Afera
The European Adhesive Tape Association

GLOBAL TAPE FORUM

1st Afera Global Adhesive Tape Summit

Taiwan Trends of Functional Fim for PSA Industries

Speaker Profile

- SK.Wang
- Yem Chio Co Ltd Taiwan
- Deputy Director
  Biaxially Oriented Polypropylen Film Div
- >25 Years in Packaging Industries
  Mainly in Flexible Packaging material sector

Reliable and Best Choice

Taiwan Trends of Functional Fim for PSA Industries

- Introduction of Taiwan Regional Association of Adhesive Tape Manufacturer (TAAT)
- Trends of Film Application in the Tape Sector (Degradable Bopp Film)

TAAT's History

- Founded in 1976 by 18 members of Adhesive Tape Companies.
- First Chairman – Mr. P.Y. Yang

  (Four Pillars Co., Ltd.- President).
- Total members in 2018:

  38 x coating companies

  24 x affiliated members of raw material suppliers.

TAAT's Objectives

- Market survey for the Adhesive Tape Industry.
- Host annual technical and educational seminar for the Adhesive Tape Industry.
- Assist to establish the criteria of Chinese National Standards (CNS) for Adhesive Tape Industry in Taiwan.
- Provide professional assistance to help make government economic policy and carry out the Environmental law.

TAAT's Objectives

- Assist members to participate worldwide exhibitions and various Adhesive Tape seminars.
- Assist overseas buyers to contact our association members for preferred products.
- Issue periodical bulletin to our members.
- TAAT members directory publishing.

TAAT's Membership

- Over 38 manufacturers in various fields.
- Most of the manufacturers are middle-size companies.
- Most of the manufacturers have established their coating facilities in China.

TAAT's Membership by Capital

Registered Capital Unit：1,000 (NTD)	No.	Accumulated Capital Unit：1,000 (NTD)	%
400,000	3	2,100,000	65.85
100,000 ＜ Capital ≦ 300,000	3	2,670,705	83.88
30,000 ＜ Capital ≦ 100,000	6	3,001,986	94.28
10,000 ＜ Capital ≦ 30,000	6	3,123,163	98.09
3,000 ＜ Capital ≦ 10,000	8	3,173,223	99.50
1,000 ＜ Capital ≦ 3,000	5	3,184,123	99.84
300 ＜ Capital ≦ 1,000	7	3,189,223	100.00

