

Powering growth:
Industrial-scale manufacturing of anodes, cathodes and GDEs

Case study: Battery manufacturers for mega storage plants

Challenge

Intensifying demand for battery storage, requiring:

- **Industrial-scale production**
  Continuously processed electrodes that can be singulated either before or after pressing.
- **Solution with flexible parameters**
  To accommodate rapid product design changes.
- **Holistic, collaborative approach**
  Equipment designed for process and product.

Solution

After extensive testing to pinpoint the challenging heat and pressure conditions required, IPCO can design, build and ship a double-steel-belt press in under a year

Results

- **High yield production**
  10x throughput compared to some static presses.
- **Time and cost savings**
  Less labor-intensive and less wastage than single-electrode manufacturing.
- **Consistent quality**
  Highly controllable temperature, pressure and gap profiles with continuous pressing.
- **Designed to maximize uptime**
  Thanks to IPCO's extensive materials and process expertise.
- **Smooth running operations**
  Rapid onsite expertise from IPCO's local service technicians.

Skyrocketing interest in battery storage



With the growing demand for large energy storage solutions for wind and solar farms, companies need to turbocharge their production capacity.

Today, electrodes are often produced on a static press, which is not a feasible way to manufacture at scale.

There can be challenging temperature, pressure and dwell time conditions too. Electrodes need e.g. to be consolidated, compressed, laminated and densified around a current collector over time, sometimes under extremely high temperatures and pressures. While a typical calendering system can deliver such temperature and pressure profiles, the pressure is only applied momentarily by a line load.

An innovative solution is required that can maintain the pressures, at high temperatures, and enable industrial-scale production.

Companies investing in manufacturing capability also need to future-proof their investments as far as possible. Flexibility is a must-have to accommodate the pace of battery innovation. Each line needs to be able to operate at a wide range of temperatures and pressures. And to capitalize on the surge in demand for energy storage, they usually want it fast.

"The engineers at IPCO's productivity centers collaborate with customers to identify and optimize processes and parameters to suit different materials and specifications. Together we verify the best processes to scale production to a consistently high quality."

Petrik Ziebeil, IPCO Chief Technology Officer

Innovative solution: Double-belt press

IPCO takes a holistic, collaborative approach to ensuring each customer gets the results they are looking for. Every piece of equipment is uniquely designed for the process and product.

In many cases, a double-steel-belt press, with multiple lanes, is the perfect solution, since it enables continuous processing of electrodes at scale. The press holds the electrodes between two steel belts, applying controllable profiles of temperature, pressure and dwell time to consolidate, compress, laminate and densify the battery materials.

To meet the challenging and flexible conditions, IPCO's materials and process engineers work closely with the customer to test and refine different heat, pressure and dwell time parameters. One press recently specified has the capability of controllably operating at 200 to 400°C and 5 to 20 bar, with an extended dwell time.

When speed is of the essence, IPCO can fast-track production of the equipment from its site in Germany, sometimes in less than 12 months.

Once the equipment arrives, IPCO's service technicians work at the customer site to install and commission it. When the press is up and running, the same service technicians can be there with short notice, whenever training, minor repairs, servicing and maintenance are required, maximizing production uptime.



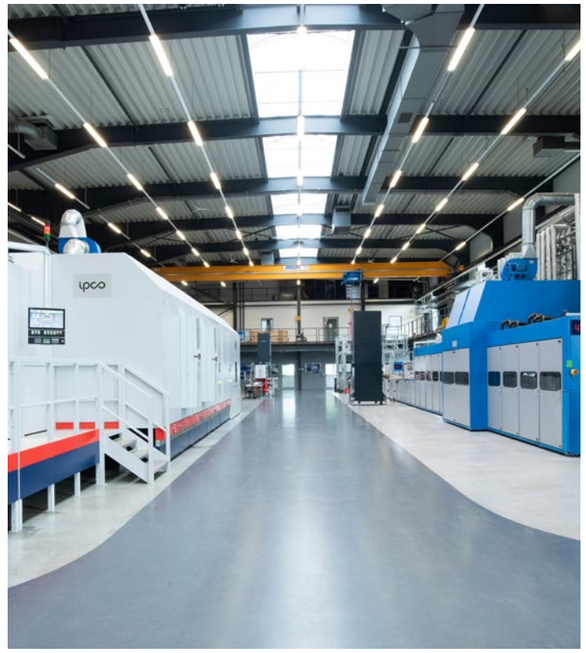
IPCO's ThermoPress double-belt press systems feature:

