

SUPER FILM
PACKAGING FILMS

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***EFFECT OF HEAT SEALING FOR
PRESERVATION OF PACKAGED GOODS***

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OUTLINE

- Packaging & Food Preservation Facts
- Seal Integrity and Seal Failure
- Film Development With Enhanced Sealing Properties
- Conclusions

FOOD WASTE & FOOD LOSS FACTS

- $\approx 1/3$ of food produced globally gets lost or wasted ($\approx 1,3$ billion tonnes)
- The amount of food loss and waste resulted from industrialized and developing countries are roughly equal (670 and 630 million tonnes respectively)
- Economically, the total cost of food waste is roughly US\$ 990 billion.
- One-fourth of reduction in global loss and waste will provide adequate food for 870 million people.
- In developing countries 40% of losses occur at post harvest and processing level while in industrialized countries 40% of losses occur at retail and consumer level.



ROLE of PACKAGING on FOOD LOSS & WASTE

Packaging has a crucial role on food loss and waste!

Packaging helps reduction of food waste by;

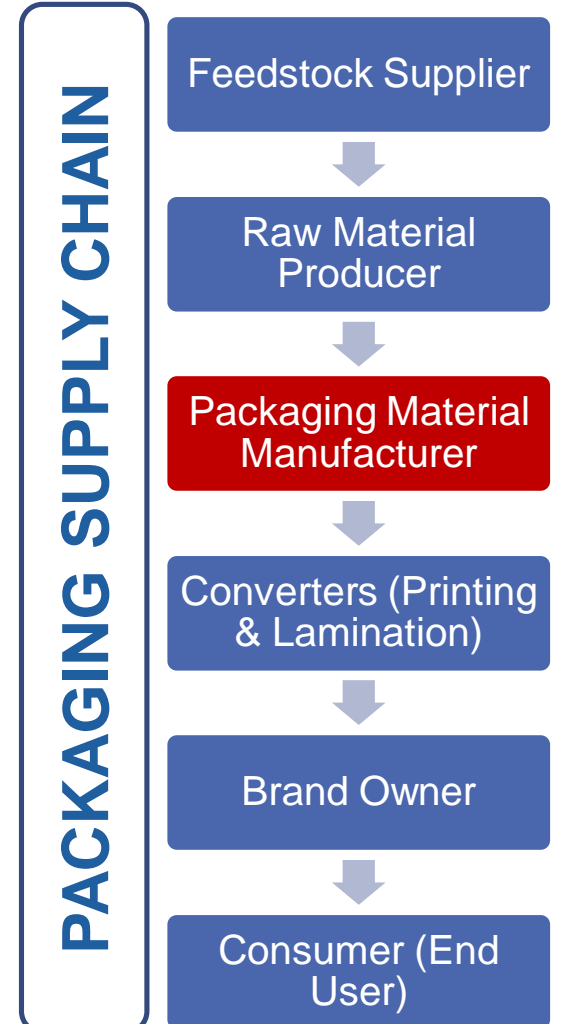
- Portioning the food
- Protection of the food from outer disturbances
- Active functions by stabilizing the content of the good inside the package (by adsorption, scavenging etc.)
- Intelligent functions by informing the conditions of the package and its content (storing conditioning alert, shelf life indicator etc.)



