO

Tetra Pak and Parmalat Company Visit

Group 13:

**Franco Bortot 72261,
Lasse Kemppainen 72288,
Pedro Ramalhosa 58126,**



INSTITUTO
SUPERIOR
TÉCNICO

Companies



Tetra Pak is the world's leading food processing and packaging solutions company

Parmalat is a multinational food group present in all five continents through either a direct presence or through license agreements in the products areas of milk, vegetable, fresh (yogurt, cheese, desserts)



INSTITUTO
SUPERIOR
TÉCNICO

Relationship between Tetra Pak / Parmalat

- Parmalat is a large producer of dairy products, such as milk, cream and bechamel.
- Tetra Pak provides the solutions for packing the food produced by Parmalat





INSTITUTO
SUPERIOR
TÉCNICO

Why is Automation used in this Companies?

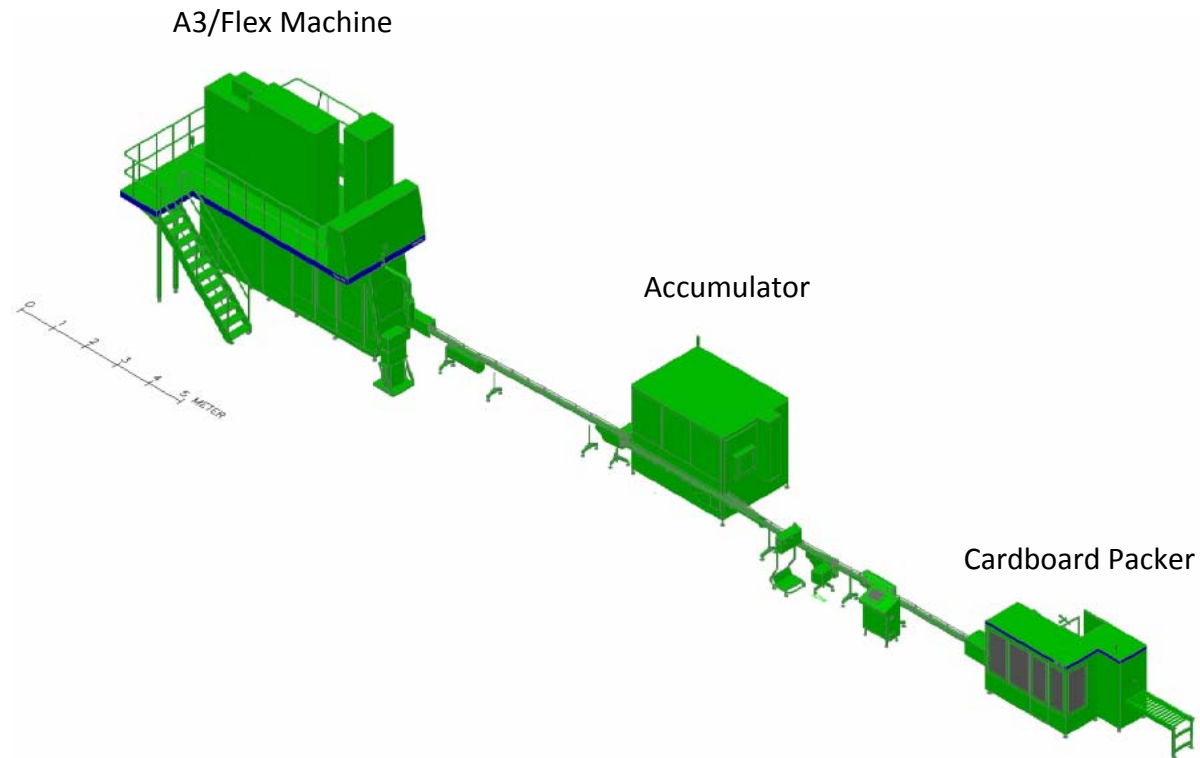
- Parmalat products are consumed by 200 millions people all over the world
- In order to satisfy the consumers necessities the production has to be quick and in large number
- Using automation, particularly PLCs, the company can reach the production number required by consumers
- The production is quick and effective thanks to Tetra Pak Machines.
- Tetra Pak machines use PLCs to control the production of packages filled with dairy products
- Ex: Production line with A3/Flex package and filling machine



