

Automation and control of a continuous process dough making machine

Food & Beverage:
VMI Rayneri



FRANCE

Introduction

With 200,000 machines installed in more than 100 countries, VMI Rayneri is a world leader in mixing machines for pastry, bakery, delicatessen, catering, pharmacy and cosmetics, chemistry and paints. VMI Rayneri has work force of 220 people and is certified to ISO 9001 specifications



The application

Using its global experience, VMI developed a machine for the production of dough in a continuous process. The machine integrates not only the various mixing steps but also the dosing and metering of each individual ingredient.

Advantages of the continuous mixer:


- Flexibility to suit to the required process.
- Possibility to integrate autolysis or resting time steps on dough conveyors.
- High hourly production (up to 8 tons/h).
- Comprehensive Automation by PLC & microprocessors.

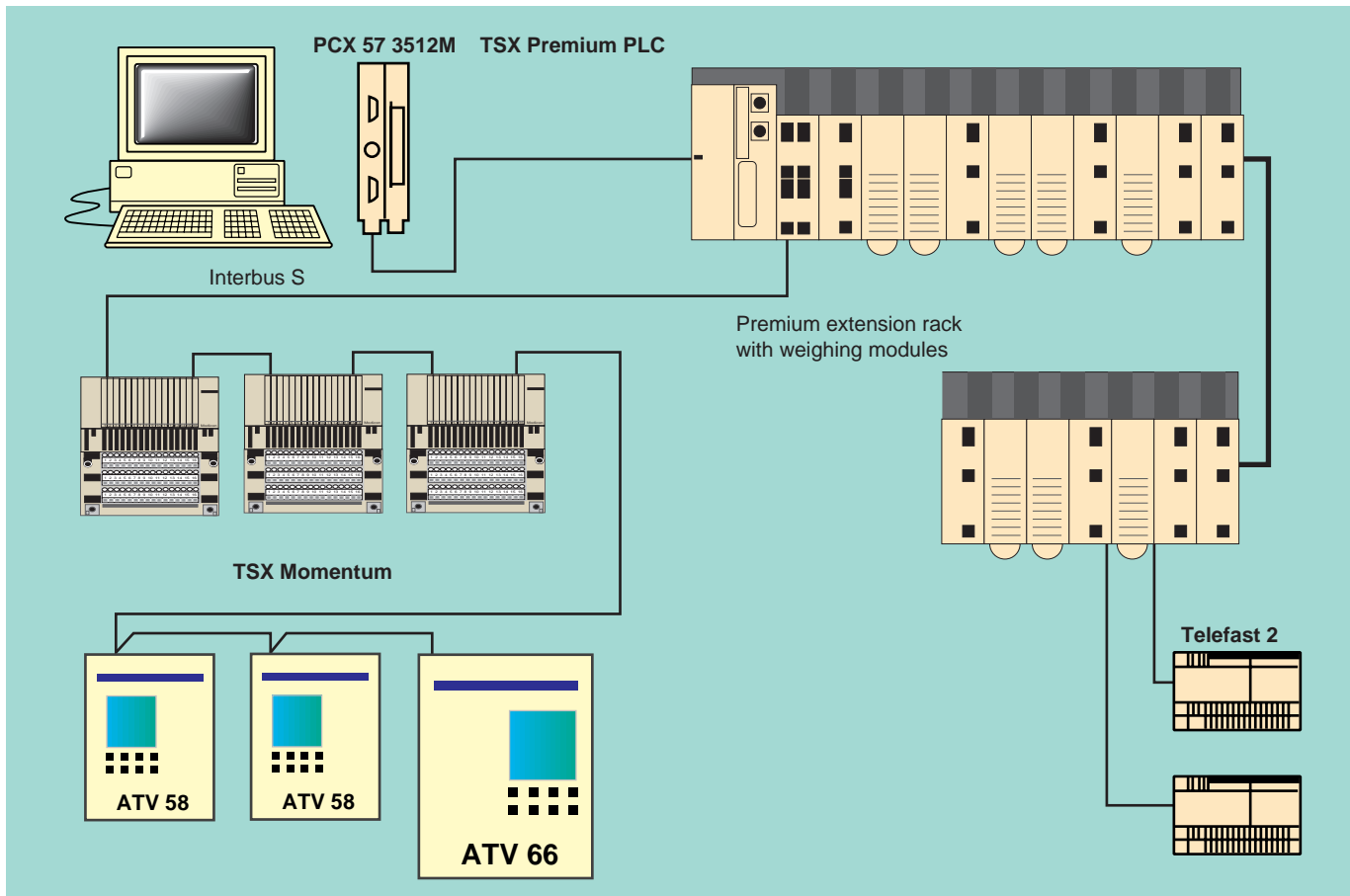
Merlin Gerin

Modicon

Square D

Telemecanique

Schneider
 **Electric**



The general control architecture for the VMI Rayneri continuous process dough making machine.

The application (cont.)

- High dough quality consistency.
- Control and maintain of dough temperature provided by a double jacketed bowl.

The solution

VMI and Schneider Electric have collaborated to automate this continuous mixing machine. The control is provided by a TSX Premium and a PC communicating over an Interbus S network. The supervisory software is Monitor Pro. Momentum remote I/O, ATV 58 and 66 variable speed drives are connected to the PCX TSX Premium via Interbus S. Weighing modules and in-rack I/O modules are contained on two extension racks

Schneider Electric also developed the modular and configurable application software using PL7 Pro and Monitor Pro.

The PLC software controls :

- The dosing functions: The software can be configured up to 10 mass-based dosing units, 4 volumetric dosing units and 4 flow control dosing units. The dosing control is either a volumetric control or a flow control or mass-based control. Depending the type of the dosing unit (powder, fat or liquid) the control loops and the operation cycles are different and fully programmed under PL7 Pro. The PLC also controls the filling of the dosing units.
- The mixing function : The PLC controls the rotor and the screw of this equipment.
- The kneading function: The PLC controls the continuous mixing cycle (up, down, tilting, cutting and mixing).

The solution (cont.)

The PLC automates other functions as well :

- Mixing screw
- Lift screw
- Sieve
- Conveyor belt
- Weighing Conveyor belt
- Manual, automatic and setting modes depends on the function and are fully controlled by the PLC.



The supervisory system built with Monitor Pro has 11 main screens :

- A general screen where all status is displayed and gives access to all functions.
- A screen to select the operating mode and to start/stop all the production cycles.
- A screen to configure the start/stop delays of all functions.
- A screen to display the status of all functions.
- A password protected screen to display and to modify all working parameters.
- A password protected screen to tune the dosing unit.
- A screen to display, to generate, to modify or to delete production recipes.
- A screen to display, to generate, to modify or to delete production forms.
- A screen to display, to print, to store or to initialize all data of each dosing unit by production cycle or from a date (completion, faults, status and events).
- A screen to display faults, status and events.
- A screen to configure language, units, densities, type of filling and name of product.