3M Science. Applied to Life.™

Rail Solutions

Adhesives & Tapes

Industrial Adhesives & Tapes Division

Choose an application

Market segment	Process	Application
Rail	Assembly	Floor system assembly - floor cover bonding
		Floor system assembly - floor panel seam sealing
		Floor system assembly - floor panel bonding
		Window installation
		Wall construction/installation - panel to post and wall sealing
		Wall construction/installation - wall attachment and small fixture attachment
	Paint process	Paint coat masking
	Final finish	Vehicle sealing

Floor system assembly - floor cover bonding

Application description

Train carriage floors can be stressed by constant vibration, twisting and bouncing, train subfloors must “roll with the punches” to maintain their long-term viability. 3M’s advanced bonding technologies are designed to maintain their effectiveness and elasticity even after years of hard use.

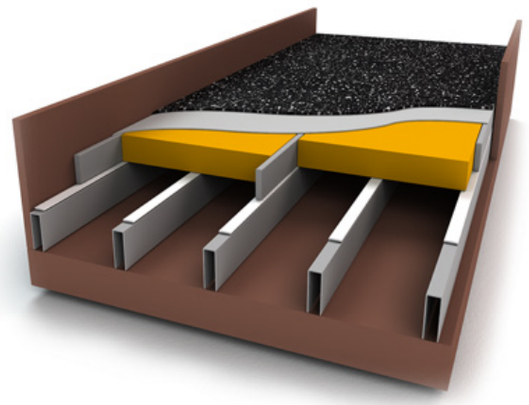
Winning application profile

Questions to ask the customer

- **SEAL$**
- Do you have any issues with your current assembly process?
- What would it mean for your business to be able to speed up your assembly process? Faster curing would allow walkability in the carriage
- Do your customers value flooring with a smooth appearance?
- Is there an anticipation for floor covering replacement in the future?
- How often is the floor covering currently place?
- How long does the floor covering need to last for?
- What is the expected exposure to moisture?
- Do you have any HS&E or other requirement/certification? e.g. isocyanate free/FST etc./i.e. EN45545

Potential 3M solutions

- 3M™ Structural Adhesives
- 3M™ Laminating adhesives: (300MP)
- 3M™ Sprayable adhesives
- 3M™ VHB™ Tape



Why 3M solutions win

- 3M can help speed up the assembly process which can lower overall manufacturing costs
- Solution provider for all bonding needs
- Address needs in floor system life cycle
- Increased vehicle flooring durability, solutions provide moisture resistance
- Increased productivity
- Full adhesive coverage provide overall improved aesthetics

Assembly

Floor system assembly - floor panel seam sealing

Application description

Train carriage floor can be stressed by constant vibration, twisting and bouncing, train subfloors must “roll with the punches” to maintain their long-term viability. 3M’s advanced seam sealing technologies are designed to maintain their effectiveness and elasticity even after years of hard use.

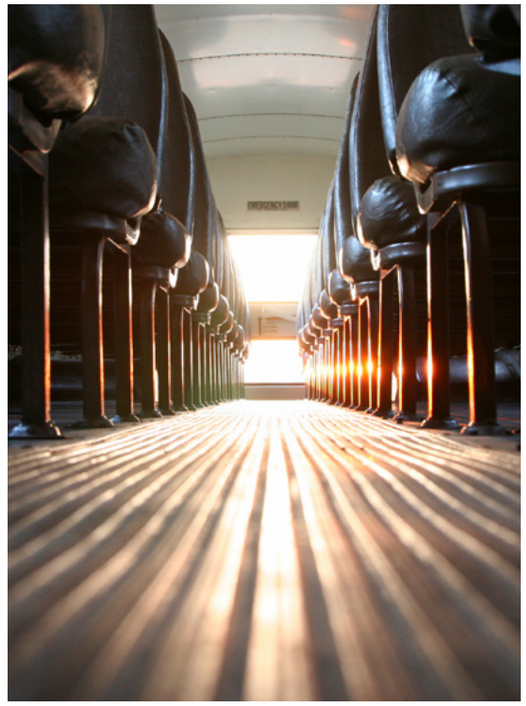
Winning application profile

Questions to ask the customer

- **SEAL$**
- Do you have any issues with your current assembly process?
- What would it mean for your business to be able to speed up your assembly process? Faster curing would allow walkability in the carriage
- Do your customers value flooring with a smooth appearance?
- Is there an anticipation for floor covering replacement?
- What is the expected exposure to moisture?
- Do you have any HS&E or other requirement/certification? e.g. isocyanate free/FST etc./EN45545

