

# Complete lines for compact and foamed PVC sheets

Application: Sheets

Sustainable  
Solutions  
Worldwide.

battenfeld-cincinnati 

## **Process engineering for efficient plastics extrusion of tomorrow – From the raw material to the finished product**

Based on our modular line concept, we are able to implement cost-optimized and customer-specific solutions. This goes beyond the product specification to the processing of the materials, the infrastructure specified in the general conditions up to the appearance of the plant and the control interface. Our company takes all of these conditions into account when designing your extrusion line. We combine our own products with components from long term partners in order to supply our customers the ideal solution from a single source.

### **battenfeld-cincinnati extrusion lines – One-stop solutions**

- |  |   |   |  |
|--|---|---|--|
| <b>1</b>   | <b>2</b>  | <b>3</b>  | <b>4</b>   |
| <ul style="list-style-type: none"><li>• Customer expectation</li><li>• Plant specification</li><li>• Specifications</li><li>• Resource check</li></ul> | <ul style="list-style-type: none"><li>• Technical clarification</li><li>• Specification sheet</li><li>• Production of machines</li><li>• Selection of suppliers</li><li>• Supplier coordination</li></ul> | <ul style="list-style-type: none"><li>• Manufacturing</li><li>• In-house testing</li><li>• Pre-commissioning</li><li>• FAT on request</li></ul> | <ul style="list-style-type: none"><li>• Line commissioning</li><li>• Line handover</li><li>• Process consulting</li><li>• Staff training</li><li>• After Sales Service</li></ul> |

### **Conservation of resources while maintaining profitability – Sustainability all along the line**

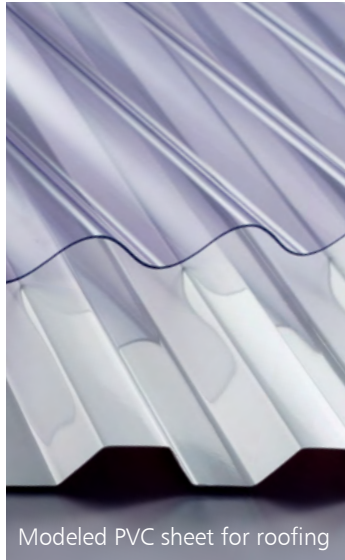
Our solutions offer a resource-saving and economical production of your products and our worldwide service network ensures the constant process availability. We focus on highest product quality with high output rates, functionality, machine availability as well as energy saving.



Colorful PVC sheets



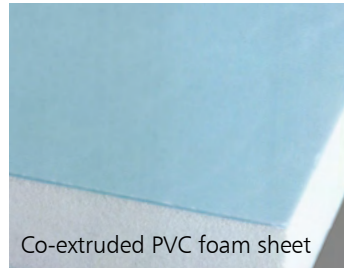
Embossed PVC free foam sheets



Modeled PVC sheet for roofing



PVC free foam sheets



Co-extruded PVC foam sheet



Integral PVC foam sheet

### Application – PVC sheet end products

A basic distinction is made between compact sheets and foamed sheets, and here again, between free foam and integral foam (Celuka), and co-extruded multi-layer sheets. PVC free foam sheets have a fine, even foam structure and a matt-finished, finely structured, closed-cell surface. Integral sheets have a firm, smooth surface with a finely structured core. Co-extruded multi-layer sheets offer many options for additional or new product attributes geared to a specific field of application, for example in terms of color schemes and surface design.

PVC sheets are used in many industries, but the main applications are found in the building construction industries, furniture as well as in marketing and communications. Compact PVC sheets are, for instance, transparent or corrugated sheets for carport covers and awnings.

**Building construction industries:** compact, transparent or corrugated sheets for carport covers and awnings; foam sheets used as insulation sheets and decor panels (trim boards).

**Marketing and communications:** used for signs, banners, signboards, trade fairs and displays.

**Furniture:** applied as shelves and paneling and in store construction.

### Free foam process

In the production of free foam sheets, after melt processing in a parallel twin-screw extruder, the melt is guided through a single manifold die. The cell structure is formed over the entire cross-section of the sheet. The cooling of the melt stops the foaming process at the surface. The extruded sheet then passes through a pre-calibration unit and a vertical, 3-roll polishing stack before being further processed by roller conveyor, haul-off and horizontal cross-cut saw.

