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GLOBAL ADHESIVES DYNAMICS WITH PARTICULAR VIEW OF HMA AND PSA DUE TO TOUGHENING REQUIREMENTS FROM UPCOMING CIRCULAR ECONOMY

Adhesives and Sealants (A&S) enjoy a growth pattern globally that is almost unique to the chemical and A&S formulating industry worldwide! The market currently growth with 30 to 40 % above country specific and global GDP, in specific market segments even up to 50%!

The first part of my presentation will focus on A&S in general, but will put a more detailed attention on the market dynamics of pressure sensitive adhesives (PSA) on one hand, and hotmelt adhesives (HMA) on the other.

Growth dynamics and key drivers for A&S in general are manifold, and mainly attribute to the following criteria: Starting with on-going substitution of traditional bonding and sealing technology by chemical bonds, permanent progress in polymer technology on both, oil base and renewable resources, the emerging rise of Circular Economy and with it stiffening legislation on recycling, remanufacture and re-use of resources, rising transparency on all product- and technology-related footprint results relative to CO₂ emissions, use of virgin resources and fresh water, including related taxation. Steady innovations in target industries and application and dosing equipment also heavily contribute. Further drivers are demographics and the exponential growth of mankind, growing urbanization and a constant rise of an economically capable middle class especially in emerging economies, plus last but not least permanently blurring boundaries between A&S on one side, on specialty coatings and potting resins on the other. A&S permanently come up with ever new functionalities, not only a source for innovations, but for process rationalizations as well. During presentation details of global growth dynamics and key drivers will be given before focusing on HMA and PSA in particular.

As mentioned already Circular Economy (CE) and its over-all aim at reducing footprints on criteria such as energy consumption, CO₂ emission, fresh water and virgin material usage will not only radically impact product design including a built-in concept for using such product or material after end of service life in the next "generation" according to the 3R principle of Re-manufacture, Re-use and/or Re-cycling preferably without Down-cycling. 3R consequently will impact the use of A&S, and here for semi or nonstructural bonding Hotmelts and Pressure sensitives come automatically into play as de-bonding will become a pre-requisite, thus allowing for reversible bonding and de-bonding, or debonding-on-command. Hotmelts easily de-bond on elevated temperatures, and PSA show a similar pattern when debonding forces are applied rectangular to the designed load pattern or its tensile strength. Thus both adhesive types ideally match basic CE requirements at least for low- to medium-duty bonds, and it is of particular challenge for adhesive formulators to come up with tamper-proof solutions for heavy-duty bonds, i.e. on semi-reactive HMA, and on classic one and two component A&S showing reversible bonding.

In my presentation I will give a number of examples how to achieve or approach this goal. It will challenge both, adhesives formulators and raw material suppliers, not to mention product designers and product manufactures plus collecting spent products and 3R processes for closing the cycle. CE will no doubt generate an interesting innovation process within our industry! Naturally more traditional bonding techniques like welding and mechanical fixing will participate in this innovation process as well, as there is certainly also room for hybrids in combination with chemical bonds, as I also see hybrid solutions in combination with hook-and-loop technology. But these topics cannot be dealt with in detail in this presentation, but certainly will also contribute to successfully approach to successfully realize CE.

In any case I hope this presentation helps to sensitize for upcoming CE, and what it means for adhesives usage and its formulations in future!