INSTITUTO
SUPERIOR
TÉCNICO

Production Line using A3/Flex

- A3/Flex Machine
- Accumulator
- Cardboard Packer





INSTITUTO
SUPERIOR
TÉCNICO

A3/Flex – Machine





INSTITUTO
SUPERIOR
TÉCNICO

Production line with A3/Flex – Tetra Pak package and filling machine

- A3/Flex is a Tetra Pak package and filling machine used by Parmalat to produce lots of products with 2 specific packages.
- Packages per hour:
Family packages (500-750-1000 ml): **8000 packages per hour**
Portion packages (200-250-330 ml): **9000 packages per hour**
- We can see that's lot of packages produced in just one hour!
- That's more than 2 packages per second!
- This is only possible using automation!
- This machine uses **7 PLC's** to control all the production

330ml Package





INSTITUTO
SUPERIOR
TÉCNICO

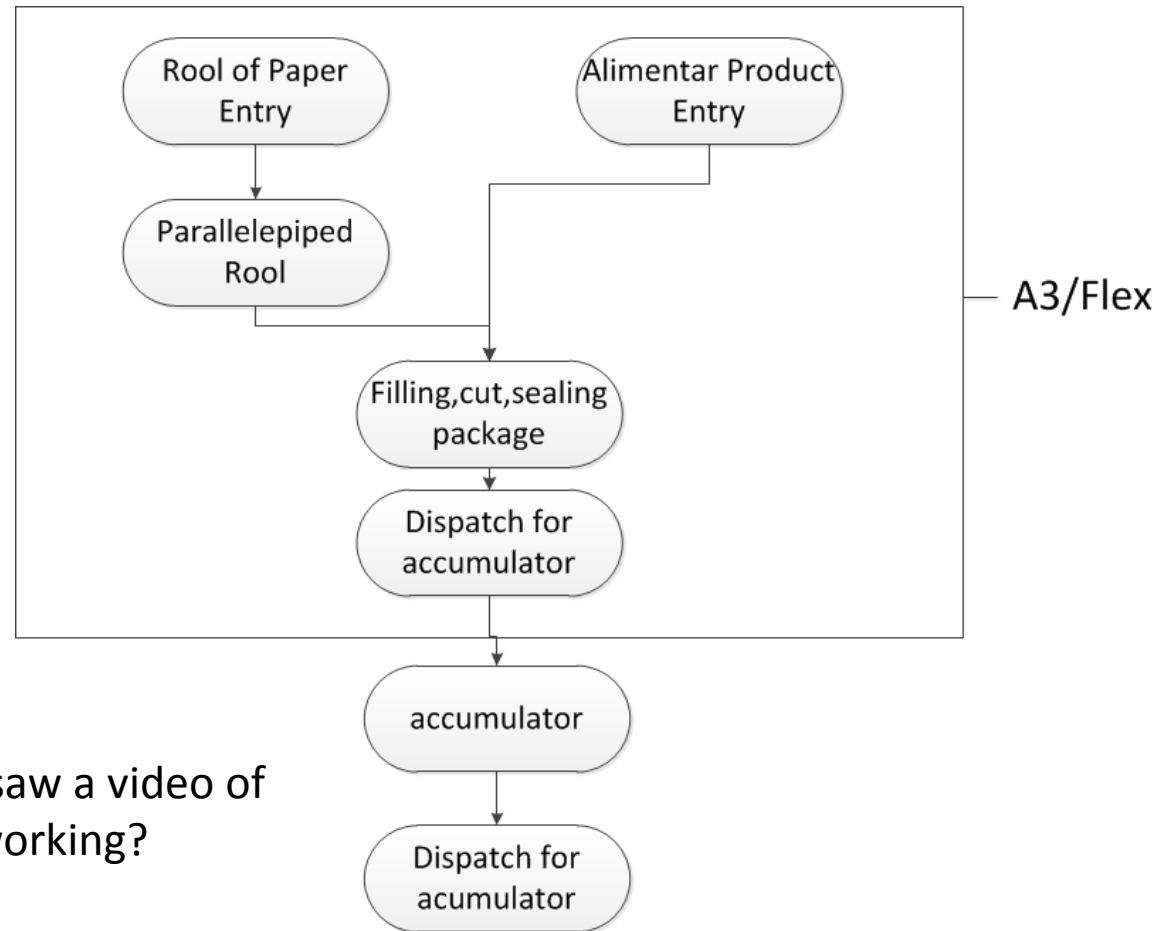
A3/Flex – PLC's



1 of the PLCs used by A3/Flex (Allen-Bradley PLCs)



How does the production line work?