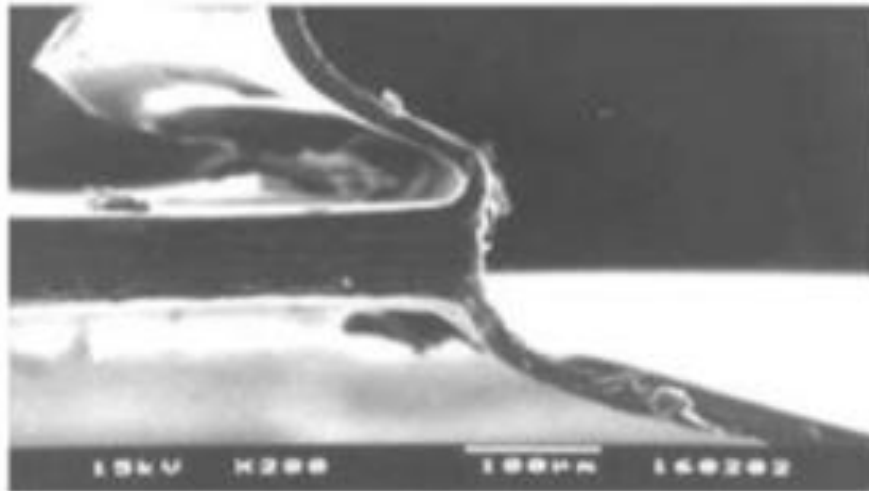
CHALLENGES OF MATERIAL MANUFACTURERS

Maintaining the quality - enhance the shelf life of the goods while meeting the requirements of the cost reduction of the package systems, the material manufacturers focus their R&D studies mostly on:

- Downgauging
- Barrier systems
- Processability for new generation converting systems

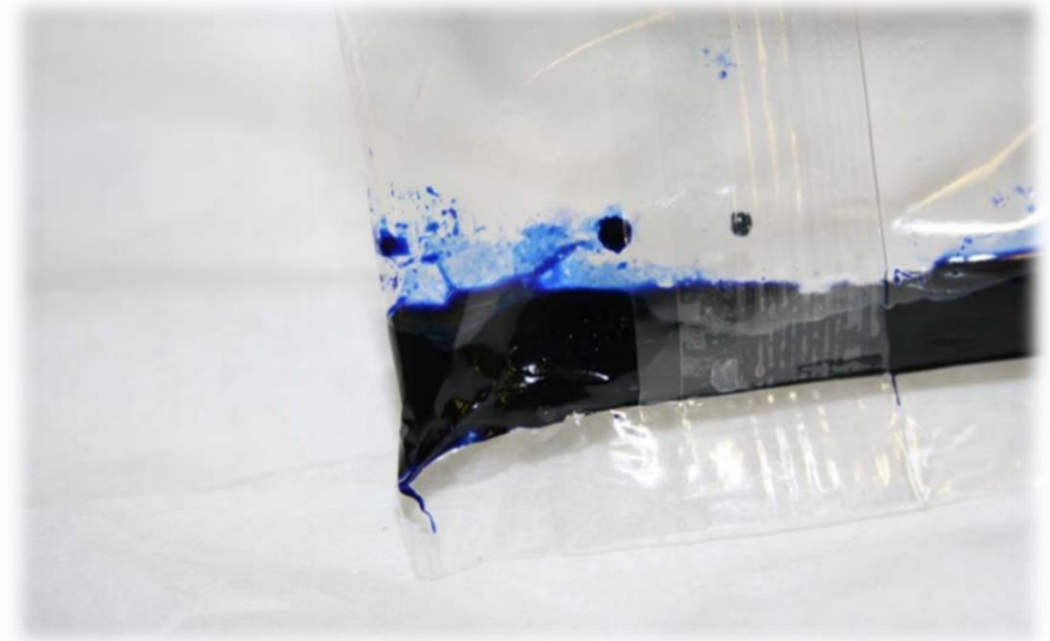


WHAT ABOUT SEALABILITY OF THE PACKAGE???



