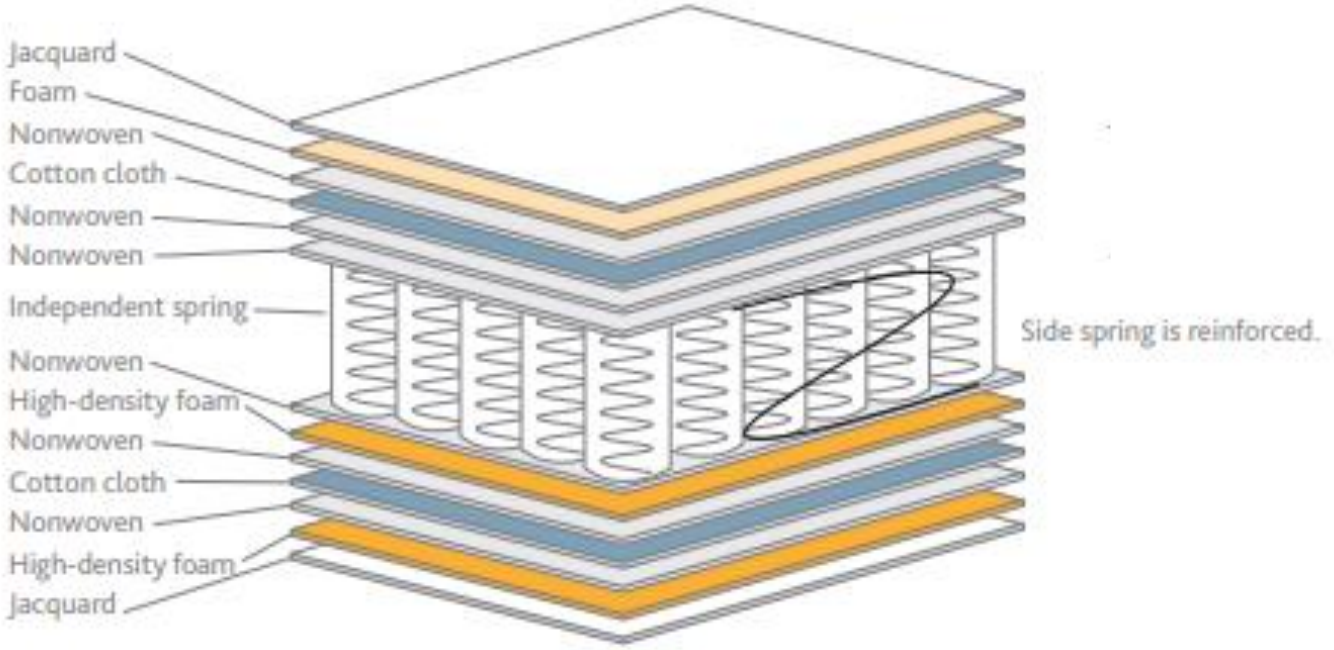
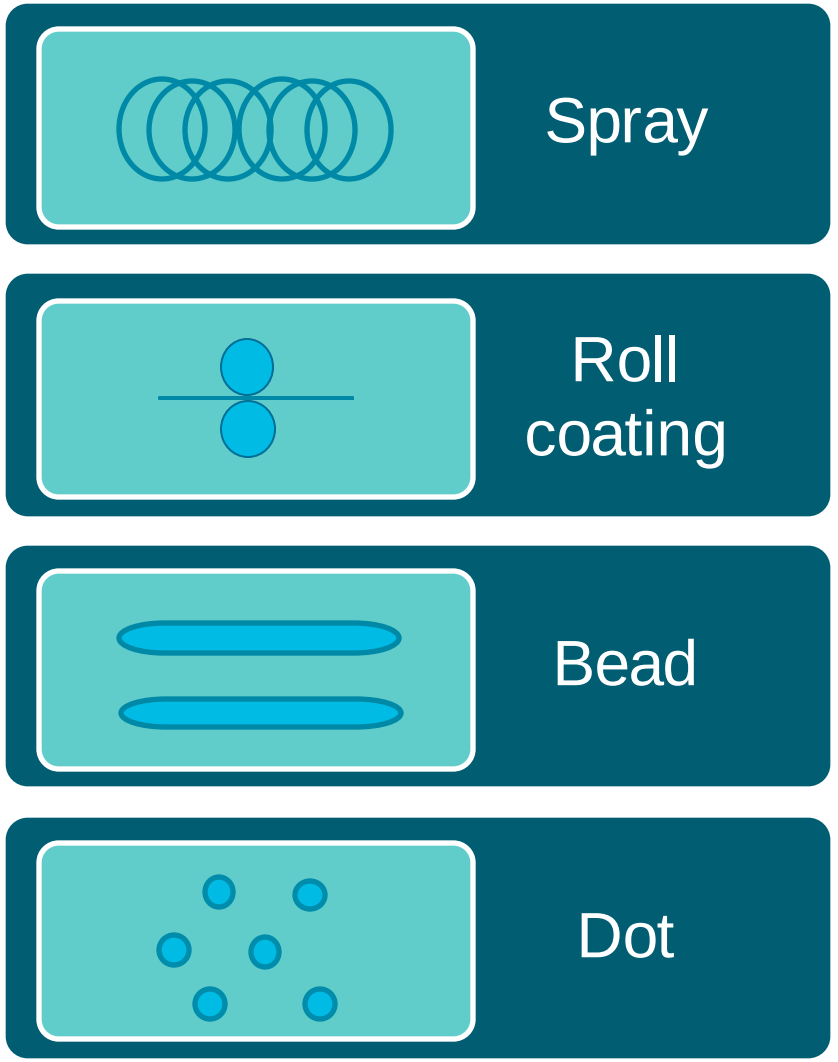
Aerafin™ 35 polyolefin polymer

