

Packing in the clouds

When Empresa Pública Productiva Cementos de Bolivia (ECEBOL) awarded Claudius Peters the contract for a packing and palletising facility at its cement works in Oruro, Bolivia, the project sent the German equipment supplier into the clouds.

■ by *Claudius Peters Projects GmbH, Germany*

The new Oruro cement plant of Empresa Pública Productiva Cementos de Bolivia (ECEBOL) is located in the Andes, at an altitude of 4000m. The facility is considered a key infrastructure project in the region and will enter service later this year.

The overall contractor of this turnkey project is UTE Oruro, a consortium of Spain-based Sacyr Industrial SLU and Imasa Ingeniera y Projectores SA, with the plant's main equipment supplied by thyssenkrupp Industrial Solutions. In terms of packing and palletising, the contract was awarded in 2016 to Claudius Peters Projects GmbH.

Packing plant requirements

The packing facility at the Oruro works is required to pack cement in 50kg paper bags and 1000kg big bags at rates of 3600 bags/h and 20 bags/h, respectively. The facility also needs to include a palletising plant for pallet-free bag handling on slip sheets. In addition, ECEBOL requested plant control based on an Allen Bradley system. Claudius Peters had to take into account not only the plant's altitude but also its low building height.

ECEBOL's new Oruro cement plant will benefit from the latest packing and palletising technology



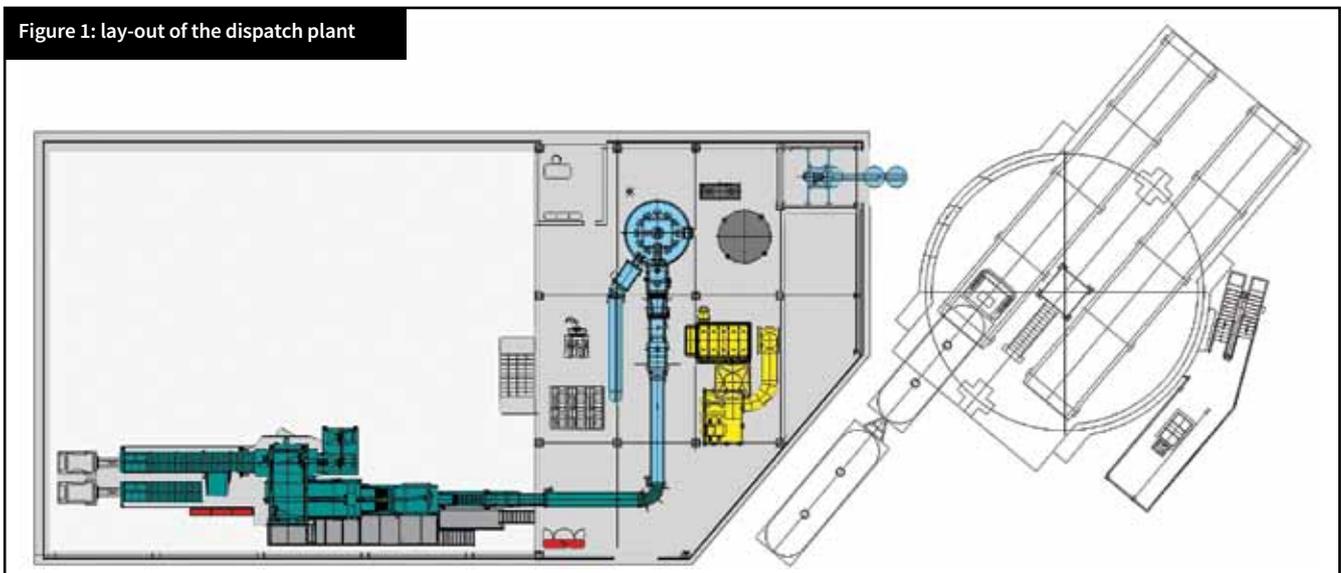
Plant design and equipment

The special requirements of the plant had a direct impact on the final design and selection of equipment for the facility. For example, the plant's location affects the efficiency of cooling equipment for the motor and electric components due to the lower air density. Claudius Peters had to select equipment in line with these

demands. In addition, due to the low building height, a pre-bin over the packer was moved next to the packing line.

