

Bicor™
OPPalyte™
Metallyte™
Alox-Lyte™

Jindal
Films



PP MONO-MATERIAL SOLUTIONS

Delivering PP mono-material solutions using OPP films

Improved Flexible Recycling Packaging

Numerous flexible packaging applications use multi-material laminates which are considered non-recyclable in Europe and can be converted to mechanically recyclable solutions by using polypropylene (PP) films. PP resins are light weight due to a very low density (0.9g/cm^3) and are naturally easy to recycle (no crosslinking, no gels, no strong discoloration) and very well suited for multiple re-extrusions, favoring its use in mechanical recycling operations.

OPP films provide the best balance of properties to maintain all the key essential packaging functions, such as stiffness, heat resistance, barrier, heat seal and optical properties. Specific OPP films are commercially available for the 3 main functionalities of flexible laminates: **PRINTABILITY, BARRIER** and **HEAT SEALABILITY**.

PRINTABLE WEBS

Replacing Paper or PET with OPP offering a broad range of features

Some of the most demanding packaging formats and product segments are using paper, oriented PET films or other harder to recycle substrates in laminate forms. Papers and PET films are stiff, heat stable and tolerate high seal jaw temperatures allowing for a robust packaging operation.

To replace Paper or PET films, OPP films are available with a broad range of features. Commonly available in white or clear, matt or glossy, one or two-side processable, heat sealable or non-sealable, barrier or non-barrier formulations and typically compatible with most printing and lamination processes.



Paper can be substituted either with OPPalyte™ white films (SHH, ORH) or Bicolor™ clear films with a matt-look (CSRM). Using non heat sealable matt OPP will help for packaging efficiency while providing a paper finish aspect.

Paper replacement with BOPP films

PAPER LOOK ASPECT		OPP FILM	GAUGE (µm)	HEAT SEAL	FILM DESIGN (OUT/IN)	KEY FEATURES
CLEAR REVERSE PRINT	MATT	CSRM	18, 25	NHS	Matt/TRT	Good jaw release
		GNR, GPR	20, 30	HS	Matt/TRT	O/O seal and lap (O/I) seal to PP
	GLOSS OR PARTIAL MATT OPV	NNH	20	NHS	TRT/TRT	2-side treated; good jaw release
		MB666	20-40	HS	Acrylic/Acrylic	Aroma & MOH barrier
		MB666	21	HS	Acrylic/PVOH	High gas, aroma & MOH barrier
WHITE SURFACE PRINT	GLOSS OR PARTIAL MATT OPV	SHH	28, 40	HS	TRT/TRT	Two side treated
		MW647	35-45	HS	Acrylic/Acrylic	High gloss; Aroma & MOH barrier
		MH647	42-52	HS	Acrylic/Acrylic	High gloss; Aroma & MOH barrier
	MATT	ORH	60-70	HS	Matt TRT/Gloss TRT	2-side treated

Glossy or matt PET films can be replaced with Bicolor™ clear OPP films (NND, NNH, CSRM) to deliver various functional features or visual aspects depending on the final use.

Optionally clear barrier OPP films (MB890, MB866, AO894) are also available in various gauges for two-ply applications using reverse printing. Alternatively, coated white barrier OPP films (MW647, MH647) provide outstanding glossy white aspect with excellent barriers to aroma and mineral oils.

PET replacement with BOPP films

VISUAL ASPECT		BICOR FILM	GAUGE (µm)	HEAT SEAL	BARRIER	FILM DESIGN (OUT/IN)	KEY FEATURES
CLEAR REVERSE PRINT	GLOSS	NND	20, 25	NHS	-	NHS/TRT	Non-sealable; Good jaw release
		MB400, GND	15-50	HS	-	HS/TRT	O/O & I/O seals with Cast or OPP
		MB666	20-40	HS	Aroma	Acrylic/Acrylic	High gloss, MOH barrier; O/O seals
		MB890	16	HS	Gas, aroma	HS/EVOH	MOH barrier; O/O & O/I seals (PP)
		MB866	21	HS	Gas, aroma	Acrylic/PVOH	MOH barrier; O/O seals (acrylic)
		AO894	16	HS	H ₂ O, gas, aroma	HS/AIOx	MOH barrier; Flexo print only
	Matt	CSRM	18, 25	NHS	-	NHS/TRT	Non-sealable; Good jaw release
		GNR, GPR	20, 30	HS	-	HS/TRT	O/O seal and lap (O/I) seal to PP
	PARTIAL MATT & GLOSS	NNH	20	NHS	-	TRT/TRT	Two side treated; Good jaw release
		MB666	20-40	HS	Aroma	Acrylic/Acrylic	MOH barrier; O/O seals
		MB866	21	HS	Gas + Aroma	Acrylic/PVOH	MOH barrier; O/O seals (acrylic)