TAAT's Membership by Capital

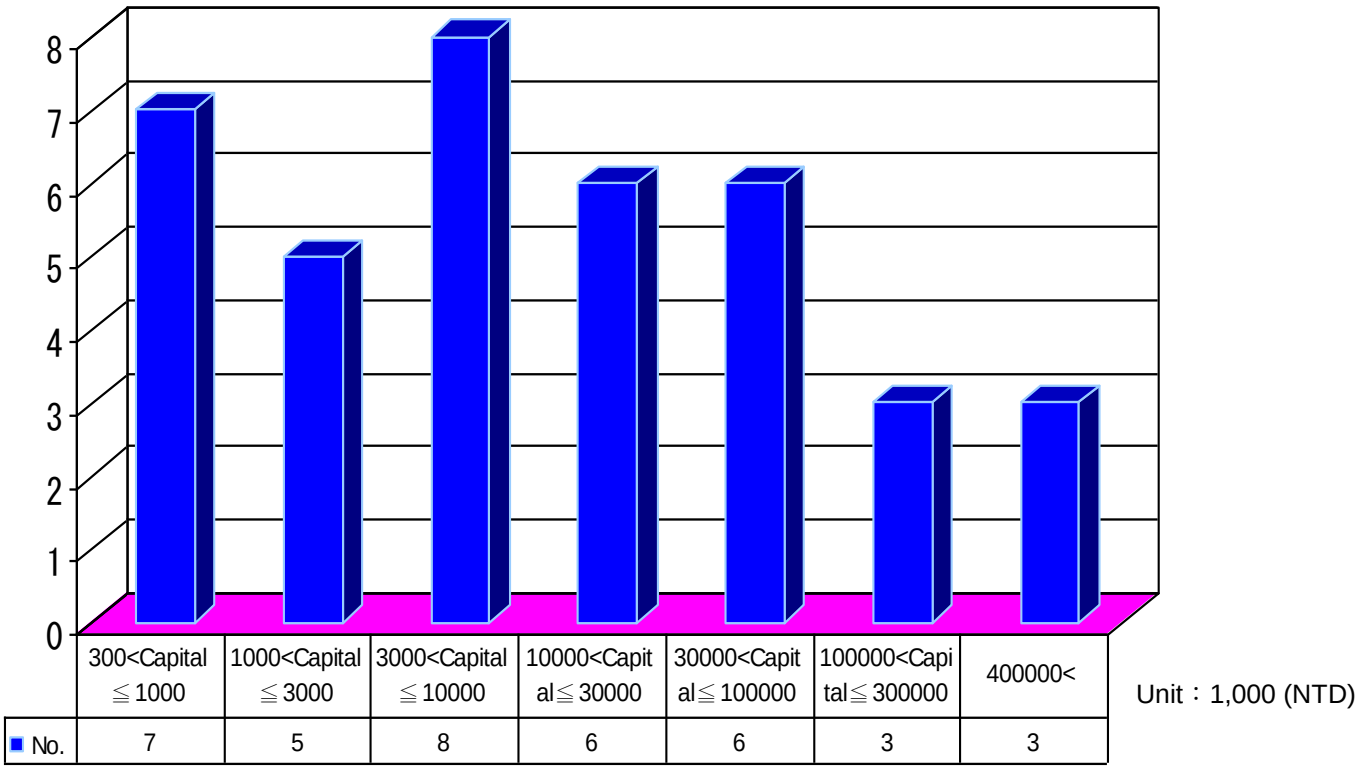


Figure 1 Affiliated Membership - Capital 2016

TAAT's Affiliated Membership by Category

	Number	%
Adhesive Supplier	10	41
Material	3	13
Release	6	25
Machine	3	13
Others	2	8
Total	24	100

