Complete system solutions
Cost-effective extrusion of PVC sheets and films

Engineering Value

KraussMaffei
Berstorff
# Facts and figures regarding film and sheet production

## Applications

<table>
<thead>
<tr>
<th></th>
<th>Partitions</th>
<th>Advertising boards</th>
<th>Furniture</th>
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</thead>
<tbody>
<tr>
<td></td>
<td><img src="image1.png" alt="Partitions" /></td>
<td><img src="image2.png" alt="Advertising boards" /></td>
<td><img src="image3.png" alt="Furniture" /></td>
</tr>
<tr>
<td></td>
<td>House building</td>
<td>Covers</td>
<td>Thermoformed products</td>
</tr>
<tr>
<td></td>
<td><img src="image4.png" alt="House building" /></td>
<td><img src="image5.png" alt="Covers" /></td>
<td><img src="image6.png" alt="Thermoformed products" /></td>
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</tbody>
</table>

## Technical data relating to KraussMaffei Berstorff sheet extruders

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Output range [kg/h]</td>
<td>210 - 520</td>
<td>300 - 700</td>
<td>450 - 1,100</td>
<td>600 - 1,400</td>
<td>800 - 2,000</td>
<td>80 - 220</td>
<td>80 - 240</td>
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<tr>
<td>Motor power output [kW]</td>
<td>64</td>
<td>100</td>
<td>155</td>
<td>230</td>
<td>320</td>
<td>38,4</td>
<td>32</td>
</tr>
<tr>
<td>Screw torque, max. [Nm]</td>
<td>18,000</td>
<td>35,700</td>
<td>56,000</td>
<td>90,000</td>
<td>140,000</td>
<td>12,000</td>
<td>9,400</td>
</tr>
<tr>
<td>Screw speed [min⁻¹]</td>
<td>32</td>
<td>25</td>
<td>25</td>
<td>23</td>
<td>32</td>
<td>28</td>
<td>17</td>
</tr>
<tr>
<td>Screw length [L/D]</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>17</td>
<td>26</td>
</tr>
<tr>
<td>Screw diameter [mm]</td>
<td>90</td>
<td>114</td>
<td>133</td>
<td>164</td>
<td>184</td>
<td>63 - 120</td>
<td>75</td>
</tr>
<tr>
<td>Screw heating/cooling</td>
<td>external*</td>
<td>external*</td>
<td>external*</td>
<td>external*</td>
<td>internal</td>
<td>internal</td>
<td>internal</td>
</tr>
<tr>
<td>Extrusion height [mm]</td>
<td>1,150</td>
<td>1,150</td>
<td>1,150</td>
<td>1,150</td>
<td>1,150</td>
<td>1,000</td>
<td>1,150</td>
</tr>
</tbody>
</table>

* Internal possible as an optional extra

## Dimensions [mm]

<table>
<thead>
<tr>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Length incl. adapter</td>
<td>5,075</td>
<td>6,250</td>
<td>7,425</td>
<td>9,625</td>
<td>10,350</td>
<td>3,100</td>
<td>3,800</td>
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<tr>
<td>Width incl. control cabinet</td>
<td>1,400</td>
<td>1,650</td>
<td>1,850</td>
<td>1,540</td>
<td>3,270</td>
<td>1,330</td>
<td>1,280</td>
</tr>
<tr>
<td>Height incl. hopper</td>
<td>2,600</td>
<td>2,650</td>
<td>2,650</td>
<td>2,600</td>
<td>3,450</td>
<td>2,210</td>
<td>2,400</td>
</tr>
</tbody>
</table>

Coextruders

* Internal possible as an optional extra
Complete system solutions for cost-effective extrusion of PVC sheets

PVC sheets - compact, foamed or coextruded - are a modern alternative to wood, fiberboards and other compact materials. They can be reprocessed in different ways, can be refined and are used in many areas of the construction and advertising industries.

KraussMaffei Berstorff, in its capacity as a competent system provider, has been supplying for years proven integrated overall system concepts for a large number of film and sheet products made of PVC.

The perfected process and application know-how of our application engineers and all engineering work from a single source reduce your costs at the start of production and during further production steps.