Improving mattress application

MATTRESS ADHESIVES

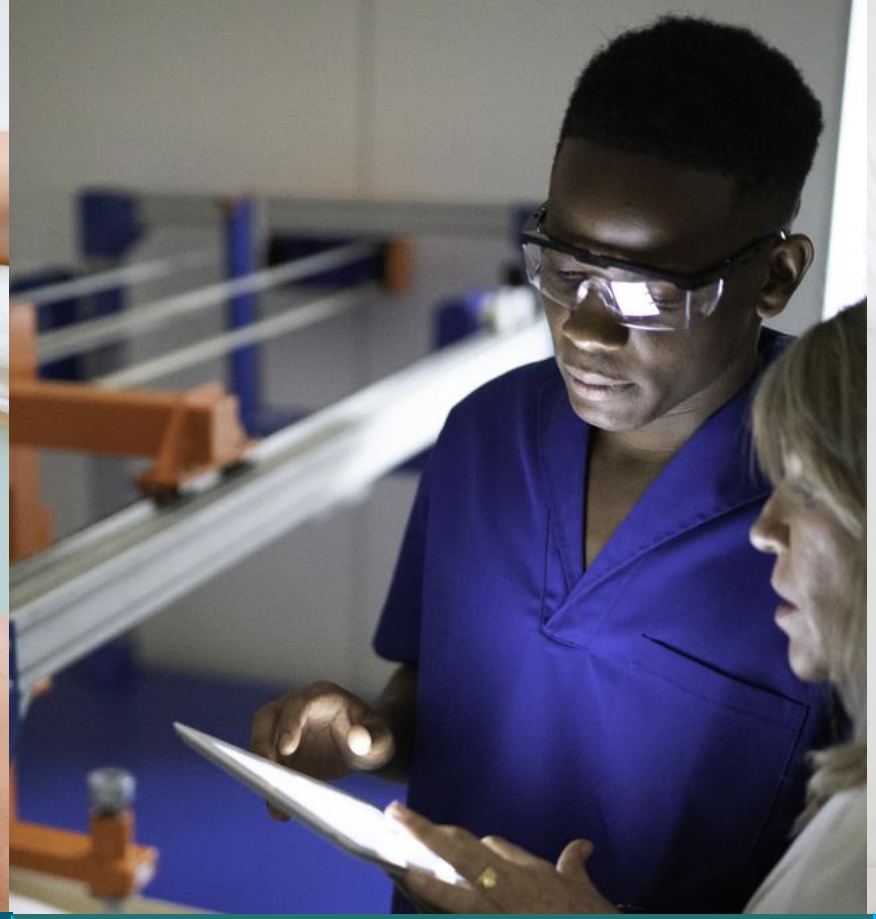
Where adhesives are needed and application methods





TRENDS

For mattress production



MATERIALS

- Substrate evolution—new fibers and foams
- All-foam units
- Microcoils
- Gel-infused foams

MANUFACTURING

- Automation and fast application
- Increase in roll coating process
- Roll-packaged mattresses for e-commerce

CONSUMERS

- Customization
- Additional sensors to adjust pressure, firmness, and body contouring
- Eco-friendly/organic materials (cotton/wool)
- Noise-free units

WHAT MATTERS

For mattress adhesives

SAFETY

Concerns for the environment, workers, and consumers

DURABILITY

Mattresses are designed to withstand up to 10 years of wear and tear. The adhesive must have a high bond strength to a diverse set of substrates.