The transport of cement to the packing equipment is carried out via aeroslide, bucket elevator, vibration screen and screw conveyor. Depending on the actual filling level, the packer is supplied with a continuous material flow.

Figure 1: lay-out of the dispatch plant





The Claudius Peters PACPAL Palletizer 5000 can palletise 3600 bags/h

Bagging equipment

A key part of ECEBOL's packing plant is the bagging machine, a 12-spout Claudius Peters PACPAL Roto Fill packer. It works at a constant capacity of 3600bags/h and is currently set to fill 50kg bags. However, the packer can fill bags in a range of weights from 20-50kg by selecting the required weight on the control panel.

The electric energy supply with the main voltage is carried out via a slip-ring body. The control voltage for the filling

modules is generated and distributed on the packer, which also includes a PLC for the control of single functions such as bag holding, filling in coarse and fine flow and bag discharge.

The data exchange between the rotary packer and the master plant control is carried out via a wireless connection.

Application of empty bags

The application of the empty bags is carried out automatically using a Claudius

Peters PACPAL bag applicator. With autonomous control and equipped with a bundle magazine, the empty bags are inserted in bundles. The applicator then automatically separates the bags, opens the valves and shoots them onto the filling spout, helped by suction ledges and a vacuum pump.

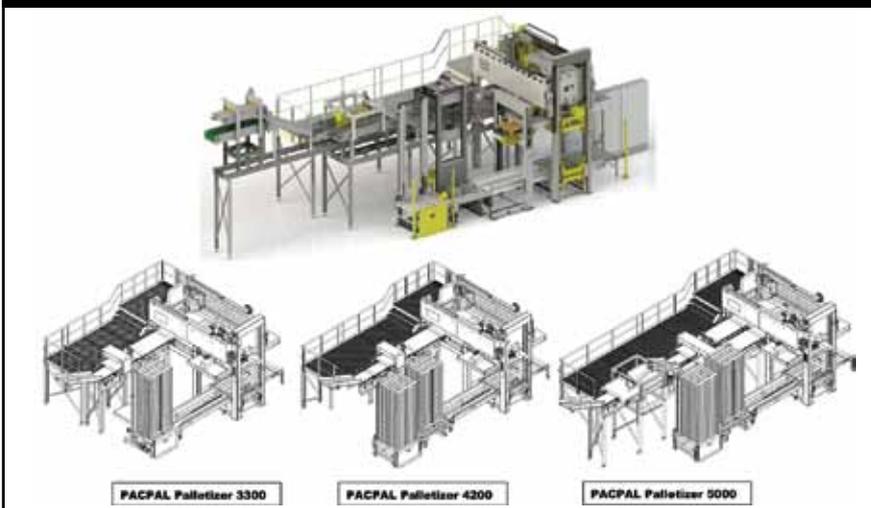
Bag discharge and transport

When full, the bag is dropped onto a discharge belt. The bag is cleaned in an air channel and moves along an alignment belt to a control weigher. Behind the control weigher a bag reject for bags with incorrect weight is installed. The rejected bags are torn apart, cement and paper are separated, the paper is collected and the screened product is returned to the packer. Connected to the packer is a conveying system to the palletiser.

Check weigher and return control

The bagging plant's check weigher has two functions. The first is as an independent quality control of the bags. For this purpose the single weights are recorded. Bags which are outside the freely-selectable tolerance range are rejected, while bags which are neither overweight nor underweight are palletised and moved onto the dispatch area. This also enables

The Claudius Peters PACPAL Palletizer range with one basic control system and a range of different subassemblies simplifies spare part stock control and staff training, resulting in significant cost benefits



operators to recognise bags that have lost weight due to damage.

In addition, the weigher allows capacity optimisation. Single weights are allocated to a filling spout. These data are transferred wirelessly to the evaluation software of the packer, which calculates the systematic deviation of each filling spout by means of an average determination. This deviation will be compensated during the next filling. This process takes place continuously.