Potential 3M solutions

- 3M™ Structural Adhesives (i.e. PU)
- 3M™ Adhesive Sealants
- 3M™ VHB™ Tape



Why 3M solutions win

- 3M can help speed up the assembly process which can lower overall manufacturing costs
- Solution provider for all bonding needs
- Address needs in floor system life cycle
- Increased vehicle flooring durability, solutions provide moisture resistance
- Increased productivity
- Improved aesthetics within the carriage

Assembly

Floor system assembly - floor panel bonding

Application description

Train carriage floor can be stressed by constant vibration, twisting and bouncing, train subfloors to maintain their long-term viability. Panels can be materials such as aluminium, steel or composites. These are attached to the interior frame of the carriage.

Tape and adhesive solutions can provide performance advantages over traditional attachment methods.

Winning application profile

Questions to ask the customer

- **SEAL$**
- Do you have any issues with your current assembly process?
- What would it mean for your business to be able to speed up your assembly process?
- How important is it to keep moisture from getting behind your panels?
- Do your customers value a smooth appearance and the performance advantages that come with it?
- If you were able to produce a quieter vehicle, would that provide a better customer experience?
- What would less re work of panels mean for you?
- Would your process benefit from bonding and sealing in one?
- Do you have any HS&E or other requirement/certification? e.g. isocyanate free/FST etc./EN45545

Potential 3M solutions

- 3M™ VHB™ Tapes
- 3M™ Structural Adhesives
- 3M™ Adhesive Sealants

Why 3M solutions win

- 3M can help speed up the assembly process which can lower overall manufacturing costs
- Increased productivity
- 3M solutions can be combined together i.e. 3M™ VHB™ Tapes and structural adhesives
- Increased vehicle flooring durability, solutions provide water resistance
- Weight of the carriage can be reduced as mechanical fasteners can be removed
- Bonding solutions can provide gap filling with fast curing

Window installation

Application description

Glass panels are sealed using adhesive sealants, a durable product is required to protect rail car exteriors from the environmental affects of rain, sun and abrasion.

Winning application profile

Questions to ask the customer

- **SEAL$**
- Do you have any issues with your current assembly process?
- What would it mean for your business to be able to speed up your assembly process?
- What is the expected exposure to moisture?
- Do you have any issues with water ingress?
- Does your current solution provide a water tight seal?
- Is there an anticipation for window replacement?
- How often are repairs carried out on window seals?
- Is removability of windows a requirement?
- Do you have any HS&E or other requirement/certification? e.g. isocyanate free/FST etc. EN45545

Potential 3M solutions

- 3M™ VHB™ Tapes
- 3M™ Adhesive Sealant

Why 3M solutions win

- Solution provider for all bonding needs, can combine both tape and adhesives
- 3M can help speed up the assembly process which can lower overall manufacturing costs
- Solutions can help reduce warranty claims
- Increased durability and prevention of water ingress
- 3M solution can mitigate maintenance over the long haul

Wall construction/ installation - panel to post and wall sealing

Application description

Panels can be materials such as aluminium, steel or composites. These are attached to the interior or exterior frame of the vehicle with fasteners, rivets, tapes or adhesives. This can include both interior and exterior panels such as interior access panels.

Tape and adhesive solutions can provide performance advantages over traditional attachment methods.

Winning application profile

Questions to ask the customer

- **SEAL$**
- Do you have any issues with your current assembly process?
- What would it mean for your business to be able to speed up your assembly process?
- How important is it to keep moisture from getting behind your panels?
- Do your customers value a smooth appearance and the performance advantages that come with it?
- If you were able to produce a quieter carriage, would that provide a better customer experience?
- What would less re work of panels mean for you?
- Would your process benefit from bonding and sealing in one?
- Do you have any HS&E or other requirement/certification? e.g. isocyanate free/FST etc. EN45545

Potential 3M solutions

- 3M™ VHB™ Tapes
- 3M™ Adhesive Sealants
- 3M™ Scotch-Weld™ Toughened Epoxy Adhesive
- 3M™ Dual-Lock™ Reclosable Fastener

Why 3M solutions win

- Solution provider for all bonding needs, can combine both tape and adhesives
- 3M can help speed up the assembly process which can lower overall manufacturing costs
- Increased durability
- 3M solution can mitigate maintenance
- Improved appearance with no unsightly mechanical fasteners

Final finish

Wall construction/ installation - wall attachment and small fixture attachment

Application description

Small panels and small fixtures for train interiors are attached internally to the carriage with fasteners, rivets, tapes or adhesives.