You profit from:
- Low production costs
- Short amortization periods
- High quality of your finished products
Everything at a glance
A tour of the complete PVC sheet machine

- Cooling roller conveyor
  To cool down the sheet

- Four-roll haul-off

- Embossing roller

- Stacking system
  Stacking is possible in-line or on the right/left or both sides

- Edge-trim chopper

- Longitudinal parting saw

- Unwinding unit for Protective film, top and bottom

- Crosscut saw/guillotine combination
  • Setting option for right-angled cutting
  • Repeatability of the lengths +/- 0.2 mm
Twin-screw extruders in the 32D series

Gravimetrics
For volumetric/gravimetric material metering

Coex adapter
To join material from the main extruder and coextruder when producing coextruded sheets

Polishing stack
- Rollers
- Chrome-plated
- Driven individually
- Clearance - free gap adjustment also under full load
- Gap monitoring using a position measuring system

Flat sheet die
For compact, transparent, free-foamed and coextruded PVC sheets with a special melt channel design for a wide thickness range and with a special lip system.
- Oil temperature-controlled die lips

Accessible platform

Laminating station
To unwind a laminating film

Embossing unit
- Rollers
- Chrome-plated
- Driven individually
- Clearance - free gap adjustment also under full load
- Gap monitoring using a position measuring system

Pre-cooling
For use when producing foam sheets

Temperature control unit

Longitudinal cutting knives
Movable

Cooling roller conveyor
To cool down the sheet

Polishing stack

Twin-screw extruders in the 32D series

Laminating station

Embossing unit

Longitudinal cutting knives
Movable

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Longitudinal cutting knives
Movable
Standards in PVC sheet production
32D twin-screw technology
The best machine solution for every production requirement

3D technology has long proved itself in profile extrusion and is also becoming established in PVC sheet production. Whereas the KMD 164-32/PL guarantees a high output rate with foam sheets, the KMD 114-32/PL and KMD 133-32/PL models are proven for the production of thermoforming, premium quality compact sheets and foam sheets. These two machine types are therefore ideally suited for the most common product applications.

Extensive experience over and beyond extrusion technology

In order to be able to produce premium quality foam sheets, it is first necessary to have enormous experience of extrusion technology. Secondly, in-depth know-how is required: The dies and downstream units also influence the extrusion process critically. Our many years of experience and continuous optimization of the flat sheet dies allow the use of perfected molds for our customers. The result: Different sheet types can only be produced by replacing a die lip on a sheet die.

Coextrusion technology for new products and new markets

Coextrusion technology is opening up many opportunities to develop new product characteristics and tap new markets, for example through exact, reproducible coloring, high mechanical properties by means of a sandwich structure, varied surface design and cost-saving use of materials. The KMD 63 K/PL, KMD 75-26/PL and KMD 90-32/PL models are available as coextruders in sheet production.

Integral foam extrusion with a concept for sheets up to 2 meters wide

With our concept for integral foam extrusion (Celuca), your production benefits from a number of excellent advantages: High output rates, supply of the complete machine from a single source, all engineering work is performed by a team of experienced experts, and state-of-the-art simulation of the cooling process for optimum design of the product cooling zone.

Whether compact, coextruded or integral foam sheets, KraussMaffei Berstorff offers you technologically proven, highly cost-effective and, above all, complete system solutions.
Optimized screw geometry and precise temperature control ensure outstanding melt homogeneity

Benefit from the enormous advantages of our sheet extrusion systems to ensure your competitive edge in business.

Process engineering concept of the 32D sheet extruder
One thing is required, in particular, to produce premium quality PVC sheets: Excellent melt homogeneity. With the 32D twin-screw sheet series extruder, this is achieved and permanently maintained by means of two measures: Firstly through optimized screw geometry and secondly through exact temperature control of the processing unit. The screws are molybdenum-welded as a standard feature, and are chrome-plated and externally temperature-controlled along their entire length. This ensures optimum process control and melt flow control. A constant vacuum is created by an optimized vacuum unit with a double solids separator. The system is easy to clean and has a very user-friendly design.

The barrels of nearly every twin-screw extruder are air-cooled by aluminum half shells, only the barrel of the KMD 164-32/PL is also partly cooled with water. In the 32D sheet extruders the screw flights extend into the adapter in order to prevent material stagnations. In addition to the twist adapter, whose function principle ensures perfect quality of the sheet surface, an open adapter and a spider-channel adapter are also available.