And if we saw a video of machine working?
Sure!



INSTITUTO
SUPERIOR
TÉCNICO

Programming PLC's

- Entries
 - Type of package (size, weight and more)
 - Temperature of product
 - Time and temperature of sterilization
 - Pressure
 - Production demand
 - Production rate
 - Signals from accumulator
 - Signals from cardboard packer
- Outputs
 - Servomotors controls
 - Coils sealing high frequency
 - Speed of conveyor
 - Time to finish
 - Parameters of product
 - Time need to start production

OBS : The PLC's have to know what's happening in all production line machines by using an Ethernet connection between the different machines.



INSTITUTO
SUPERIOR
TÉCNICO

All PLC's



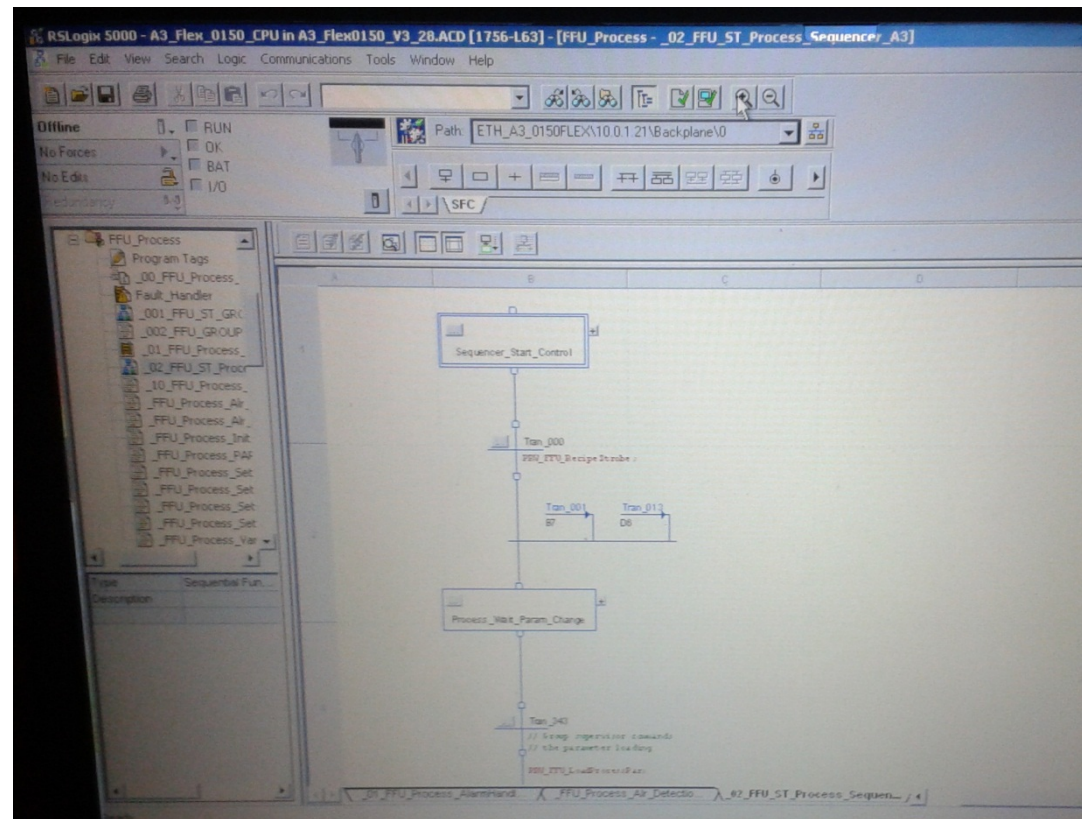
As you can see, that's lot's of PLC's and Servomotors to control all the process.



INSTITUTO
SUPERIOR
TÉCNICO

Program used

The program that's used to program all the automation and PLC's of A3/Flex machine is RSLogix 5000, and, of course, the program is very big compare to our programs done in the lab.