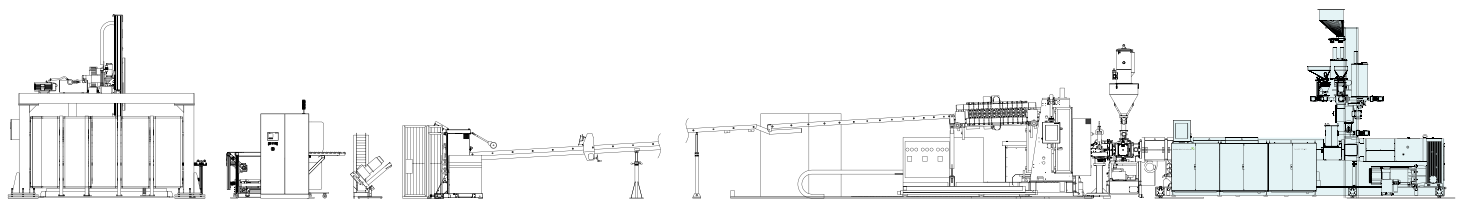
The extruder-tool-combination is coordinated in such a way that, in combination with special mixing elements at the end of the screw, the optimum L/D ratio for perfect melt homogeneity is achieved.

Using a PVC feed block, coextruded sheets show a smooth, compact outer layer and a fine foam structure in the core. These sandwich panels have a surface hardness similar to that of integral panels.

## Complete lines for PVC sheet extrusion – for compact and foamed PVC sheets

Regardless of which product has to be manufactured, battenfeld-cincinnati offers you the appropriate line. twinEX and conEX NG extruders are used in lines for the production of PVC sheets as parallel or conical twin screw extruders.

Schematic overview of a  
PVC sheet extrusion line



bc Extruder

### Extruder Series

The twinEX series, the conEX NG COEX as well as the conEX Transparent for transparent PVC sheets, they all have a very small and compact footprint and are best preferred for the PVC sheet applications.



twinEX 93-28



conEX NG 65

twinEX	Output	93	114	135	173
U-PVC	kg/h	200 - 500	300 - 700	450 - 1,100	850 - 2,000
U-PVC	lbs/h	440 - 1,100	660 - 1,540	990 - 2,420	1,760 - 3,960

The given output numbers depend on formulation, sheet thickness, density and processing condition.

conEX NG coex	Output	54	65	conEX Transparent	Output	80	92
U-PVC	kg/h	55 - 175	90 - 250	U-PVC	kg/h	140 - 350	200 - 500
U-PVC	lbs/h	120 - 385	200 - 550	U-PVC	lbs/h	310 - 770	440 - 1,100

# Complete lines for PVC sheet extrusion – for compact or free-foamed PVC sheets

The lines are very well suited for foamed boards with thicknesses up to 38 mm and output rates up to 2000 kg/h. The intensive cooling section (6) enables rapid cooling of the foam surface and from the centre of the foam board. This allows the production of high-quality foams with reduced thickness tolerances.

## 1 Main extruder twinEX

- High output rates
- Proven 28 L/D process units
- Use of optimized screw geometries

## 2 Material dosage

- Gravity dosing systems for dry blend and recyclat
- Integration of dynamic mixer for maximum material distribution

## 3 Line control BCtouch UX

- State of the art control system

## 4 Calander

- Vertical 3-roll calander with 500 mm rolls for ideal cooling
- Roller heat distribution  $\pm 0.5^{\circ}\text{C}$
- Flexible adjustment of the individual precooling rolls for a controlled foaming process
- Embossing rollers with customer-specific embossing roller/pattern (optional)

## 5 Inline Laser-thickness gauge

- Arrangement immediately after the calander
- Material consumption reduction during start-up due to rapid optimization of panel thickness

## 6 Cooling section

- Intensive cooling unit with up to 12 cooled roller pairs
- Faster cooling of the foam structure with thick sheets
- Minimization of material discoloration in the plate core
- Additional smoothing of the plate surface due to the line contact of the cooled rolls
- Shortening of the cooling section length

## 7 length cutting unit

- Saw unit for edge trimming  
Optional: with centre trimming
- Dust-free edge and length cut through multi-blade cross beam
- Exact multi-cut guidance
- Use of heated knives