IMPORTANCE OF PROPER SEALING

- Achieving high barrier systems is not only sufficient to ensure the product quality and prolonged shelf life.
- There may be capillary openings in the seal areas even high seal forces are observed.
- Leakages – insufficient sealing directly affects the shelf life.
- Seal integrity is a vital property especially for food packaging applications to achieve:
 - Preservation of food
 - Robust package
 - Customer satisfaction
 - Minimization of waste



CAUSES OF SEALING FAILURES

Significant amount of food is lost or wasted because of seal failure due to:

- Effect of seal through contamination
- Mechanical stresses on the sealing area during transportation, storing etc.
- Non-optimized sealing conditions (temperature, pressure, dwell time)
- Wrong selection of web structure (e.g. very thin sealant layer)
- Sealing jaw defects

SEAL INTEGRITY

- Carrying out many risks of failure for packages, scientific testing methods for seal integrity are being used rarely.
- The most common seal integrity test method is squeezing of randomly selected packages by hand or manual bubble tests carried out by operators.
- Scientific testing methods such as vacuum chamber testing, burst testing, dye penetration testing etc. are not common in the industry.
- As a result Brand-owners and Packers should minimize the risk of seal failure by choosing web systems exhibiting enhanced sealing properties.



HERMETIC SEALABLE BOPP FILM DEVELOPMENT

HIGH HERMETIC SEALABLE BOPP FILM

The study targets to produce a film with better sealing properties compared to standard BOPP films while ensuring advantages of mechanical and optical properties.

The key features of the new development are:

- Improved sealability for lap and fin seal applications
- Excellent printability and high gloss print surface
- Enhanced hot tack properties
- Broad seal range
- Suitability for hermetic packaging applications

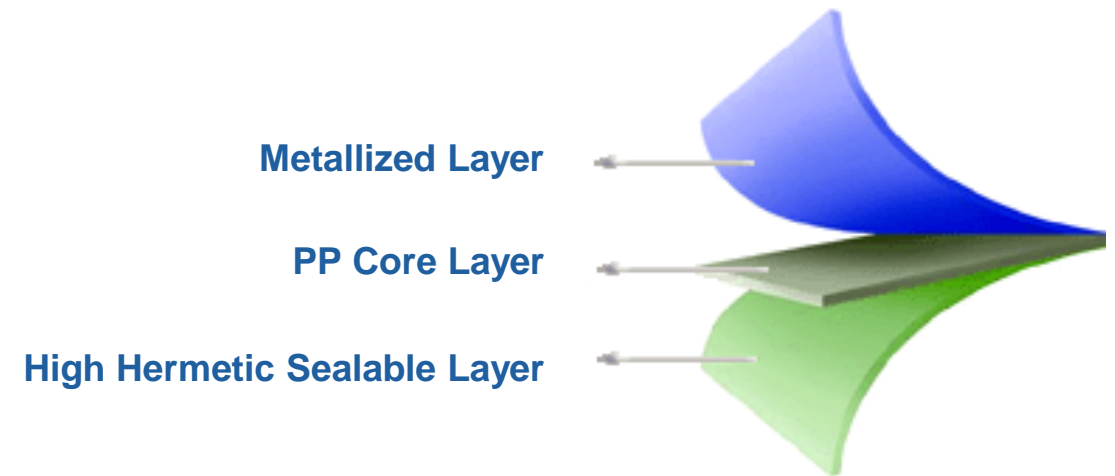
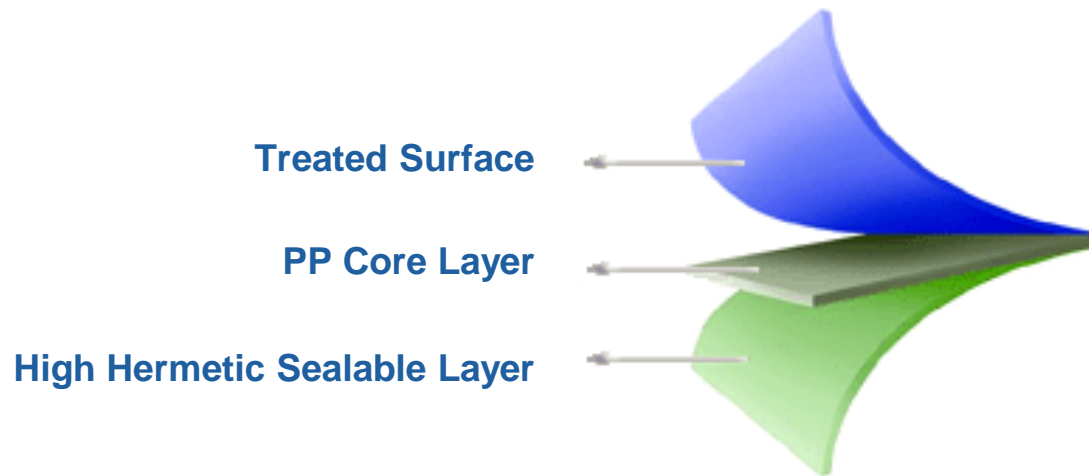
HIGH HERMETIC SEALABLE BOPP FILM