Simple GRAFCET of one part of program



INSTITUTO
SUPERIOR
TÉCNICO

Program used

```
RSLogix 5000 - A3_Flex_0150_CPU in A3_Flex0150_V3_28.ACD [1756-L63] - [FFU_Process - _10_FFU_Process_Status_A3]
File Edit View Search Logic Communications Tools Window Help
Path: ETH_A3_0150FLEX\10.0.1.21\Backplane\0
JMR SBR RET ABS TRU SIZE SFR SFP EDT
Favorites Process Drives Filters SelectLimit Stat
FFU_Process
  Program Tags
  _00_FFU_Process
  Fault_Handler
  _001_FFU_ST_GRC
  _002_FFU_GROUP
  _01_FFU_Process
  _02_FFU_ST_Proc
  _10_FFU_Process
  _FFU_Process_Air
  _FFU_Process_Air
  _FFU_Process_Init
  _FFU_Process_PAI
  _FFU_Process_Set
  _FFU_Process_Set
  _FFU_Process_Set
  _FFU_Process_Var
Type: Structured Text
Description:
IF (SI_C2.PanelControlActive) AND VAR_FFUProcessPanelControlRequest THEN // Allow use of
//INPUT//
//INPUT//
VAR_S901TpopReset      (:=) I_S901;
VAR_S902LampTest       (:=) I_S902;
VAR_S903ModeSelector   (:=) I_S903;
VAR_S904Sprinkler      (:=) I_S904;
VAR_S905InchFfu        (:=) I_S905;
VAR_S906DropChute      (:=) I_S906;
VAR_S907InchJum        (:=) I_S907;
VAR_S908ShortStop      (:=) I_S908;
VAR_S911StepUp         (:=) I_S911;
VAR_S912StepDw         (:=) (NOT I_S912);

IF I_S901 AND NOT STB_FFUstatus.1 THEN //TPOP RESET
  VAR_S901Pulse (:=) 1;
ELSE
  VAR_S901Pulse (:=) 0;
END_IF;
STB_FFUstatus.1 (:=) I_S901;

IF I_S902 AND NOT STB_FFUstatus.2 THEN //LAMP TEST
  VAR_S902Pulse (:=) 1;
ELSE
  VAR_S902Pulse (:=) 0;
END_IF;
STB_FFUstatus.2 (:=) I_S902;

IF I_S903 AND NOT STB_FFUstatus.3 THEN //MODE SELECTOR
  VAR_S903Pulse (:=) 1;
ELSE
  VAR_S903Pulse (:=) 0;
END_IF;
STB_FFUstatus.3 (:=) I_S903;
```