## 8 Haul Off

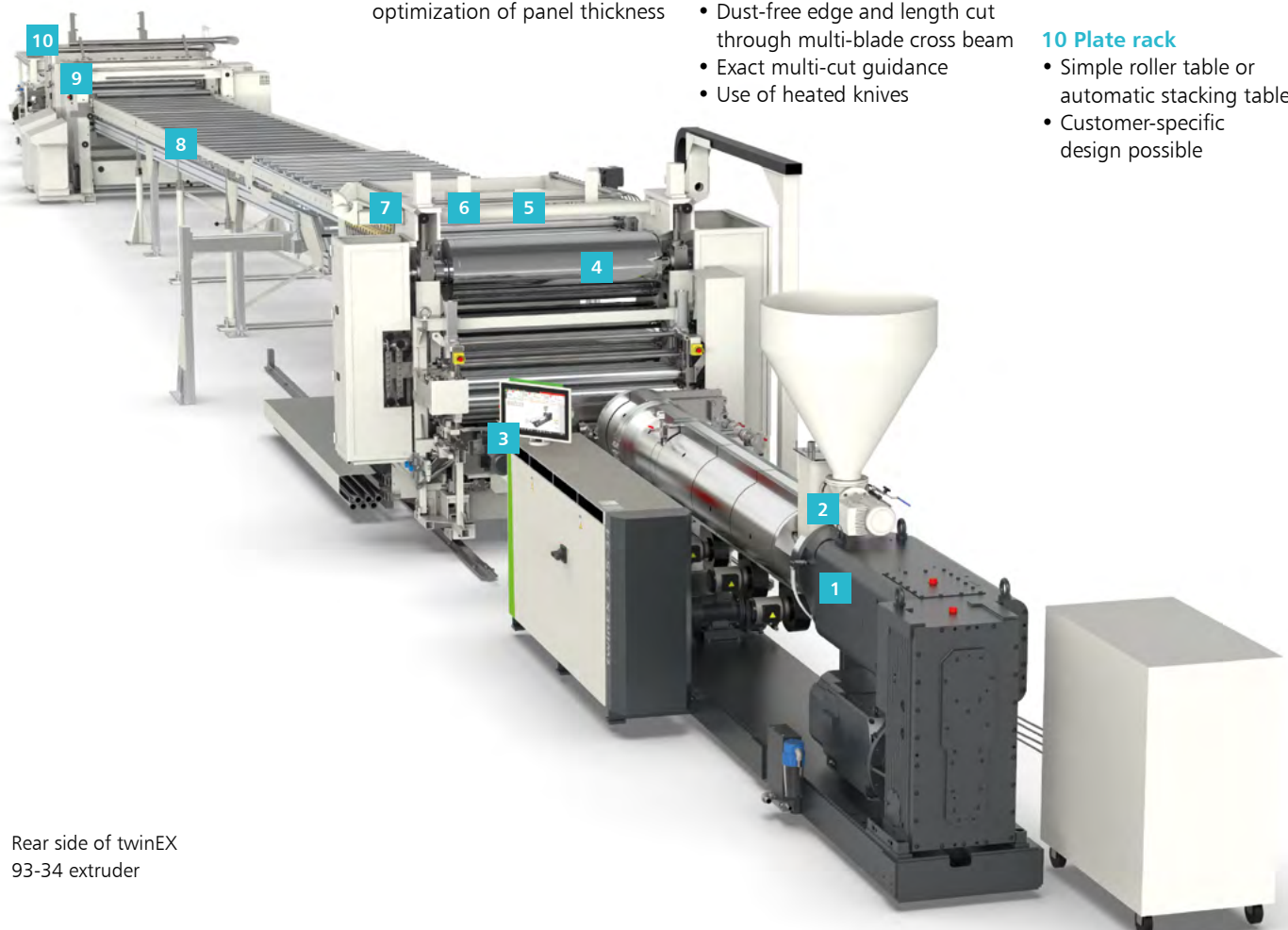
- Pair of rubber rollers synchronized with the calander rollers
- Double take-off with customer-specific embossing roller/pattern (optional)
- Infrared radiant heaters for surface heating

## 9 QTS crosscut saw

- Exact saw blade cut for all panel thicknesses 1-40 mm
- Optional: Guillotine for thin plates up to 12 mm
- Combination of saw and guillotine possible

## 10 Plate rack

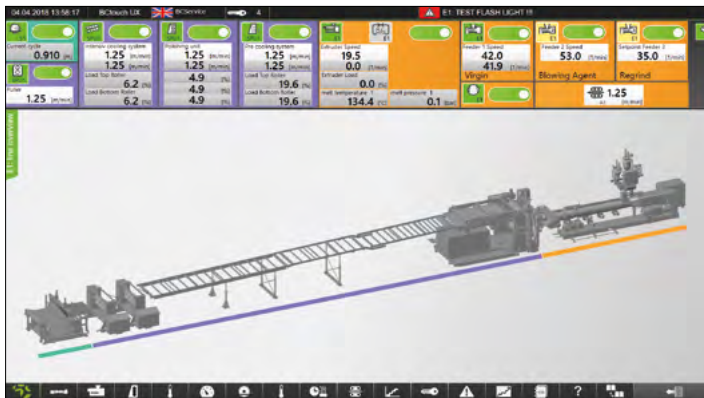
- Simple roller table or automatic stacking table
- Customer-specific design possible