Hermetic Sealable Layer is designed to function in both;

Transparent

&

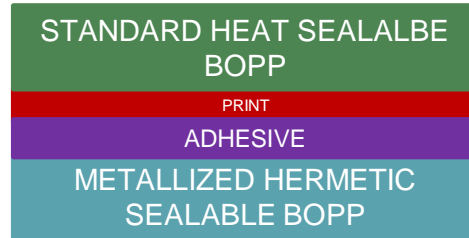
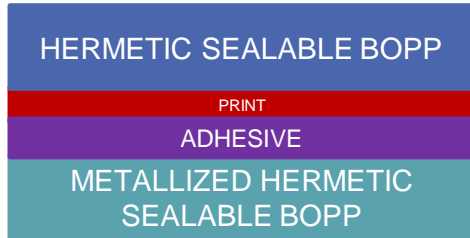
Metallized



APPLICATIONS & PROPERTIES

GAS FLUSHED SNACK FOOD

EVALUATED STRUCTURES

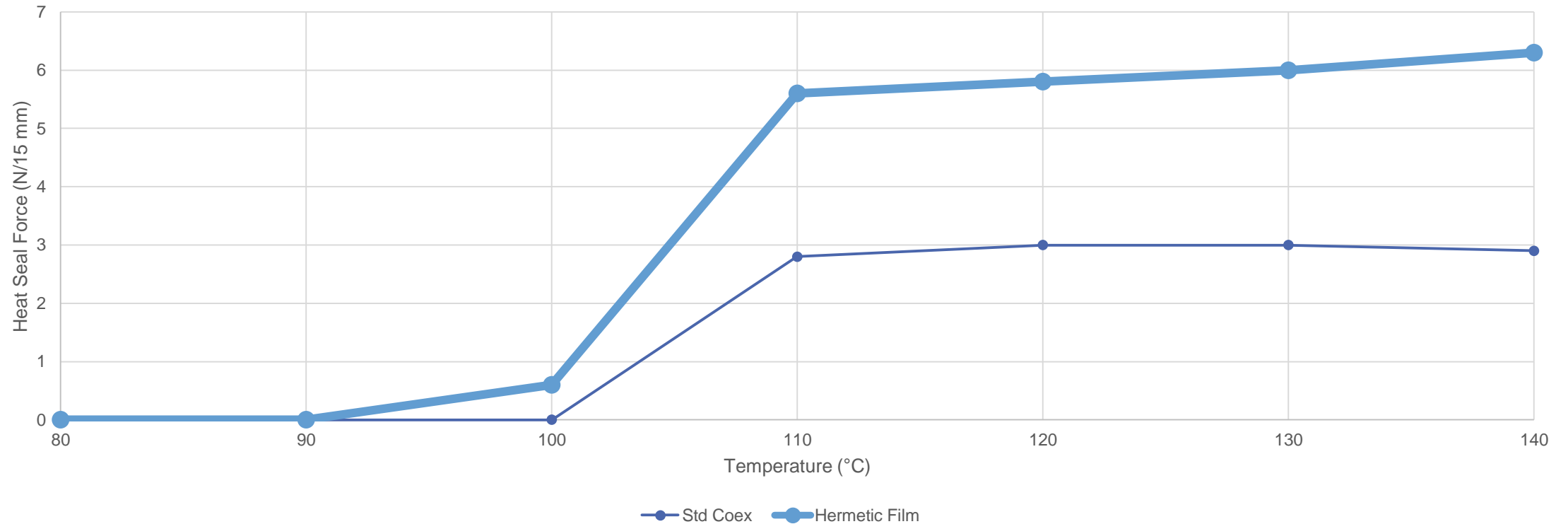


- For gas flushed snack food applications transparent (printing layer) & metallized film lamination is evaluated for hermetic seal and lap seal properties.
- With the modification of the sealant layer, it is expected to minimize the micro size cracks on the seal area that causes gas leakage problems
