

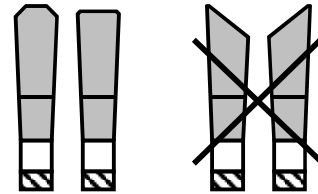
Recommendations for sawing SMART-X®

Machine

- Use a normal horizontal or vertical panel saw.
- Set the pneumatic clamping devices to minimum air pressure to prevent damaging the sheets.

Saw blades

- Most important: The circular saw blade must be very keen (very sharp).
- Using worn or blunt saw blades will result in poor quality of the cut (crumbling at the edges and excessive burring).
- The circular saw blade must have carbide tipped teeth (marked HM - hard metal).
- Saw blades marked HSS (high speed steel) are not recommended because they quickly become too blunt to cut SMART-X.
- The circular saw blade should have an alternate flat tooth and trapeze tooth design and ideally have a hollow (concave) face grind.
- Alternate top bevel teeth are not recommended because they cause chipping on the lower surface.
- The best possible saw blade for cutting SMART-X.



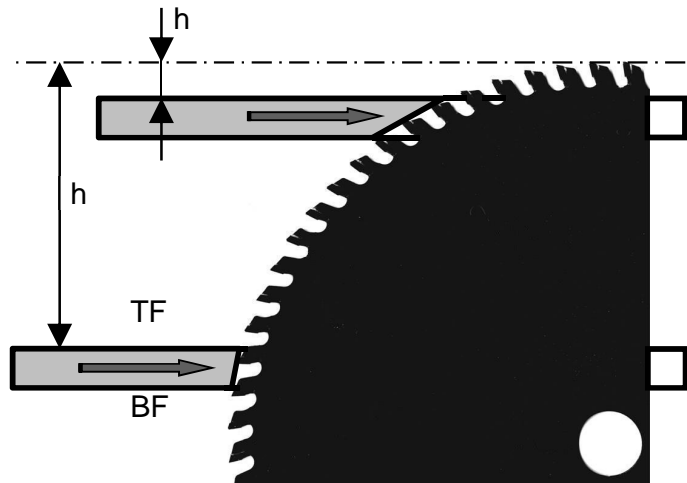
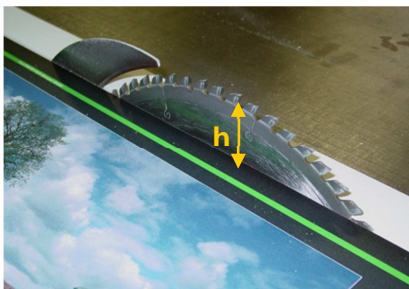
The alternate flat and trapeze tooth prevents chipping.

The hollow face grind suits brittle materials like PS.

Important for the good quality of the cut

The position (height) of the saw blade

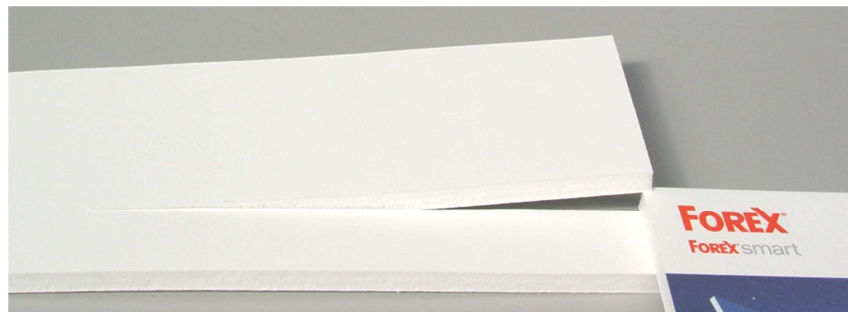
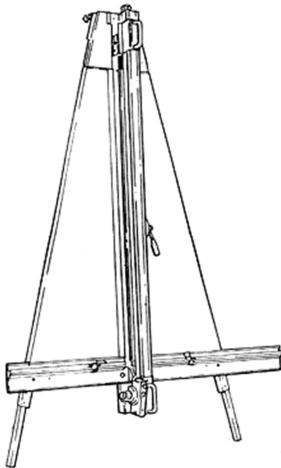
- **The bigger the height "h",** the better the quality of the top face (TF) of the sheet
- **The smaller the height "h",** the better the quality of the bottom face (BF) of the sheet



- The best height setting of the circular saw blade must be established by tests.

Alternative cutting technology

Vertical sheet material cutters provide a viable alternative means for cutting SMART-X panels to size. The absence of dust particles is a big advantage of this technology.



Conditions which influence the quality of the cut POSITIVELY

upper edge: saw blade high	↑	<u>Parameter settings and conditions that upgrade the quality of the cut</u>
lower edge: saw blade low	↑	
teeth with hollow face grind	↑	
slow feed rate	↑	
alternate flat and trapeze (or roof top) teeth design	↑	
keen (new) saw blade	↑	
cut in machining direction	↑	
thick (rigid) material	↑	

Conditions which influence the quality of the cut NEGATIVELY

<u>Parameter settings and conditions that downgrade the quality of the cut</u>	↓	thin (vibrating) material
	↓	cut across machining direction
	↓	blunt (used) saw blade
	↓	alternate top bevel teeth
	↓	fast feed rate
	↓	teeth with flat face grind
	↓	lower edge: saw blade high
	↓	upper edge: saw blade low

Since it is unlikely that ALL optimal conditions can be met in any given situation, the best possible combination needs to be determined locally by a series of practical tests. This is especially true for the tooth design: The difference between flat face grind and hollow face grind for example isn't decisive for a successful sawing job but would be noticeable if someone is looking for the best possible quality of the cut.