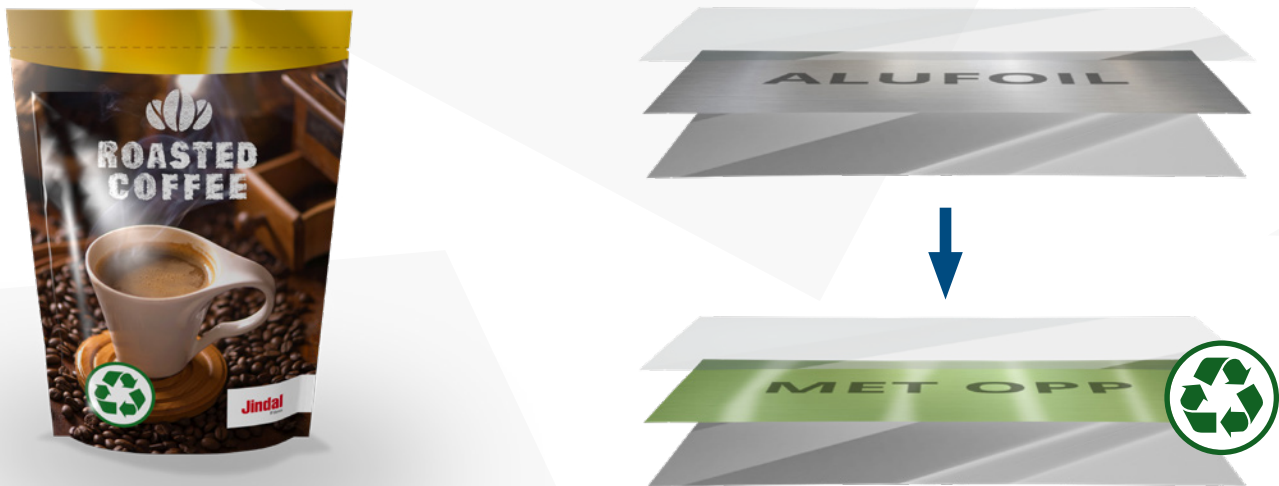
To help replace PET films in more demanding applications, Jindal Films recently developed improved heat resistance OPP films for general outer web applications (Bicolor™ MB100), or for more specific market segments where extra heat processing is used such as retort or sterilization (Bicolor™ MR100).

Please contact us for more details on these developments.

BARRIER WEBS

Replacing Alu Foil or vacuum coated PET with high barrier OPP films

For sensitive products, many barrier laminates still use thin Aluminum foils or vacuum coated PET films (clear coated or metallized) that are non-recyclable when combined with printable or sealable polyolefin films. Outstanding moisture, gas, aroma and mineral oil barriers can be delivered with OPP films, usually also resulting in improved mechanical properties such as puncture or flex-crack resistance.



Alu foil and Met-PET can be replaced with Metallyte™ high barrier (MM288) or ultra-high barrier (MM883) OPP films - typically in 2-side processable form – or optionally with white metallized high barrier OPP films (MU842).

Aluminum Foil & Met-PET replacement with BOPP films

BASE FILM ASPECT	METALLYTE FILM	LAMINATE TYPE	WVTR 38C 90%RH	OTR 23C 0%RH	Aroma & MOH Barrier	TYPICAL MARKET SEGMENTS
CLEAR	15MM288	3-PLY	0.1	25	+	Soluble drinks, instant coffee
	16MM883		0.1	0.1	+++	Dry milk, roasted coffee
WHITE	28MU842	3-PLY	0.1	0.1	+++	Dry yeast
	35MU842		0.1	0.1	+++	Baby food
	28MH388ES	2-PLY	0.1	10	+	Dry seasonings
	28UBWES		0.1	0.1	+++	Dehydrated soups

For transparent applications, **Alox-Lyte™** films (AO894, AO893) or **Bicor™** coated films (MB866, MB890) are suitable to either replace **SiOx or AlOx vacuum coated PET films**, or to shift thicker barrier layers (EVOH) from the coextruded PE or PP sealants to the middle or outer webs of laminates and results in improved PP mono-material composition for better recyclability.