- Both structures are designed to have higher seal force on the lap sealed area compared to standard coex film.
- With these structures, the packages with gas flush are expected to become more resistant to ambient temperature and pressure changes.

APPLICATIONS & PROPERTIES

TEST RESULTS – HEAT SEAL FORCE

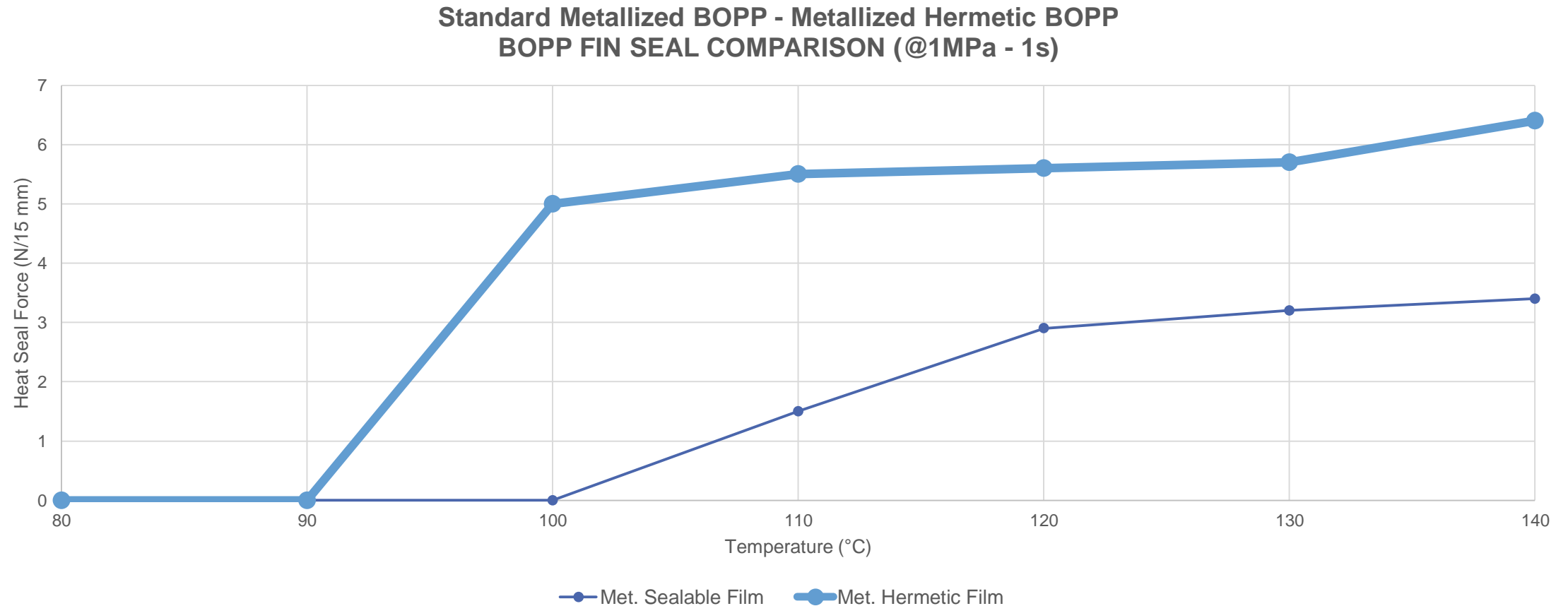
Standard BOPP - Hermetic Sealable BOPP
FIN SEAL FORCE COMPARISON (@1MPa - 1s)



New developed hermetic sealable film shows superior sealability compared to standard coex films.

