One of the major areas for PUR hot melt adhesives used with roller application is the assembly of sandwich elements made of aluminium, hard polystyrene foam, and plywood. These sandwich elements are used in the assembly of caravans or recreational vehicles (Figure 2).

Following some extensive tests during the past year, one of the largest companies for recreational vehicles started to convert their bonding procedure from PUR pre-polymers to the use of a reactive polyurethane hot melt. The red curve in Figure 3 underlines the increase in strength, determined in a tensile shear test on a bond made of beech/beech, in order to provide comparative data on crosslinking times. 60% of the final strength is reached after 24 h at approx. 500 N/cm². The element is now perfectly suitable for use. We know that the one factor leading to excellent resistance properties against, e.g. humidity and solvents is the crosslinking reaction of the PUR hot melt adhesives. The heat resistance of these crosslinked PUR hot melts is also far superior to other products, such as EVA and APAO adhesives. A crosslinked PUR hot melt adhesive has an elastomer character, this means it is highly elastic at RT, and softens when exposed to heat, but without melting again. The blue curve indicates loss of tensile shear strength when...
exposed to heat. It is important to bear in mind that when strength data reach levels of slightly above 300 N/cm² at 100°C, every-day stress resistance of the end-product is maintained.

When the tensile shear resistance of samples coming directly from the factory is determined, this will underline the statements made above. The inherent strength of the bonded substrates is the major determinant for compound strength, while the adhesive here plays a minor role. The bond of beech to beech will of course be much more resistant to tensile shear stress, and this is the result of the NCO reacting with the wood composites, while any bonding of particleboard or GFK will naturally only lead to much lower strength data and complete substrate failure (Figure 4).

Assembly of door panels for interior use

When doors for indoor (Figure 5) use are industrially assembled today, the major manufacturing procedure is the semi-continuous method, using multi-daylight and intermittent presses and (rarely) star presses. Door panel frames are here provided with shells of HPL or veneer, using urea resins or PVAc glues. The new reactive PUR hot melt adhesives now provide an opportunity to run fully continuous operations for assembling doors for interior uses.

The standard frame constructions are of softwoods or MDF, core fillings of cardboard sandwiches or fluted particleboard and shell layers of hardboard or thin particleboard. They are then surfaced with HPL. The adhesive is applied to the HPL by roller in flat applications, then pressed on by roller press, to cure subsequently under stack pressure.

Especially when these doors are to be used in high-moisture and humidity areas like doors in pool areas or shower cabins and sauna facilities, these highly moisture-reactive PUR adhesives are most suitable. They represent advantages also from the adhesive point of view, since some recycling materials due to their composition with condensation resins and PVAc dispersions would in themselves lead to insufficient adhesion. Due to the many variations and insufficiently known properties of the substrates used for the manufacture of these doors used for high-humidity areas, it is absolutely necessary