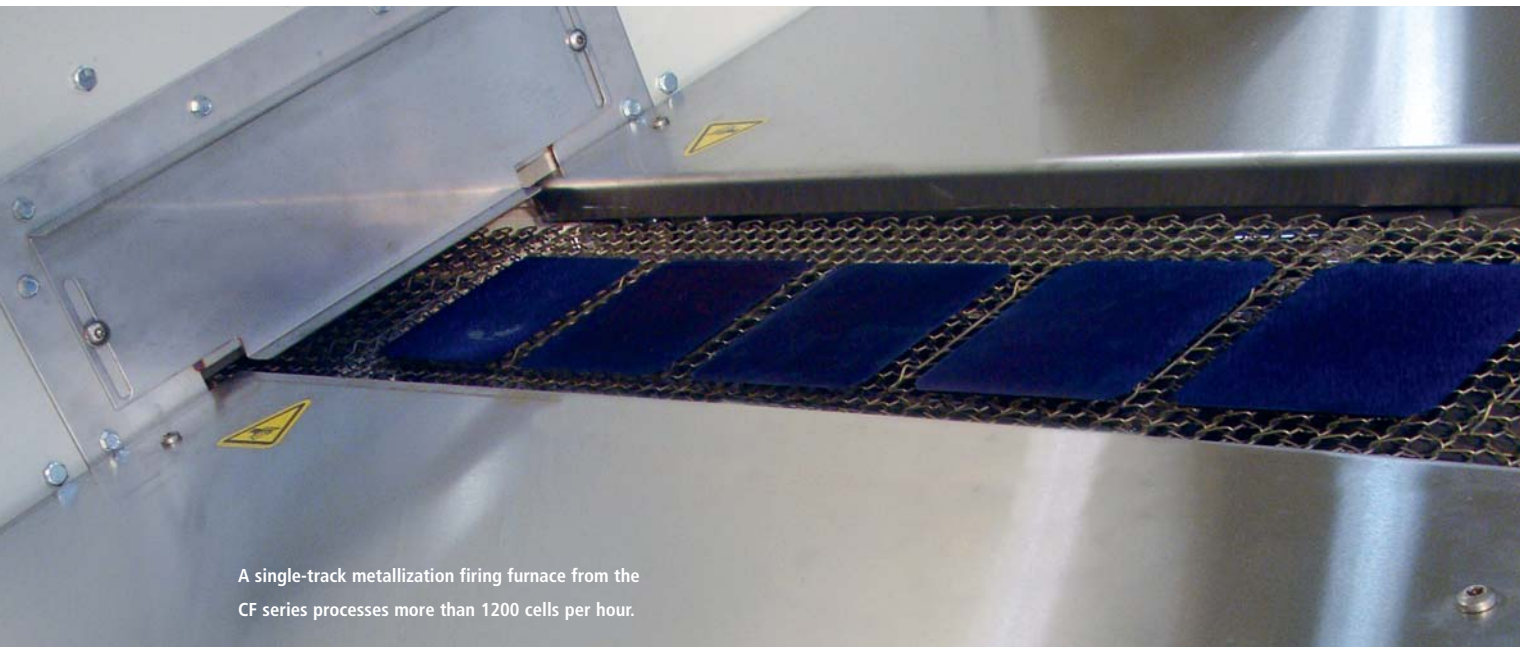


Maximum efficiency and lowered production costs for solar modules

Despatch advances photovoltaic production with innovative control technology

The photovoltaic industry is currently under high cost and market pressures so machine manufacturers are also feeling the effects. Despatch Industries, a globally established supplier of thermal and processing equipment for photovoltaic production, has changed the control of its CF-series metallization firing furnaces to a PC-based control platform from Beckhoff and can now promote increased uptime, greater user-friendliness and maximum efficiency of solar cells.



A single-track metallization firing furnace from the CF series processes more than 1200 cells per hour.

The manufacture of solar cells is a highly complex procedure encompassing many different process steps. A central component of the production is the furnace. The volatile components used in the production of the solar cells are dried here following the metallization. In the next work step, the metallic contacts are burned onto the emitters or connected to them in order to close the electric circuits and to improve their adhesion at the same time. After firing, the cells pass through the cooling area to be sorted and tested.

