

Packaging Hot Melt

Adhesive Solution Advisor

NO MORE CHAR

Eliminating Adhesive Char in Your End-Of-Line Packaging Operations

As a consumer products manufacturer, you are constantly under pressure to increase your productivity and reduce your costs, which include the risks associated with lost production downtime.

Carbon buildup—“char”—of your adhesive application system’s hot melt glue tank, hoses, nozzles, and other critical flow components will inevitably occur over time in your end-of-line packaging operations for case, carton, and package sealing—costing you valuable lost production time, equipment damage, and needless downtime and expense.

Understanding the causes and remediation of char in hot melt packaging adhesive application points the way to new adhesive options now available which provide for more efficient, economical, and more highly productive end-of-line packaging operations.

Char Caused by Shortcomings in Traditional EVA-Based Hot Melt Adhesive

Ethylene vinyl acetate (EVA) adhesive is the most widely used adhesive for packaging hot melt applications, primarily due to its lower cost and suitability for a wide range of packaging applications. However, because of its chemical composition, EVA-based adhesive has one significant drawback: It is prone to developing carbon buildup, or char, inside of adhesive application tanks, lines, hoses, and nozzles.

Charring is carbon buildup which occurs when EVA hot melt adhesive oxidizes at prolonged high temperatures above 350 degrees Fahrenheit. This heat and oxidation reaction creates carbon buildup in your adhesive application system during idle periods when adhesive is not flowing through the system during production, and is caused by degradation of EVA-based adhesive over time in tanks, lines, and hoses.



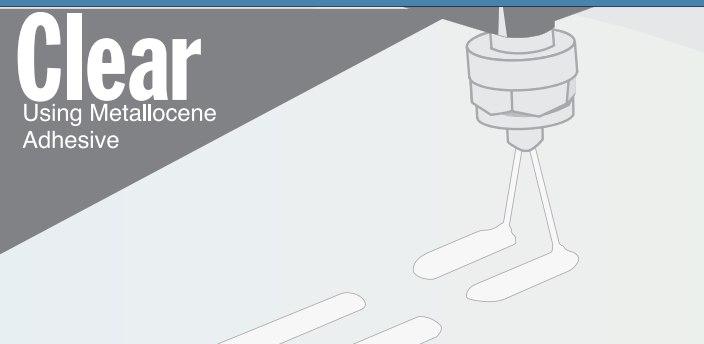
Eliminating Char

Char—clogging due to carbon buildup in adhesive tanks, lines, and nozzles—is a leading cause of downtime in packaging operations using traditional EVA-based hot melt adhesives

EVA Adhesive Thickens Over Its Pot Life, when stored and applied continuously at hot melt temperatures—first by gelling, and then forming char. Over time, and regardless of maintenance, char will form, blocking flow in adhesive lines and nozzles

Metalocene Adhesive Maintains Its Viscosity

consistently over time at continuous hot melt application temperatures. Due to its chemical composition, metalocene-based hot-melt adhesives always run clear, never forming char buildup



Also, during packaging operations, since adhesive which flows closer to the walls of a hot melt applicator hose moves more slowly than the adhesive flowing in the center of the hose, adhesive nearer to the outer wall of the hose wall tends to degrade more readily, becoming thicker and sticking to the inner walls of the hoses, and eventually forming char on the inside of the hoses, adhesive tank, and nozzles of your hot melt adhesive application system.

often increases the amount of heat your adhesive application system must apply to the glue tank and hoses, which in turn causes even more char buildup.

Even When Not Yet Visible, Char Degrades Adhesive Performance

When char buildup occurs, pieces of this carbon char break loose in your application system, clogging applicator hoses and nozzles, leading to uneven adhesive application on packaging and clogged nozzles, and eventually causing production stoppages. Even when charring may not be immediately visible during operation, hidden char deposits contribute to poor adhesive application due to clogged or char-degraded tanks, hoses, or nozzles, which eventually leads to improperly and insufficiently glued packages and char deposits on packaged products.

Before clogging even occurs and charring is even apparent, carbon char in hose linings creates a thermal barrier which lowers the optimal operating temperature of the adhesive, causing poor flow performance. This slower flow

Char Buildup is Inevitable, Despite Preventive Maintenance

Preventive maintenance (PM), which involves systematic monitoring and periodic flushing of the adhesive application system, can substantially reduce the incidence of charring and gelling and extend the life of applicator hoses and extrusion nozzles.

However, the unfortunate fact is that charring is an inherent problem with EVA-based adhesives. No matter how diligent the preventive maintenance program, charring will eventually occur in any hot melt system using EVA-based adhesive that is kept at an operating temperature above 350 degrees Fahrenheit for prolonged periods. Since prolonged high temperature operation naturally occurs in any production environment, char resulting from use of EVA-based adhesive will eventually pose a problem, regardless of the steps taken to prevent it.