APPLICATIONS & PROPERTIES

TEST RESULTS – HEAT SEAL FORCE

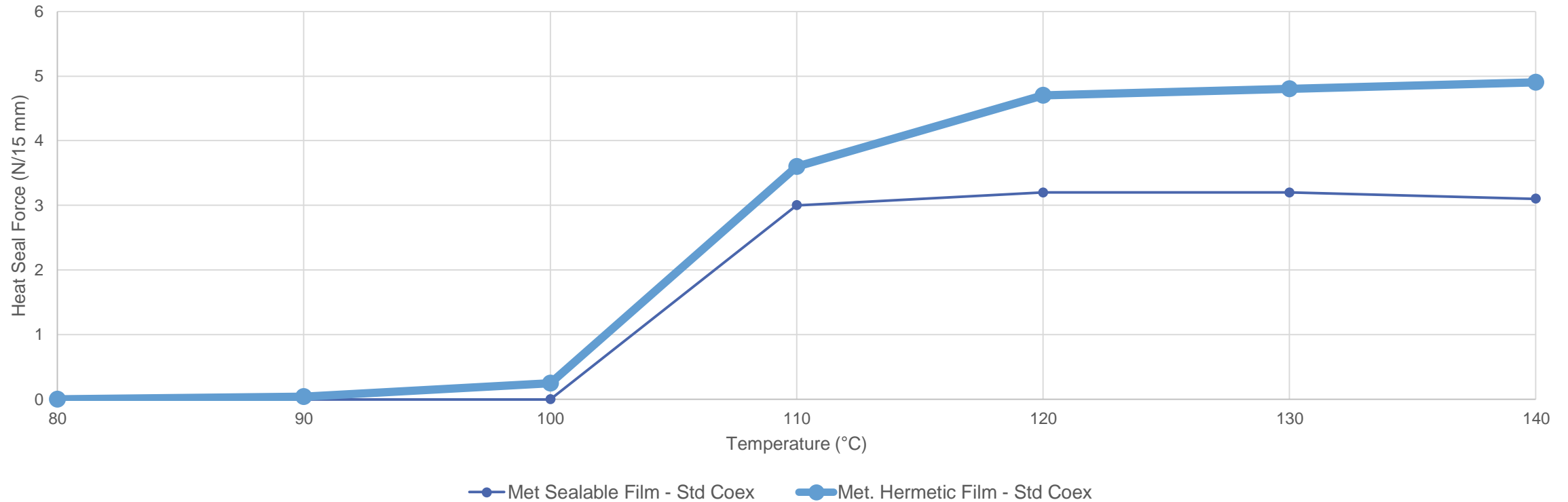


New developed metallized hermetic sealable film shows superior sealability compared to standard coex films.

APPLICATIONS & PROPERTIES

TEST RESULTS – HEAT SEAL FORCE

Standard BOPP - Hermetic Sealable BOPP
LAP SEAL COMPARISON (@1MPa - 1s)



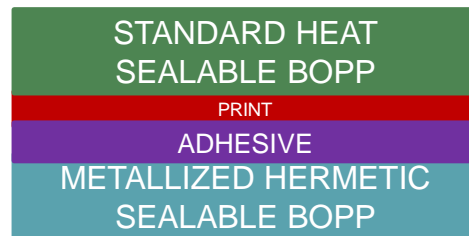
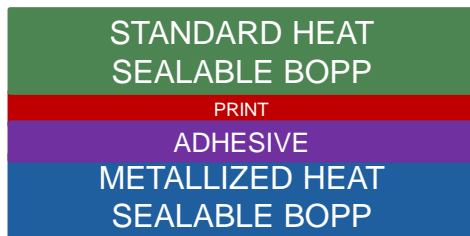
3031 MPE heat seal forces are the average testing results of after production and 1 week aged sample testing