ODOR

Low odor is desirable.

FLEXIBILITY

Ability to fold/bend mattress without “popping” sound

STABILITY

Good thermal stability to withstand high temperatures during transport and use.

SPEED

Fast drying times to speed production

ADHESIVE TECHNOLOGIES

For mattress applications

Solvent-based	Water-based	Hot-melt
+ Stronger bonds than water-based	+ Environmentally friendly	+ No mold issues and better shelf stability
+ Can be applied by roll coating, spray, beads or dots	+ Reduced occupational hazard (no VOCs)	+ Reduced occupational hazard (no VOCs)
– Contains VOCs	+ Ambient temperature application	+ Fast set speed/no drying process
	+ Repositionable assembly	+ Rapid initial tack
	– Longer set time (due to reliance on evaporation)	+ No carry agent (solvent/water) (more adhesive coverage per kg)
	– Slows down manufacturing	+ Allows complex mattress construction
	– Water entrapment causes mold	+ Better adhesion to low-surface-energy substrates
	– Potential for adhesive to spoil in container (due to water content)	+ Low total adhesive consumption (due to better sprayability)

AERAFIN POLYOLEFIN POLYMERS

Expanded portfolio for hot melt adhesive applications

	T_g (°C)	Softening point (°C)	Viscosity @ 190°C (mPa·s)	Needle penetration (dmm)	Physical form	Tensile strength (MPa)/elongation (%)
Aerafin 180	–38	120	18,000	20	Pellets	1.9/263
Aerafin 17	–38	125	1,500	20	Pellets	2.3/18
Aerafin 35	–40	120	3,300	14	Pellets	2.7/40

- Higher tensile strength
- Good elongation at lower viscosity

RECOMMENDED EASTMAN PRODUCTS

For formulations

Model formulations

	Formulation 1	Formulation 2
Aerafin 35	20%~30%	10%~20%
Eastoflex M1058	5%~15%	—
Aerafin 180	15%~25%	—
Eastoflex E1200	—	25%~35%
Regalite R1100	30%~40%	40%~50%
Oil	5%~15%	5%~15%
	100%	100%

Recommendations

A combination of Eastman APOs to ensure desired properties for easy processing

Eastman fully hydrogenated tackifiers to ensure good compatibility and thermal stability with APOs

Key requirements/criteria to consider

- **Processability/productivity:** viscosity, RBSP, open time, set time, sprayability
- **Performance/FFU:** cohesion, adhesion to various substrates

ADHESIVE PROPERTIES

	Viscosity, cP			Ring and ball softening point, °C
	140°C	160°C	180°C	
Formulation 1	4,250	2,175	1,237	117.9
Formulation 2	5,025	2,430	1,340	119.5
Comp. 1	5,950	2,860	1,600	118.5