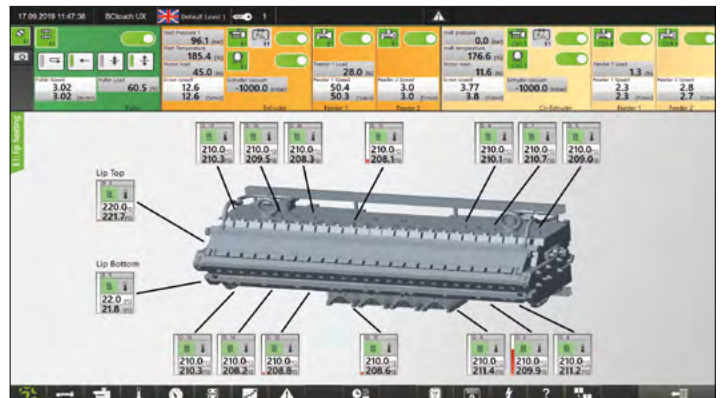
Rear side of twinEX  
93-34 extruder

## BCtouch UX Line-Control – State of the art “Industry 4.0 ready” control system

The battenfeld-cincinnati BCTouch UX provides an intelligent process control and monitoring system for the complete extrusion line. The intuitive HMI (Human Machine Interface) system can be used instantly without a time-consuming learning phase. It offers all interfaces for an industry 4.0 oriented production and much more.



Master view line



Detail view extrusion tool

### Human Machine Interface (HMI) System

- Dual Core Industrial PC
- Windows 10 IoT Enterprise Operating System
- 21.5" landscape multi-touch display
- Overview display correlates to real line layout
- Master-Detail view, more infor. by finger-touch
- User configurations and customizable screens
- Login with RFID (Radio-Frequency Identification) key, most existing customer RFID keys usable
- Multiple operator terminals for line operation at several positions e.g. at the saw
- Wi-Fi tablet as additionally terminal („view-only“, due to safety regulations)

### Programmable Logic Controller (PLC)

- B&R X20 PLC / IO System
- Real-time data bus CAN / Powerlink

### User Benefits and Advantages

- Fast, intuitive machine handling (no user manual needed, but available)
- Context-sensitive help system
- Reduced training times for operating personnel
- Fit for Industry 4.0
  - Flexible OPC DA Server for data connectivity to MES systems
  - Preventive / predictive maintenance to prevent unscheduled downtime
  - Condition Monitoring
    - (Vibration gearbox / Oil condition)
    - Monitoring of switching cycles
    - Operating hour counter
  - Integration of web-controllable devices
    - battenfeld-cincinnati downstream devices
    - Visualization of gravimetric dosing units
    - Inline thickness measuring system
  - Integration of social media services (e.g. messenger)

## battenfeld-cincinnati Services – Worldwide active for you

We have an extensive service network at our disposal to support our customers professionally and promptly with technical know-how and spare parts. Our locally available service technicians are regularly trained on the current state of the art and informed about new developments.

### **Wear Analysis**

- Regular wear measurement
- Wear protection consulting

### **Spare Parts**

- Tailor-made spare parts packages
- Innovative screw design

### **Extruserve**

- Completely overhauled extruders
- Screws repair for many external extruders
- Screws & barrels for other brands

### **Repairs & Upgrades**

- Control retrofits
- New drives for extruders & successions
- Repairs of screws, gears, controls & drives

### **Technical Service**

- Commissioning, maintenance, inspection
- Repair-in-the-field-Hotline
- Remote diagnosis system

### **Support & Training**

- Consulting & training
- Inspection & service contracts
- Energy-saving advice
- Forecasting required key parts
- Material analyses & pilot plant



## battenfeld-cincinnati Group

### **BC Extrusion Holding GmbH**

Grüner Weg 9  
32547 Bad Oeynhausen

### **battenfeld-cincinnati Germany GmbH**

Grüner Weg 9  
32547 Bad Oeynhausen  
P +49 (5731) 242-0  
F +49 (5731) 27124  
germany@battenfeld-cincinnati.com  
www.battenfeld-cincinnati.com

### **battenfeld-cincinnati USA**

823 S. By-Pass, P.O. Box 832  
McPherson, KS 67460, USA  
P +1 (620) 241-6843  
F +1 (620) 241-0207  
usa@battenfeld-cincinnati.com  
www.battenfeld-cincinnati.com/usa

### **battenfeld-cincinnati Austria GmbH**

Laxenburger Str. 246  
1230 Wien  
P +43 (1) 61006-0  
F +43 (1) 61006-8  
austria@battenfeld-cincinnati.com  
www.battenfeld-cincinnati.com

### **battenfeld-cincinnati (Foshan) Extrusion Systems Ltd.**

2 Jinxiang Road, Daliang, Shunde  
Foshan, Guangdong  
P +86 (757) 2238 0110  
F +86 (757) 2221 1801 / 2238 0195  
china@battenfeld-cincinnati.com  
www.battenfeld-cincinnati.com/china