New Metallocene-Based Adhesives Offer Superior Performance and Char-Free Operation

In the past few years **metallocene-based polymer hot-melt adhesives** have become more widely available in the marketplace, and more affordable for use in the packaging field.

Metallocene-based hot melt adhesives offer several key advantages compared to traditional EVA-based hot-melt adhesives:

- **Char-free operation:** The chemical composition of metallocene-based hot melt adhesives means they are not subject to carbon buildup, gelling, or any other changes over extended high temperature storage and use. As a result, they can be stored indefinitely in glue tanks at high temperatures and will flow clearly at all times through the application cycle, without char buildup or any other material change causing poor or blocked adhesive flow through pumps, hoses, or nozzles;
- **Improved mileage:** Because metallocene-based hot-melt adhesives have a lower density than EVA-based adhesives, they can be applied at lower flow rates, often yielding up to 40% reduction in adhesive use compared to EVA-based hot melt adhesives;
- **Precision application:** Since viscosity of metallocene-based hot-melt adhesive does not increase during its pot life, metallocene-based hot melt adhesive gives operators more precise control over flow, bead size, and bead quality, so that application can be continuously optimized for maximum economy of application;
- **High- and low-temperature performance:** Metallocene-based adhesive provides superior bonding strength across a wide

Metallocene Benefits:

- **Char-Free Operation Slashes Downtime Expense**
- **Improved Mileage—Use Less Adhesive for Less Cost**
- **Highly Versatile for Many Stock Types**

range of temperature variations, offering resistance to both high temperatures and freezing cold. This performance makes metallocene a strong choice for frozen food packaging applications as well as for many packaging, carton, and box applications requiring resistance to wide temperature fluctuations;

- **Use with many coated and uncoated package stocks:** The superior adhesion performance of metallocene-based hot melt makes it versatile for application to a wide variety of coated and uncoated paper packaging and

corrugated stock. Because of this versatility, Metallocene-based hot melt adhesive is especially suited for application to coated stock used in frozen food products;

- **Superior penetration over heavy ink surfaces:** Compared to EVA-based adhesive, metallocene hot-melt adhesive provides deeper penetration of packaging surfaces having heavy ink coverage, for greater package and carton sealing assurance and reliability

Cost Advantages of Metallocene vs. EVA Hot Melt Adhesive

Although metallocene-based hot-melt adhesive initially costs somewhat more than EVA-based hot melt adhesive, as a packaging production professional you must consider the overall added costs of continuing to operate your packaging machinery with lower-cost, but char-prone, EVA hot-melt adhesive. These costs include:

- **Production downtime expense:** Usually the highest cost, which can be calculated from hundreds to thousands of dollars per hour, depending on the operator's production environment;
- **Product defect costs:** Packaging defects due to poor carton adhesion, which lead to pop-opens and other package failures throughout



the distribution chain, can be a significant ongoing expense, leading to additional negative impacts from lost and damaged products, negative effects on customer goodwill, and potential liability cost;

- **Replacement adhesive applicator parts and service cost:** When charring conditions reach the point where the adhesive application system can no longer be cleared, hoses, nozzles, and other affected parts of the system must be replaced, usually at a significant cost in new applicator components and additional costs per hour of service expense

A Range of Metallocene Hot-Melt Options Available

In addition to its superior performance properties, metallocene-based hot-melt adhesives, such as those provided by Evans Adhesives, also provide manufacturers with a range of product options and capabilities:

- **High-melt temperature metallocene adhesive,** applied at 350 degrees Fahrenheit gives production operators a smooth-flowing, consistent, and trouble-free adhesive solution for a wide variety of product operating requirements;
- **Low-melt temperature metallocene adhesive,** applied at 250 degrees Fahrenheit, melts to a lower viscosity, so that the same amount can be applied at lower pressure, increasing mileage. Low-melt temperature adhesive also offers machine operators the added safety feature of working with adhesive at a safer, lower application temperature;
- **Packaging-specific metallocene adhesives:** Metallocene-based hot-melt adhesives have also been formulated for application to a wide variety of specialized box, carton, tray, and packaging materials: Corrugated plain and inked, coated and uncoated stocks, paper bag stocks, trays, frozen food and ready-made meals packages, and other packaging stocks and configurations specific to your industry

With Today's Higher Cost Pressures, the Time is Now to Eliminate Char Risk from Your End-of-Line Packaging Operations

To respond to higher commodity and materials costs, as a consumer products manufacturer you must constantly increase your productivity and reduce your costs, which include the risks associated with lost production downtime. One significant way to increase efficiency by eliminating this production downtime risk is to closely examine the performance of critical production materials, such as packaging adhesives, and their susceptibility to production-killing problems like charring from carbon buildup in your end-of-line packaging operations.

For these reasons, making the switch from traditional EVA-based hot-melt to metallocene-based hot-melt adhesive is a simple, straightforward, and cost-effective solution to eliminate the high cost of lost production time and risk of packaging failure in your company's packaging operations.

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