Tape and adhesive solutions can provide performance advantages over traditional methods.

Winning application profile

Questions to ask the customer

- **SEAL$**
- Do you have any issues with your current assembly process?
- What would it mean for your business to be able to speed up your assembly process?
- How important is it to keep moisture from getting behind your panels?
- Do your customers value a smooth appearance and the performance advantages that come with it?
- If you were able to produce a quieter carriage, would that provide a better customer experience?
- What would less re work of panels mean for you?
- Would your process benefit from bonding and sealing in one?
- Do you have any HS&E or other requirement/certification? e.g. isocyanate free/FST etc. EN45545
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- If you were able to produce a quieter carriage, would that provide a better customer experience?
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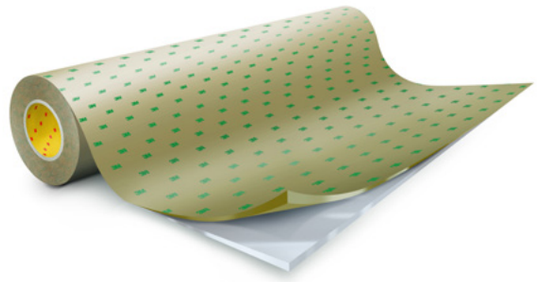
- Would your process benefit from bonding and sealing in one?
- Do you have any HS&E or other requirement/certification? e.g. isocyanate free/FST etc. EN45545



Potential 3M solutions

- 3M™ VHB™ Tapes
- 3M™ Polyurethane Sealant
- 3M™ Scotch-Weld™ Epoxy Adhesive
- 3M™ Dual-Lock™ Reclosable Fastener
- 3M™ Laminating Adhesives

Why 3M solutions win

- Solution provider for all bonding needs, can combine both tape and adhesives
- Increased durability
- 3M can help speed up the assembly process which can lower overall manufacturing costs
- 3M solution can mitigate maintenance
- Improved appearance with no unsightly mechanical fasteners

Final finish

Fine line masking

High temperature masking

Low to medium temperature masking

Fine line masking

Application description

For detailed or complex masking which can be costly to rework such as corner masking, door sill masking or bumper masking. Fine line masking applications provide a highly conformable solution with clean removal.

Winning application profile

Questions to ask the customer

- **SEAL$**
- Do you have difficulty making tight corners when masking fascia?
- Do the edges lift?
- Do you have to die cut for tight radius curves?
- Does your fine line tape go into the oven?
- What temperature is the oven?
- Do you have issues with clean or one piece removal of masking tape?
- Do you have clear coat drips around corners?
- Do you use electrostatic paint processes?
- Do you have trouble with corners or crevices?

Potential 3M solutions

- 471+ / 471 - Painted surfaces and low temperature masking
- 855 - Bare metal surfaces
- 8991 / 8992 - Electrostatic paint process, powder coating
- 8992 - up to 204°C
- 8991 - up to 204°C
- 855 - up to 200 °C
- 471+ - up to 121°C for 30 min
- 471 - up to 70°C
- 4735 / 4737 - High temperature fineline - up to 160°C
- 218 for medium temp fineline - up to 120°C

Why 3M solutions win

- Highly conformable, excellent for complex patterns and contours
- Clean removal on a variety of surfaces
- High temperatures
- Chemical and abrasion resistance
- Reduces rework saving cost and time, less residue left on removal
- High tack and holding strength

High temperature masking

Application description

Many vehicles endure high temperatures during the bake process and are exposed to chemicals during cleaning. Specialty masking tapes protect surfaces from these elements.