Recommendations for working with SMART-X®

Bonding

Use commercially available hotmelt glue for bonding pieces of SMART-X to each other. Small items can also be bonded with a model making glue like UHU-Plast (a dedicated adhesive for polystyrene). In addition, SMART-X can also be bonded to entirely different materials with high performance adhesive tapes (VHB™ products).

Fastening

Commercially available pressure-sensitive hangers are the easiest and fastest way to hang SMART-X prints from walls, support structures and ceilings.

Take the thermal expansion into account (allow for free dimensional change) when mounting SMART-X signs to support structures. Prefer screws with large washers or, in the case of a wire mesh fence, use cable ties. Simply prick the fixing holes approximately 30 mm from the edge with an awl or a screwdriver.

The **thermal expansion** (coefficient of linear expansion) of SMART-X is **0.08 mm/m/K**.

Joining flat sheets and cuts

Individual SMART-X signs can be quickly assembled to free-standing information columns. Use for example double-U extrusions (W-profile) which are available from 3A Composites.

The edges of SMART-X sheets can be lined and decorated with every type of commercially available gauge 10 mm plastic (PVC) extrusions. Attention: Use a PVC glue to bond PVC extrusions (polystyrene glue wouldn't do the job).

Painting

SMART-X sheets (including their edges) can be painted in a choice of colours using acrylic paint from spray cans.

Screen printing

SMART-X sheets can be screen printed with standard inks formulated for polystyrene. Four colour halftone prints may appear a bit darker than usual due to slightly smudged halftone dots. It may therefore become good practice to reduce the dot size in order to prevent 'overly-tanned' skin areas (e.g. faces).

Direct digital printing

SMART-X sheets can be printed with excellent results using UV-curing inks on flatbed printing machines. Attention: Aggressive solvent inks may attack the surfaces of SMART-X.

Wear cotton gloves when handling unprinted sheets. Never spray liquid cleaning agents directly onto the sheets, only on a rag. Use ionized air to blow loose debris off SMART-X sheets prior to printing.

Remark: Even half the number of UV lamps is enough to cure inks on SMART-X. Reducing the number of UV lamps prevents warping of sheets, especially of small formats.

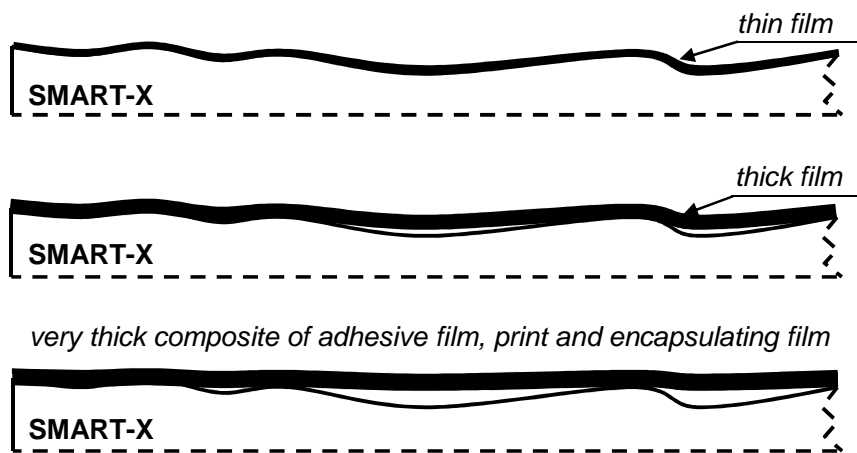
Application of adhesive films

Compared to traditional sheet materials, the surfaces of SMART-X are slightly rougher. Prior to undertaking a commercial operation with SMART-X for the first time, some practical tests with familiar graphics film of known performance are highly recommended in order to verify that the envisaged film is really suitable for the intended purposes and locations.

Take care to avoid humidity, temperature differences between film and substrate and over-drawing of the film during its application.

Some fabricators insist on routinely treating the surfaces with primers or cleaning agents to assure extra good adhesion of graphic films on SMART-X.

On cutting plotters, prefer thin gauge lettering films with a high glue spread.



Whenever possible, use thin gauge, cast inkjet films because these cling best to the surface structure of SMART-X.

The exact opposite, i.e. poor adhesion, may result from attempting to laminate thick gauge films and particularly multi-layer film composites. The high rigidity of these films means that the adhesive and there-

fore the film is only adhering to a small part of the potentially available surface.

A good way to evaluate the adhesive performance of an envisaged film is to inspect the adherent face of the film after its (forced) delamination from the substrate:

- If the reverse of the film appears matt (contact with the substrate), then the overall adhesion will be satisfactory;
- If the reverse of the film appears glossy (little contact with the substrate), then the overall adhesion is likely to be poor;

Storage and transport

Unprocessed sheets must be stored dry, flat and away from heat and dust. Surplus sheets are best kept in their original wrapping which should be carefully resealed for storage. General precautions must aim at preventing fire hazards. Do not store together with combustible materials.

Polystyrene is rather brittle compared to other plastics. Particularly the corners of already printed SMART-X sheets should be well padded for transport to prevent them from chipping and to avoid injuries from sharp corners.