Clear Coated PET replacement with BOPP films

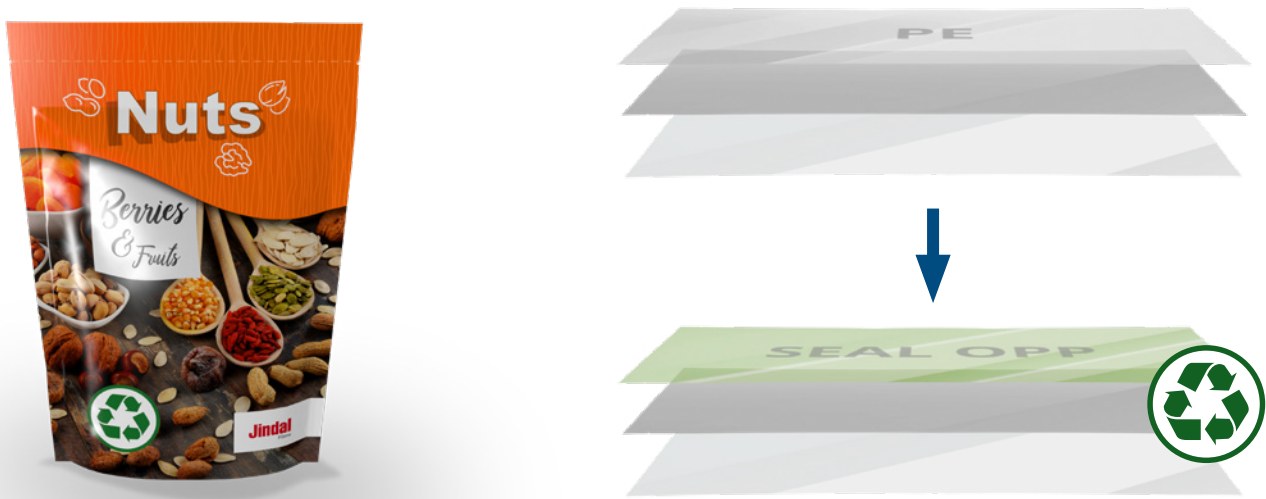
BARRIER TECHNOLOGY	BARRIER OPP FILM	WVTR 38C 90%RH	OTR 23C 0%RH	Aroma & MO barrier	TYPICAL MARKET SEGMENTS
ACRYLIC	20MB666	3.5 - 7	500-1000	+++	PET, Cellophane, PVdC-OPP, Paper
EVOH/PVOH	16MB890	5	0.5	+++	PVdC-OPP, EVOH coex PP or PE, Dry applications
	21MB866				
ALOX	16AO894	0.7	0.5	+++	PET-AIOx, PET-SiOx, PET-PVdC, PVdC-OPP
	16AO893				

Jindal Films is improving its high barrier technologies with tighter barrier specifications as well as developing modified films for more demanding applications such as for liquid packaging or for retort sterilized segments.

HEAT SEAL WEBS

Replacing PE films with enhanced seal performance OPP films

Many demanding packaging applications – such as for powdered products or those with MAP - use blown or cast polyethylene heat seal films that contribute to strong pack integrity. Cast PP or enhanced seal BOPP films can be used to shift the final laminate composition towards a PP mono-material composition, resulting in improved recyclability. OPP films provide enhanced mechanical properties (e.g. stiffness, puncture resistance) over blown or cast films, to help significantly down-gauge the sealant webs and provide additional features like easy tear from a notch or from a crimp-seal.



Jindal Films has developed specific Bicolor™ or Metallyte™ films with higher seal performance to partially close the gap with PE-based sealants. The latest generation of Bicolor Ultra Seal films (MB344US) delivers 6 times higher seal strength than most standard coex OPP films, with exceptional hot tack window and often with lower seal initiation temperatures (SIT) than most cast PP films.

OPP films with improved seal performance

MATERIAL REPLACEMENT	HEAT SEAL PERFORMANCE	OPP FILM	BASE FILM ASPECT	SIT (°C)	SEAL STRENGTH	WVTR 38C 90%RH	OTR 23C 0%RH
STANDARD OPP APPLICATIONS	Broad Seal Range (low SIT)	HLD	CLEAR	80	+		
		STD	WHITE	80	+		
		SVD	WHITE	100	Peelable		
		MLB	METALLISED	85	++	0.3	40
		MM398	METALLISED	85	++	0.3	50
		QFM	WHITE / METALLISED	85	+	0.2	30
EXTRUSION COATED PE	ENHANCED SEAL	MH388ES	WHITE / METALLISED	75	+++	0.1	10
		UBWES		80		0.1	0.1
PE & CPP	ULTRA SEAL	MB344US	CLEAR	95	++++		

Please contact us for more details on these developments.



Jindal Films provides PP mono-material solutions with a broad range of films - printable, barrier and heat sealable - to help brand-owners and converters launch their multi-material flexible packaging laminates on a journey towards a more sustainable future, feeding the RPP recycling streams being progressively implemented across Europe.



Please contact us for more details.

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