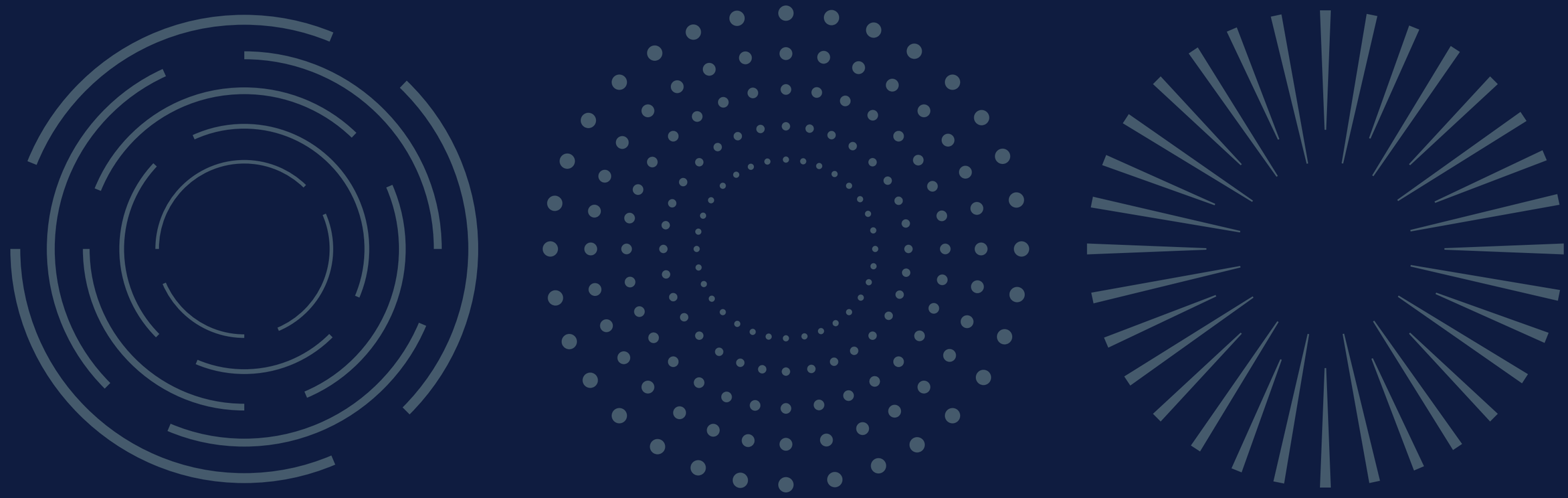
- Production at scale: continuous pressing, across multiple lanes
- Controllable parameters: to optimize processing of higher density batteries

Impact: Battery production at scale

The double-belt press can make a dramatic difference:

- **Large throughput**
  Thanks to multiple lanes of continuous processing, a new line can enable the manufacturing of electrodes at scale.
- **Consistent quality**
  With several controllable temperature, pressure and gap zones, the electrodes coming off the line will be of a consistently high quality.
- **Maximized uptime**
  IPCO uses its experience of building machines that operate at high temperatures to introduce robust solutions to maximize equipment and component life.
- **Flexible parameters**
  A battery company can alter the materials in the electrode as they innovate and improve battery performance by changing temperature, pressure, gap and dwell time conditions.





IPCO has a long history of delivering advanced technological solutions for various industrial processes. With over 125 years of experience in steel belt and manufacturing equipment, we continuously push the boundaries of innovation.

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info@ipco.com

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