Winning application profile

Questions to ask the customer

- **SEAL$**
- Does your tape go through an oven? What temperature is the oven? How long for?
- Do you have issues with clean or one piece removal of masking tape? Ghosting?
- Do you have any issues with your current paint coat masking processes?
- What is your process if reworking areas where you have a paint bleed? Do you experience slivering or paint bleed when you de-mask?
- Do you experience residue transfer/ adhesive clean up during the process?
- How long will you leave tape on application?
- Is it temporary/permanent? Are you leaving the masked product outside?
- What could you do with the labour saved from eliminating rework?

Potential 3M solutions

- 3M™ Polyester (PET) Tapes (8402, 8403/8403L, 8901, 8902, 8905, 8991, 8992) - up to 220°C
- 3M™ Polyester (PET) Tapes - 850 Polyester Tape FAR 25.853
- 3M™ 401E High Performance Masking Tape - 140°C for 30 minutes
- 3M™ 501E High Temperature Masking Tape - 160°C for 1 hour
- 3M™ 1104 Low Tack Masking Tape - 135°C for 30 mins
- 3M™ High Performance Masking Tape 2693 - 163°C for 30 minutes
- 3M Scotch™ Washi Tape 2899 (150C 1 hour)

Why 3M solutions win

- High temperature resistance
- Chemical and abrasion resistance
- Ability to see through tape for positioning and placement
- Good initial tack and holding strength, with clean removability
- One piece, clean removal from many surfaces
- Good solvent and moisture resistance
- Silicone adhesive offers high heat resistance compared to many rubber and acrylic adhesives, reducing failure due to softening, oozing, and adhesive transfer

Final finish

Low to medium temperature masking

Application description

General purpose masking, for applications such as painting the vehicle after assembly.

The nature of the application, the paint or coating system and temperature at which it dries or cures determines the required characteristics of a masking tape, such as the type of paper backing used e.g. creped, flatback or filmic, as well as the adhesive.

Winning application profile

Questions to ask the customer

- **SEAL$**
- Does your tape go through an oven? What temperature is the oven? How long for?
- Do you have issues with clean or one piece removal of masking tape? Ghosting?
- Do you have any issues with your current paint coat masking processes?
- What is your process if reworking areas where you have a paint bleed?
- Do you experience slivering or paint bleed when you de-mask?
- Do you experience residue transfer/adhesive clean up during the process?
- How long will you leave tape on application?
- Is it temporary/permanent? Are you leaving the masked product outside?
- What could you do with the labour saved from eliminating rework?
- Is the tape exposed to UV lighting for extended periods?

Potential 3M solutions

- 3M™ 101E 60°C
- 3M™ 201E 80°C
- 3M™ 301E 100°C
- 3M™ 244 UV Resistant 100°C
- 3M™ 202 Moisture resistant 121°C

Why 3M solutions win

- Easy to tear and easy unwind for application
- UV resistance on 244 for products left outside
- Reduced slivering and clean one-piece removal
- Moisture resistance
- Good initial tack and holding strength

Vehicle sealing

Application description

Once the carriage has been assembled, the unit is sealed to prevent water intrusion. This can include roof sealing and exterior panel sealing.

Tapes and sealants can be applied over a seam on the roof or around the perimeter of the carriage to prevent water from entering the interior.

Winning application profile

Questions to ask the customer

- **SEAL$**
- Do you have any issues with your current vehicle sealing processes?
- Where are the toughest areas to seal on your rail car?
- Is there any time constraints with curing of sealant?
- Are their any hard to reach or large surface areas that require sealing?
- What problems and costs do you experience when units begin to leak and water gets in areas it's not intended to?
- Do you have any HS&E or other requirement/certification? e.g. iscoyanate free/FST etc. EN45545

Potential 3M solutions

- 3M™ Adhesive Sealant
- 3M™ Extreme Sealing Tape (4411/4412) used with AP111

Why 3M solutions win

- Breadth of sealing options: tapes and sealants
- Speeding up cure times (550FC)
- Can help reduce or eliminate water intrusion and leaking issues because of 3M's proven performance chemistry
- Emergency repairs (4412/4411)
- 3M™ Extreme Sealing Tape bonds immediately with no dry time, oozing, or cleanup which can result in faster application
- 3M aluminium and plastic sealant packaging does a better job of preventing moisture from entering the package resulting in less waste due to premature curing