Your advantages:
- Optimum melt homogeneity
- Very wide processing window
- Very high output
- Extremely constant product quality
- Longest possible service life
- Fast amortization of your investments
**C6 control system – flexible system for open-and closed-loop control and monitoring of an extrusion line**

With its new, innovative C6 control system, KraussMaffei Berstorff offers fast, direct access at all times to the individual units of an extrusion line, the extruders which work conjointly to produce the product, and to integrated downstream equipment.

With its numerous monitoring and control functions, the C6 control system ensures optimal production preparation and transparency throughout the production process, thereby satisfying the most stringent requirements for excellent product quality and a high level of process reliability.

**Multi-touch technology for intuitive operation**
The C6 control system is equipped with the latest multi-touch technology and state-of-the-art hardware components. A high-resolution 24-inch full HD screen provides an optimal overview. The intuitive operation and clear screen layout facilitate fast intervention and provide a comprehensive process overview. Units and functions can easily be operated and activated via the touchscreen display. With the C6 control system, KraussMaffei Berstorff has placed a particular emphasis on maintaining continuity in the design in terms of both its operation and its functionality, which have proven successful over a great many years.

**Maximum flexibility**
The C6 control system offers the user an incredibly high level of flexibility. The composition of parameter pages can be chosen freely, and display and parameter texts can be tailored to individual requirements. In addition, the system components can be connected and disconnected as required.

**Fast, secure access management using RFID technology**
The C6 control system allows fast, secure access by means of non-contact identification using RFID readers. Remote diagnostics via the Internet and data interfaces to connect to the company network tip the balance to make the C6 control system the perfect solution for all your extrusion line’s control tasks.

**Your benefits:**
- Modern, innovative operating philosophy
- Fast, intuitive operation
- Highly flexible
- Maximum process reliability
- Optimal monitoring of integrated system concepts and standalone machines
- A variety of user-friendly models

Various operating configurations are available:

- Swivel-mounted on switching cabinet (standard version)
- Mounted on switching cabinet door, tilting (option)
- Boom-mounted version (option)
- Mobile version (option)
First encounter
A tour of the 32D twin-screw sheet series extruder

Vacuum degassing
With a powerful pump and a double solids separator

Drive motor
Designed either with AC or DC technology

Gearbox
Robust and with a high torque
Gravimetric weighing of material

Small volume metering unit
For example for color masterbatch

Metal separator

Venting port

Vacuum pipework
Flexible, largely dimensioned and maintenance-friendly

32D processing unit
With molybdenum-welded screws (externally temperature-controlled) and air-cooled barrel

Twist adapter
Product characteristics for film and sheet production
Diverse products for different applications – produced on 32D twin-screw extruders

Many different products can be manufactured with KraussMaffei Berstorff machines:
- Compact opaque U-PVC sheets: 0.8–30 mm; transparent: 0.8–20 mm
- Foam PVC sheets: 1–25 mm; (32 mm on request) density range 0.55–0.75 g/cm³, depends on sheet thickness
- Light foam PVC sheets: 3–12 mm density 0.45–0.5 g/cm³, depends on sheet thickness
- Coextruded foam core sheets: 2–12 mm (>12 mm on request), either with 1 or 2 compact external layers; 0.2–0.6 mm
- Coextruded deep drawable compact sheets; 1–4 mm
- C-PVC compact sheets 1–13 mm; (>13 mm on request)
- Integral foam sheets 8–20 mm; (>20 mm on request)
- PVC-P films: 30–500 μm with one and several layers

Optimum product characteristics
Compact PVC sheets, foam PVC sheets and coextruded foam sheets are primarily characterized by:
- High surface hardness
- Very high stiffness
- High deep drawing capability
- Corrosion resistance
- Low production costs
- Low water adsorption < 0.5%
- Low heat conductivity
- Vibration dampening
- Can be equipped to prevent static

Integral foam sheets are characterized, in particular by:
- Light weight despite a hard surface
- Smooth surface
- Low thickness tolerance
- Maximum flatness

C-PVC sheets are characterized in particular by:
- Extremely high chemical resistance
- Extremely scratchproof
- High flame resistance
- Very good mechanical properties even at higher temperatures