Palletising set-up

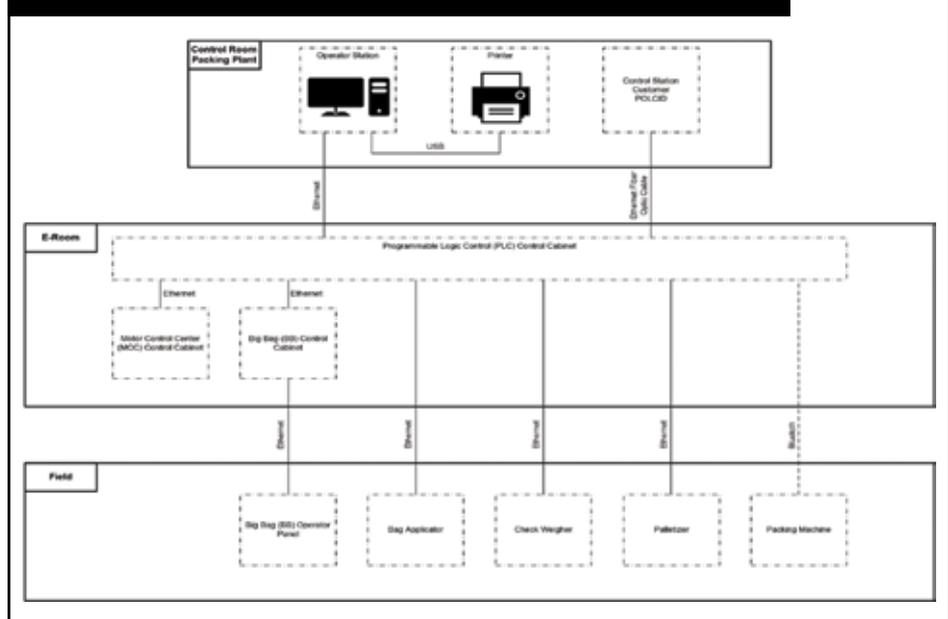
To pack the bags into pallets, the facility uses a Claudius Peters PACPAL Palletizer 5000. The latest addition to the Claudius Peters product range, the palletiser is part of a series of equipment developed especially to address the heavy-duty needs of the building materials industry.

This high-capacity palletiser is equipped with a double inlet. Once fed, the bags are divided into two lines. In each line a row is formed. The bags move longitudinally or are turned 90° onto a collecting belt. Inside the palletiser these rows of bags are combined into one layer. This layer is placed on a lifting platform with roller track. This process is repeated for each layer, forming a compact package.



The filling of big bags

Decentralised control for the packing plant is based on an Allen Bradley PLC system



The first layers are placed on the slip sheet, which has been automatically supplied.

The completed packages are then distributed to two collection areas from where they are picked up by forklifts equipped with special gripping devices. They are then transported to the warehouse for storage or loaded directly onto trucks for transport. During this loading process, the packages are moved off the slip sheet, enabling the sheet to be re-used several times.

The Claudius Peters palletiser concept addresses the demand of cement plant operators for one-source packing and palletising plants with a new PACPAL Palletizer approach.

The new concept enables the multiple use of subassemblies for machines with different capacities while maintaining the same basic control system for all palletisers. This results in simplified stock control for spare parts, and facilitates the training of service and operating staff, resulting in significant cost benefits for cement companies.

Big bag filling system

The filling of big bags is carried out in a compact system with a simple and sturdy design. The small pre-bin is filled with material from the silo via an aeroslide. A Claudius Peters flow control gate is used as a dosing device.

This ensures that in cases where power or compressed air supply fail, the filling process is halted. The cassette exchange system of the flow control gate is highly wear resistant and very well sealed.

Control

The entire plant benefits from decentralised control, based on an Allen Bradley PLC system. The single controls are connected together by Ethernet.

Control extends to the following equipment:

- bagging plant
- rotary packer
- bag applicator
- palletiser
- big bag system.

The control of the bagging plant works as a central unit which is connected with all other groups. This control system is connected with the PLCID of the cement plant by a fibre optic cable.

Onto the next project

ECEBOL's cement packing line at its Oruro works combines advanced plant and equipment technology to meet the needs set by the facility's location and altitude. In addition, the compact and space-saving lay-out enables the construction of a high-capacity packing plant on a small footprint.

Following good teamwork between Sacyr and Imasa, Claudius Peters was awarded a subsequent order for ECEBOL's next project, in Potosí. Delivery of this packing equipment is scheduled for the end of 2018. ■