

REALISTIC RADII FOR THERMOPLASTIC EDGE BANDS FOR CNC-CONTROLLED PROCESSING CENTRES WITH DIRECT APPLICATION OF ADHESIVES

The following information should be treated as reference values. Discrepancies are possible in practice (both better and worse results), as the values given here are strongly dependent on the processing conditions and the edge finishes.

Reference values for the realisation of tight radii on DC and/or DM edges								
Edge material	PVC		ABS		PP		3D	
Edge thickness [mm]	R _A [mm]	R _I [mm]	R _A [mm]	R _I [mm]	R _A [mm]	R _I [mm]	R _A [mm]	R _I [mm]
1	10 - 15	30	10 - 20	30	5 - 15	30	10 - 20	30
2	20 - 30	40	30 - 45	40	30 - 45	40	20 - 30	40
3	35 - 45	60	45 - 60	60	40 - 60	60	45 - 60	60
Reference values for the realisation of tight radii on UNI edges								
Edge material	PVC		ABS		PP		3D	
Edge thickness [mm]	R _A [mm]	R _I [mm]	R _A [mm]	R _I [mm]	R _A [mm]	R _I [mm]	R _A [mm]	R _I [mm]
1	10 - 20	30	15 - 25	30	10 - 20	30	15 - 25	30
2	25 - 35	40	35 - 45	40	20 - 30	40	35 - 45	40
3	40 - 50	60	60 - 70	60	45 - 60	60	60 - 70	60

R_I... Interior radius R_A... Exterior radius

Some of the greatest factors influencing the processing are listed below:

➤ Edge finish

- Dimensions
 - The thickness of the edge is the most decisive factor. The thinner the Edgebanding the tighter the radii that can be realised.
- Base color
 - Every color has its own idiosyncratic heat absorption behavior. As a rule dark colors absorb more heat than light colors.
- Metallic color
 - Metallic colors reflect a substantial proportion of the infrared radiation. This means that heat absorption is lower than for non-metallic colors.

- Tolerances
 - A few tenths of a millimeter can be decisive in the thickness of an edge with regards to good joint seals and the avoidance of stress whitening.
 - A high level of pre-stressing can have a negative effect on good joint sealing with very tight radii. This effect is adversely impacted if too little heat energy is introduced into the Edgebanding beforehand.

➤ **Environmental conditions and material conditions**

- Temperature
 - An optimum processing temperature is given if the environmental temperatures for processing and the material temperatures (edge and particleboard) are not below 18°C.
- Moisture in the particleboard
 - The moisture in the particleboard is ideal for processing if the value is between 7 and 10 %.

➤ **Adhesive properties**

- Processing viscosity
 - In general, we can state that the initial bonding is better the higher the viscosity of the Adhesive during processing.
- Processing temperature
 - In principle, the temperature also influences the viscosity of an adhesive. The higher the temperature, the lower the viscosity. It is therefore often advantageous to keep the temperature relatively low during processing.

‘Stress whitening’ is the term for an abnormal whitening of a plastic caused by excessive bending to the point that the plastic is overstrained for its demands. The source of the error is usually insufficient heating for the pending strain.

- Adhesive base + filler content
 - **EVA Adhesive** are very well suited to processing centers. However, it is important that the adhesive is designed for processing centers. In general EVA Adhesives that have either no or only little filler content have the best properties for processing centers.
 - **APAO Adhesive** are preferable over EVA Adhesive if hot air is used in the processing center as well as infrared radiation.
 - **PUR Adhesive** is only recommended for processing centers if the finished component will have to withstand higher thermal stress and moisture loading during later use.
 - **PA Adhesive** are not used in processing centers.
 - In general, unfilled adhesives are best.

➤ Machinery

- Edge warming possibilities
 - Infrared heating element (used to warm the edge from the front)
 - Hot air (used to warm the edge from the back)
 - Magazine oven (used for the overall warming of the Edgebanding roll. This equipment is only available for BIESSE processing centers)
- Edge compression
 - Some processing centers only press with the force of the pressure roll rubber mixture against the particleboard when processing the edge. On industrial processing centers, however, a specific (adjustable) compression ratio is exerted.
- Type of adhesive applicator rollers
 - Specifically, for the processing of Doellken 3D processing center edges it is important that rubberised adhesive applicator rollers are used on processing centers or semi-automatic molding processing machinery as damage can otherwise be caused to the 3D processing center edge.

➤ Processing programming

- Feed rate
 - The speed must be reduced drastically, especially for edge warming on tight radii. This measure needs to be taken approx. 200 mm before the beginning of the actual radius as this is the time when the part of the Edgebanding is in the warming device and this is then pressed directly around the radius.

- Use of compression rolls
 - The use of a further compression roll (besides the large main compression roll) is generally recommended in order to achieve better perimeter edges.
- Speed synchronicity between the adhesive unit and edge transport
 - Especially for interior radii we recommend that you set the feed on the edge transport a little faster than the feed on the entire adhesive unit. This is used to lay a loop into interior radius. This measure increases the seal on the joint between the edge and the particleboard.
 - The reverse case 'that the adhesive unit pulls the edge' must never be set because this would stretch the Edgebanding and this could cause small tears in and on the Edgebanding.
- Compression
 - The compression should be set as high as possible for very tight radii to achieve the best possible seal on the joint between the edge and the particleboard.
- Offset-C setting
 - This value describes the angle of the adhesive unit to the particleboard. Depending on how complex the geometry is this value could also affect the joint seal and the level of stress whitening in the Edgebanding material.

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