APPLICATIONS & PROPERTIES

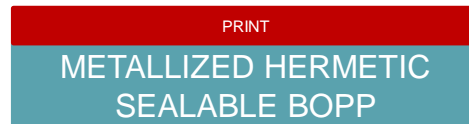
DIFFERENT PACKAGING APPLICATIONS

RECOMMENDED STRUCTURES

LAMINATION



SINGLE WEB



- Hermetic sealable grades are being tested for packaging applications where hermetic seal efficiency and hot tack performance is required.
- In addition, hermetic sealable grades are expected to perform well for packages which have excess oily products to prevent any oil leakage problem.
- For this purpose, hermetic sealable grades are tested at low dwell time and low pressure conditions. Test results show that hermetic sealable grades are better in term of seal and hot tack forces compared to standard sealable films.
- The sealing performance under extreme conditions makes hermetic sealable grades a perfect choice for applications such as seal through contamination packs.

APPLICATIONS & PROPERTIES

TEST RESULTS – SEAL FORCE UNDER LOW PRESSURE & DWELL TIME

<u>HEAT SEAL COMPARISON of</u> of Standard Metallized Heat Sealable BOPP – Metallized Hermetic Sealable BOPP -20 mic (Tests done on Nontreated/Nontreated surfaces)					
	TEST PARAMETERS			Standard Metallized Heat Sealable BOPP 20μ	Metallized Hermetic Sealable BOPP 20μ
	TEMPERATURE	PRESSURE	DWELL TIME		
	(°C)		(seconds)		
STANDARD CONDITIONS	120	1 Mpa-150 N	1	2,9	4,3
Test 1			0,5	2,7	4,2
Test 2			0,3	2,5	3,8
Test 3			0,1	2,1	3,5
Test 4		0,5 Mpa-70 N	1	2,7	4,3
Test 5		0,3 Mpa-40 N	1	2,5	4,0
			0,5	2,4	3,8
			0,3	2,2	3,5
			0,1	1,9	3,0
Test 6		0,1 Mpa-10 N	1	2,6	3,6
			0,5	1,9	3,4
			0,3	1,5	2,9
			0,1	1,3	2,8

APPLICATIONS & PROPERTIES

TEST RESULTS – SEAL FORCE UNDER LOW PRESSURE & DWELL TIME

HOT TACK TESTS of Standard Metallized Heat Sealable BOPP – Metallized Hermetic Sealable BOPP 20 mic (Tests done on Nontreated/Nontreated surfaces)					
	TEST PARAMETERS			Standard Metallized Heat Sealable BOPP 20µ	Metallized Hermetic Sealable BOPP 20µ
	TEMPERATURE	PRESSURE	DWELL TIME		
	(°C)		(seconds)		
STANDARD TEMPERATURE	120	1 Mpa-150 N	1	75 g	100 g
Test 1	115			75 g	100 g
Test 2	110			75 g	100 g
Test 3	105			50 g	75 g
Test 4	100			Fail	75 g

- Tests are performed under Super Film lab conditions
- New developed film shows stable performance even at low temperatures

CONCLUSIONS

- It is an industrial practice and fact that barrier properties of a package are not just related to barrier properties of the substrates used, but also to hermetic sealing on sealed areas to minimize the risk of any seal failure or leakage.
- As a result Converters/Brand-owners/Packers should consider expecting better sealable films to complete the structure of high barrier packages.
- New development hermetic sealable BOPP can be used as single web or laminated with metallizable films and transparent films depending on the application and required performance.
- New development hermetic sealable metallized BOPP shows enhanced hot tack and seal force to itself (fin seal) or to a sealable transparent film (lap seal) without losing barrier properties compared to standard metallized BOPP film.

THANK YOU...