

ROLL-TO-ROLL COATING TECHNOLOGY

FOR FLEXIBLE PACKAGING AND DECORATION

FLEXIBLE PACKAGING

Applied Materials is a leading supplier of advanced roll-to-roll vacuum coating systems used to deposit thin films for flexible electronics, packaging and advanced technology applications.

We offer a broad portfolio of equipment solutions that address a wide variety of applications for the evolving packaging industry. Installed throughout the world, our roll-to-roll vacuum coating product line sets the industry standard for depositing uniform flexible barrier films with superior gas/moisture barrier properties that maximize freshness and extend shelf life of consumer goods.

To meet the increasing demand for new flexible packaging materials and precision processing, Applied Materials' deposition systems allow the customization and engineering of packaging materials tailored for exacting barrier performance requirements with the lowest consumption of resources, raw materials and energy. Using our systems enables smarter packaging options supporting the growing market for compact solutions like lightweight pouch systems to replace e.g. rigid containers, thereby reducing transport and storage costs and environmental impact.

Standard Applications (Flexible Packaging)

- TopMet™ for flexible barriers Al metallic or AlOx transparent
- TopMet™ IP for inline printing

New Advanced Applications (Flexible Transparent Packaging)

- TopMet™ CLEAR for transparent AlOx Barrier layers (deposited with or without high power plasma assistance)
- TopBeam™ for high speed advanced coatings for different types of transparent (oxide) coatings on packaging materials

Product Picture Examples:



DELIVERING TECHNOLOGY LEADERSHIP WITH MORE THAN 700 TOOLS SHIPPED GLOBALLY

APPLIED TOPMET™ PLATFORM DEVELOPMENTS

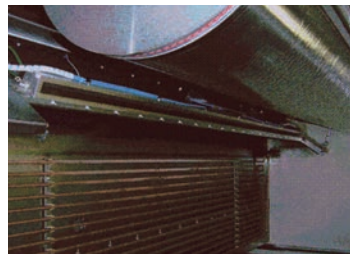
1992	2000	2008	2010	2013	2015	2018	2020
Introduction TopMet™ <ul style="list-style-type: none"> TM Family 1250-2450 	TopMet™ (2nd Generation) <ul style="list-style-type: none"> TM Family 1250-2450 Higher Pump Capacity Bigger Coating Drum 500 mm 	TopMet™ IP <ul style="list-style-type: none"> TM 1250 & 1650 Pattern (segmented) metallisation 	TopMet™ CLEAR <ul style="list-style-type: none"> AlOx ECON AlOx HAD Inline TopCoat 	TopMet™ (3rd Generation) <ul style="list-style-type: none"> TM Family 2450-3250 Coating Drum 600 mm AlOx ECON capable 		TopMet Hires <ul style="list-style-type: none"> AlOx ECON 	TopMet 2450-3250 <ul style="list-style-type: none"> NEXUS-E
	TopMet <ul style="list-style-type: none"> TM 4000 	TopMet™ HiRes <ul style="list-style-type: none"> TM 4450 Hires TM 2450 & 2850 Increase coating rate by 25 % 					



TopMet™ High Rate Evaporator



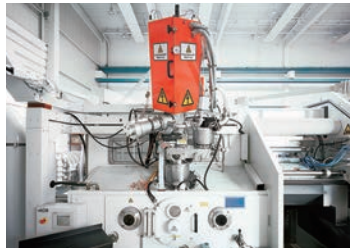
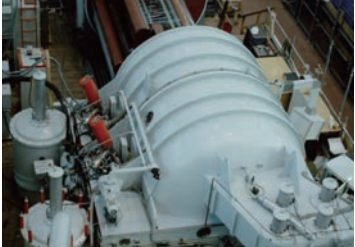





TopMet™ Clear



TopMet™ with E-Charge for improved Productivity

APPLIED TOPBEAM™ PLATFORM DEVELOPMENTS

1980	1990	1995	2000	2005	2010	2015	2018	2020
								
A 620 EB for Magnetic Tape	TopBeam™ 1900	TopBeam™ 1100S						
								
A 2100 EB, also for SiOx	TopBeam™ 2100S	TopBeam™ 2850S	TopBeam™ 2450S					

APPLIED TOPCOIL™ PLATFORM

2016	2018	2020
		
Announced in 2016	Introduction TopCoil™ 2500	Next Generation TopCoil™ 2450

TopMet™



Excellence in engineering and proven experience

With a coating speed of up to 20 meters per second, unparalleled productivity and winner of numerous design awards, the TopMet represents true excellence in engineering. Applied Materials' web coating products with more than 60 years of experience and over 700 systems installed worldwide, lead the market of roll-to-roll vacuum coating and metallizing solutions.

TopMet™ CLEAR



Offers two advanced AlOx processes and option for organic top coating

- The AlOx-ECON process minimizes capital cost while producing 15-20 nanometer thin, clear barrier coatings on PET substrates.
- The AlOx-HAD process is adopting a plasma-assisted deposition, developed in conjunction with the Fraunhofer Institute in Germany, depositing typically 10 nanometer thin layers with excellent barrier properties on a wide range of plastic packaging films.

Both processes integrate Applied Materials' robust patented evaporator boat design, winding system, and in-line control system for layer thickness monitoring. Together, these innovations generate uniform AlOx layers with higher barrier performance and higher transparency.

TopMet™ IP Inline Printing



For non-metallized structures in one path

Our vacuum metallizer features inline printing of both grey-scale and patterned structures on polymeric substrates and paper, eliminating a process step while at the same time enabling differentiated packaging.

TopBeam™



For advanced electron beam coatings

A wide variety of different metals and oxides can be evaporated with Applied's high-power electron beam evaporation. This process offers the highest coating speed of all vacuum coating processes. For high coating thickness uniformity a closed-loop inline control system both in transverse and machine direction is mandatory. This requirement is fulfilled with ESCOSYS™ in combination with the advanced inline measurement system.

TopCoil™



Evaporation system based on induction heated crucibles

The TOPCOIL™ platform complements Applied Materials' evaporation portfolio with induction heated crucible technology. This is a solution for applications demanding aggressive, low defect performance and also enables depositing a wide range of materials.

<http://www.appliedmaterials.com/roll-to-roll-web-coating> | email: web_sales@amat.com

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