PVC sheets are used in many industries
- Automotive industry: Manufacture of motor homes, trailers and commercial vehicles
- Architecture and furniture: Balconies, architectural cladding elements, shopfitting, panels, shelves, cupboards, door panels
- Construction industry: Formwork, air-conditioning and ventilation ducts, insulating walls, intermediate walls, sidings, corrugated sheets
- Industrial applications: Apparatus construction, machine housings, containers, cold store cladding, thermoforming parts
- Shipbuilding: Interior fitting out, lightweight furniture
- Electrical engineering: Switching cabinets, cable ducts

Soft PVC sheets and films are used for special purposes
- Medical technology: Blood bags, urine bags, hygiene films
- Offices: carpet mats, desk pads
- Industry: Flexible gates, strip curtains, covers

Sheets made of renewable raw materials (WPC and NFC sheets)
The production of premium quality WPC-NFC sheets requires sound knowledge of the extrusion and smoothing processes and customer-specific system planning. Well-developed application and process knowledge and all engineering operations from a single source make KraussMaffei Berstorff a reliable partner. These products are used in particular in the furniture industry and in facade construction and shipbuilding.
OEE Plus
Boosting cost-efficiency for you

High overall equipment efficiency (OEE) is a fundamental prerequisite for your company’s success. KraussMaffei Berstorff’s product portfolio comprises tailored machines and lines along with perfectly matched services that increase the economic efficiency and the sustainability of your production. Benefit from our proven know-how of extrusion technology in any application.

For more information about OEE Plus, visit: www.kraussmaffeiberstorff.com/oeeplus
KraussMaffei Berstorff
A strong brand in a unique global group

Value-proven Extrusion Technology solutions
Around the world, KraussMaffei Berstorff stands for reliable and value-proven solutions in Extrusion Technology. These range from using individual extruders for degassing in polymerization, compounding, pipe, profile, film and sheet extrusion, physical foaming and the manufacture of technical rubber articles and intermediates for tire production up to complete extrusion lines. All machines and systems from KraussMaffei Berstorff are custom-configured, for example for the chemical, automotive, construction, packaging or pharmaceutical industry.

There for you around the world
KraussMaffei Berstorff is your partner – from the first planning meeting through development of the best possible technical and business solution up through commissioning, servicing and production of your system. We guarantee high-quality advice, solution expertise, reliable spare parts logistics and fast-reacting service during each phase. Our goal is increasing your success.

Individualized service
Benefit from KraussMaffei Berstorff’s reliable service. Our customer service team and experienced fitters, technicians and engineers are there for you as quickly as possible and even help on location to optimize your systems and processes and to minimize downtime as much as possible. Rely on our highly skilled repair and spare parts service.

You can find additional information about KraussMaffei Berstorff at: www.kraussmaffeiberstorff.com

KraussMaffei Group
Comprehensive expertise

Unique selling proposition Technology
The KraussMaffei Group is the only provider in the world to possess the essential machine technologies for plastics and rubber processing with its KraussMaffei, KraussMaffei Berstorff and Netstal brands: Injection Molding Machinery, Automation, Reaction Process Machinery and Extrusion Technology.

The group is represented internationally with more than 30 subsidiaries and over ten production plants as well as about 570 commercial and service partners. This is what makes us your highly skilled and integrated partner. Use our comprehensive and unique expertise in the industry.

You can find additional information at: www.kraussmaffeigroup.com

The KraussMaffei Group has a global presence. Countries with subsidiaries are marked in light blue. In the white-colored regions, the Group is represented by over 570 sales and service partners.
Cost-effective extrusion of PVC sheets and films
The 32D twin-screw extruder series

Thanks to the long processing unit (32D), the extruder features optimum melt homogeneity, a very wide processing window and extremely high output rates.

External screw temperature control helps to improve melt homogeneity, thus ensuring constantly high quality of the machines.

The increase in screw torque coupled with enlargement of the pre-heating length leads to higher specific throughput. As a result, higher output rates can be attained with lower screw speeds.

The 32D sheet technology is synonymous with highly efficient sheet production: Investments in this technology pay off quickly.

www.kraussmaffeiberstorff.com