Structured text of input's of panel control for the operator
Inputs



INSTITUTO
SUPERIOR
TÉCNICO

Program used

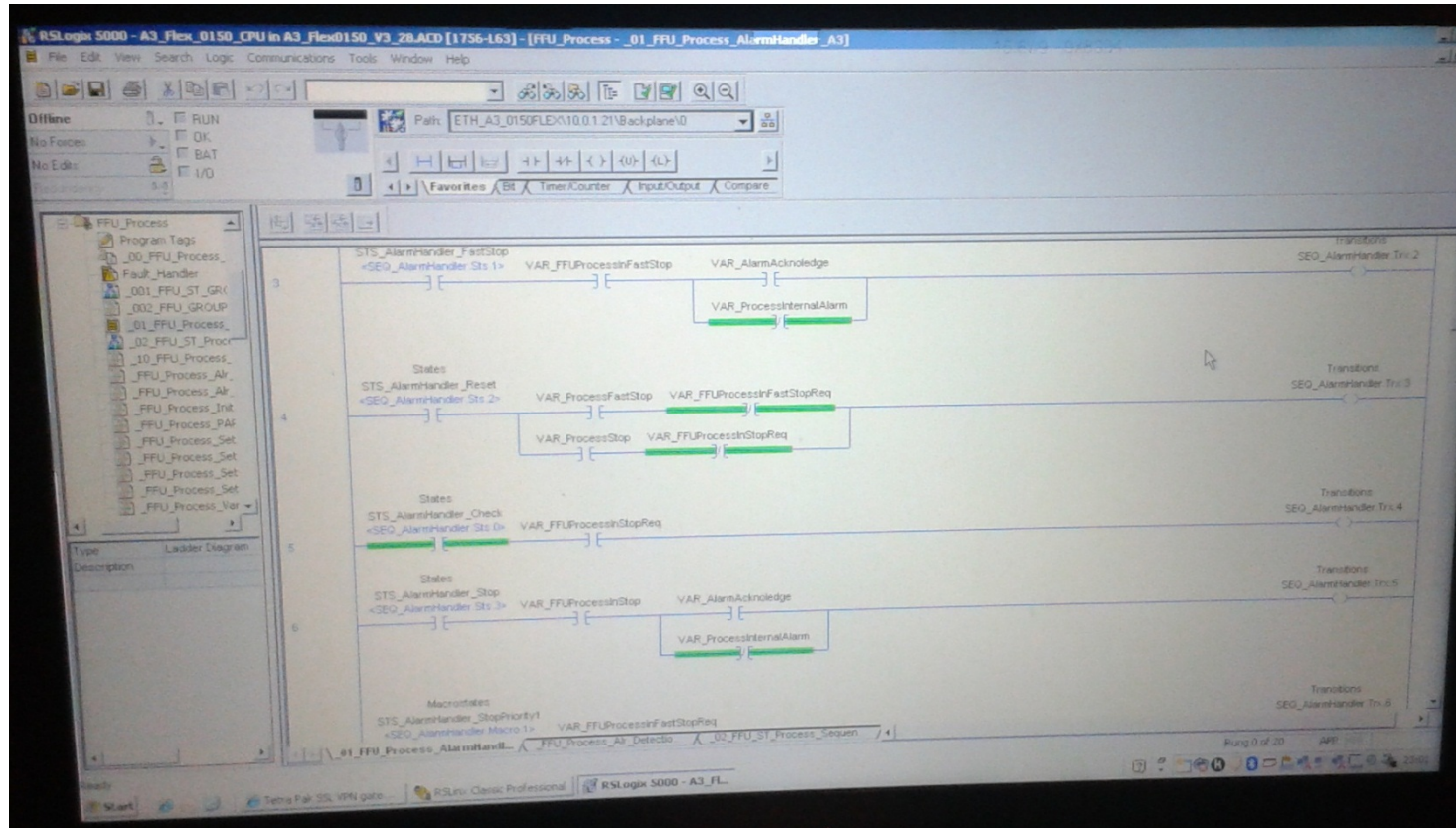
```
#####  
//OUTPUT//  
#####  
O_H901      := VAR_H901POpReset;      // TP0D RESET LIGHT  
O_H905      := VAR_H905Inchftu;       // INCH FFU LIGHT  
O_H907      := VAR_H907InchJum;       // INCH JUM LIGHT  
O_H908      := VAR_H908ShortStop;     // SHORT STOP LIGHT  
O_H911      := VAR_H911StepUp;        // STEP UP LIGHT  
O_H912      := VAR_H912StepDw;        // STEP DOWN LIGHT  
  
//  
VAR_OutReset := 0;  
//  
  
ELSE  
  
IF (NOT VAR_OutReset) THEN  
  O_H901 := 0;  
  O_H905 := 0;  
  O_H907 := 0;  
  O_H908 := 0;  
  O_H911 := 0;  
  O_H912 := 0;  
  //  
  VAR_OutReset := 1;  
  //  
END_IF;  
  
VAR_S901TpopReset := 0;  
VAR_S902LampTest := 0;  
VAR_S903ModeSelector := 0;  
VAR_S904Sprinkler := 0;  
VAR_S905Inchftu := 0;  
var_s906InchJum := 0;
```

Structured text of input's of panel control for the operator
Outputs



INSTITUTO
SUPERIOR
TÉCNICO

Program used



Example of a Ladder used in program machine
Alarm Handler



INSTITUTO
SUPERIOR
TÉCNICO

Conclusion

We could see that what we learned in API class, was very similar of what's applied at the industry, only with a different, the size!

The program machines are very big and complex, but the principles and the programming is the same as we did at API class

We conclude too, that the automation and PLC's are very important in the industry because of the boost that the production have with them so the industry can satisfy the necessities of consumers.



INSTITUTO
SUPERIOR
TÉCNICO

Thankful

- Prof. José António da Cruz Pinto Gaspar (Professor)
- Eng. Renato Fonte (Tetra Pak)
- Eng. Urbano Dias (Parmalat)
- Eng. Rui Ramalhosa (Tetra Pak)
- Eng. Gonçalo Martins (Tetra Pak)
- All operators at Parmalat