The American company Despatch Industries, based in Lakeville, Minnesota, has developed a high-performance heat treatment machine for the metallization process of photovoltaic cells. The metallization furnaces from the CF series process 1200 cells per hour in single-track mode or 2400 cells in two-track mode.

Beckhoff Panel PC helps increase the reliability and speed of machinery

"We aim to meet the requirements of our customers perfectly," explains Amber Schramm, Public Relations Specialist for Despatch. "We give our machines added value through the use of state-of-the-art technologies."

Since 2008 Despatch has been using the Beckhoff CP6202 Economy Built-in Panel PC with 1.1 GHz Intel® Atom™ processor and 3½" Beckhoff motherboard as the integrated control and visualization platform, on which the software developed by Despatch runs to manage the heater and conveyor belt controllers, I/O, data logging, alarm messages and interfaces to the MES systems. The user interface is a 15-inch touchscreen monitor in a Despatch-specific version manufactured by Beckhoff.

"We have really increased the value of our CF-Series machines with the Beckhoff Panel PCs: Apart from the increased reliability, the controller – compared with the previous one – has become much faster and more powerful," says Ron Seger, Lead Engineer at Despatch. "In addition to that we save a great deal of space in the control cabinet due to the compact size of the built-in Panel PC."

"Another advantage," explains Brian Hajder, Electrical Engineer at Despatch, "is that the CP6202 can be shipped without additional packaging due to its secure installation in the control cabinet. We had to pack our old IPC controller separately when delivering the machine, which often led to installation errors and lengthened the commissioning time of the machine."



The CP6202 Built-in Panel PC functions as an integrated machine controller and user interface and takes up considerably less space in the control cabinet due to its compact dimensions of 38 x 31 x 5.9 cm (W x H x D).

HD Bus Terminals reduce space requirements in the control cabinet

One of Despatch's decisive requirements was that the I/O components should have compact designs. "In addition to that, the I/O nodes were to be moved closer to the infrared heating lamps, which are distributed over a length of 40 to 60-ft (12.20 to 18.30 m, depending on the machine format), in order to avoid parallel wiring to the control cabinet," explains Ron Seger. "That was no problem to accomplish with the modular Beckhoff Bus Terminals." System communication takes place via the Modbus TCP communication protocol using the Beckhoff BK9100 Ethernet TCP/IP Bus Coupler. "The I/O Bus Terminals are fieldbus-neutral, which means that we have the necessary flexibility to react to future changes on the customer side," explains Brian Hajder. "Despatch uses the compact HD Bus Terminals from Beckhoff with 16 digital I/Os in a 12 mm terminal housing. This leads to a further reduction in the space requirements inside the control cabinet," explains Ron Seger. "In addition, we use the KL3403 three-phase power measurement terminal. This terminal measures the effective power and the energy consumption of each phase and represents the basis for mains network analyses and energy management."

Optimized use of energy and low wiring expenditure

By equipping the CF series with the Beckhoff control platform, it was possible to compensate the intermittent product flow of the cells that occurs in practice and to significantly improve the thermal stability of the solar cells. The soft-start reduces the connected load to less than 100 A (single-track) and results

in lower peak electricity consumption as well as lower installation costs. In addition, it is now also possible for Despatch to use direct current instead of alternating current without using a step-down transformer.

Despatch achieves considerable savings through the use of standard Ethernet and PC-based components. "The wiring of the decentralized I/Os via standard Ethernet cables offers considerable reductions in time and costs," says Ron Seger, and Brian Hajder adds: "The compact design of the Beckhoff Bus Terminals and the CP6202 Panel PC offers space savings of between 50 and 75 % compared with our previous I/O and IPC control solution, depending on the application."

"The variety of signals handled by the Beckhoff Bus Terminals was also of great value to our development department," says Ron Seger. "That makes it easier for us to adapt our machine inexpensively to the constantly changing customer requirements and to changing system designs. There are now over 1,000 machines from the CF series in operation, and the sales figures for 2011 are continuing this rapid growth."

Despatch Industries www.despatch.com

Beckhoff USA

www.beckhoffautomation.com



The American company Despatch Industries is one of the leading suppliers of heat treatment machines for cell production in the photovoltaic industry. The machines have been significantly optimized with regard to reliability, productivity and user-friendliness through the use of the Beckhoff Panel PC and Bus Terminal I/Os in the metallization firing furnaces for solar cells.