Aerafin 35 viscosity is low ⇨ allows for flexibility in formulation

SPRAYABILITY COMPARISON

Spiral glue gun on kraft paper

100 sec < **600 sec** < **850–960 sec**

Formulation 1

Comp. 1

Formulation 2

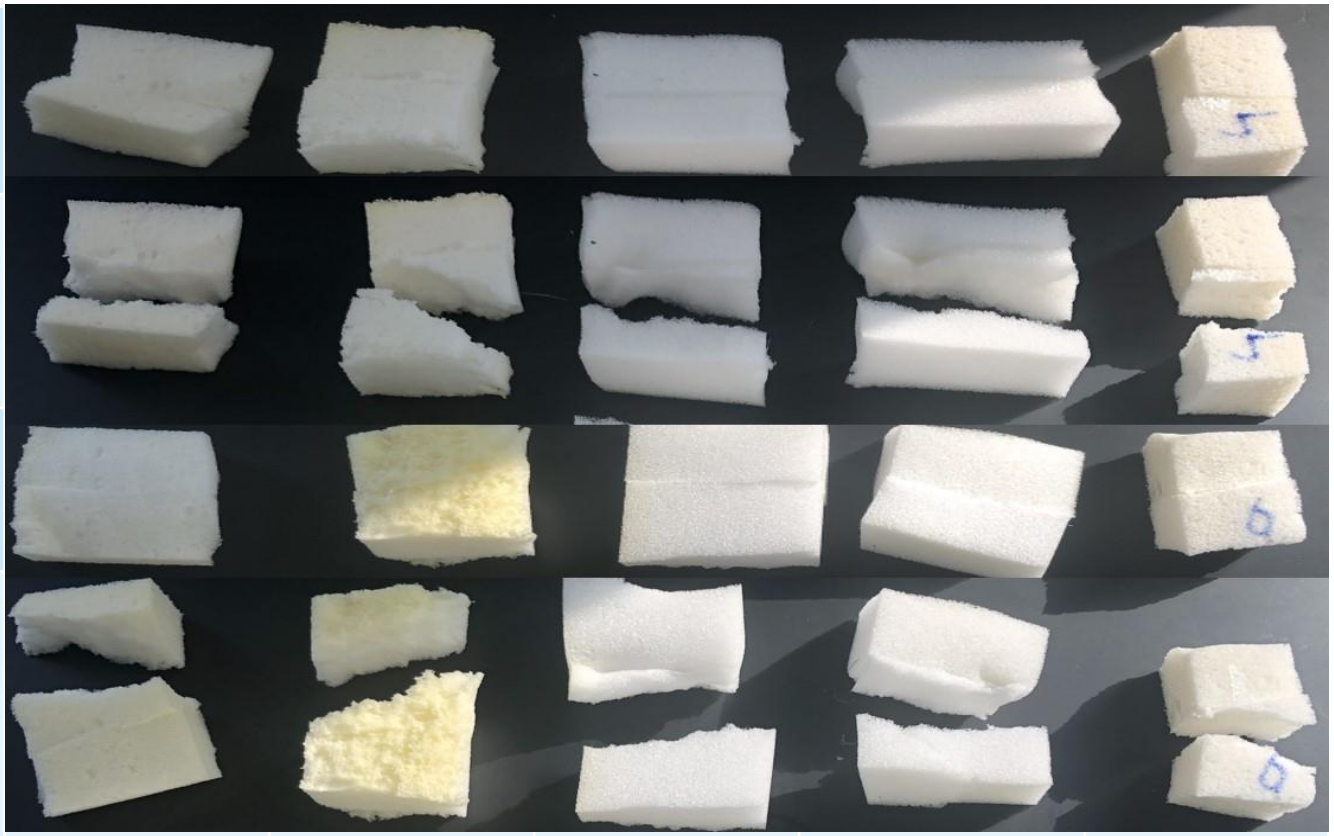
Open time at 180°C

Open time is adjustable in the formulation

Excellent sprayability

Open time: Determination of open time in the lab was done by Eastman internal method based on ASTM D4497-10. The melt (180°C) is applied as a film of 127 µm (5 mil) using hot drawdown bar on kraft paper. Strips of kraft paper are pressed into the film by a 1-kg weighted block at certain intervals (depending on open time). 30 minutes after the last strip has been applied, a 90-degree peel is carried out by hand to see which of the last strips applied can be lifted off without pulling out the paper fibers (50% fiber tear). The time at which this strip was applied is noted.

FITNESS-FOR-USE TEST

Formulation	Conditions	D = 80 kg/m^3	D = 75 kg/m^3	D = 25 kg/m^3	D = 15 kg/m^3	Latex
Formulation 1	Right after bonding					
	Peeled after 24 hr					
Formulation 2	Right after bonding					
	Peeled after 24 hr					

Excellent adhesion as substrate failure was observed on all testing substrates.

FFU test: Sponges with different density (D = 15, 25, 75 and 80 kg/m^3) and latex rubber foam were used. HMA was heated to 160°C. A thin layer was manually applied on testing substrate and pressed with hand for 2 seconds, and then the force was released. The substrates were peeled after 24 hours.

FORMULATOR ADVANTAGES

Hot-melt for mattress applications

Thank you!

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