Year：2016

TAAT's Affiliated Membership by Category

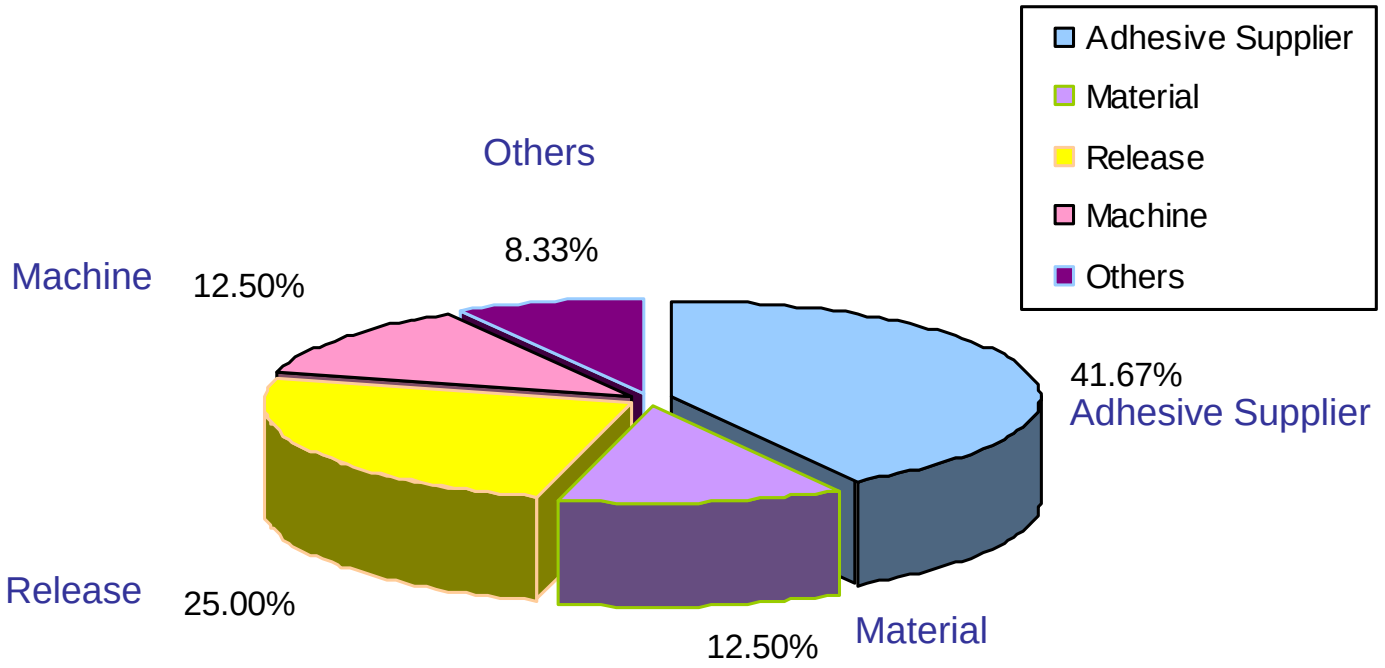


Figure 2 24 Affliated Membership - 2016

Taiwan's Adhesive Tape Market

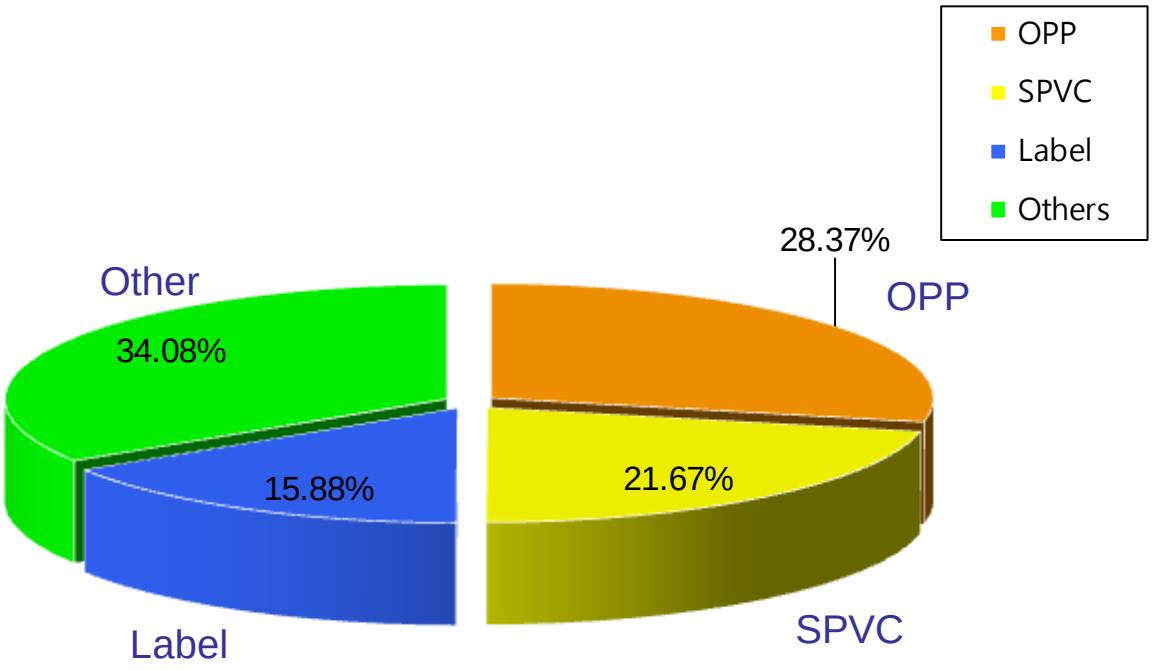


Figure 3 2016 Adhesive Tape Sales Amount

Taiwan's Adhesive Tape Market

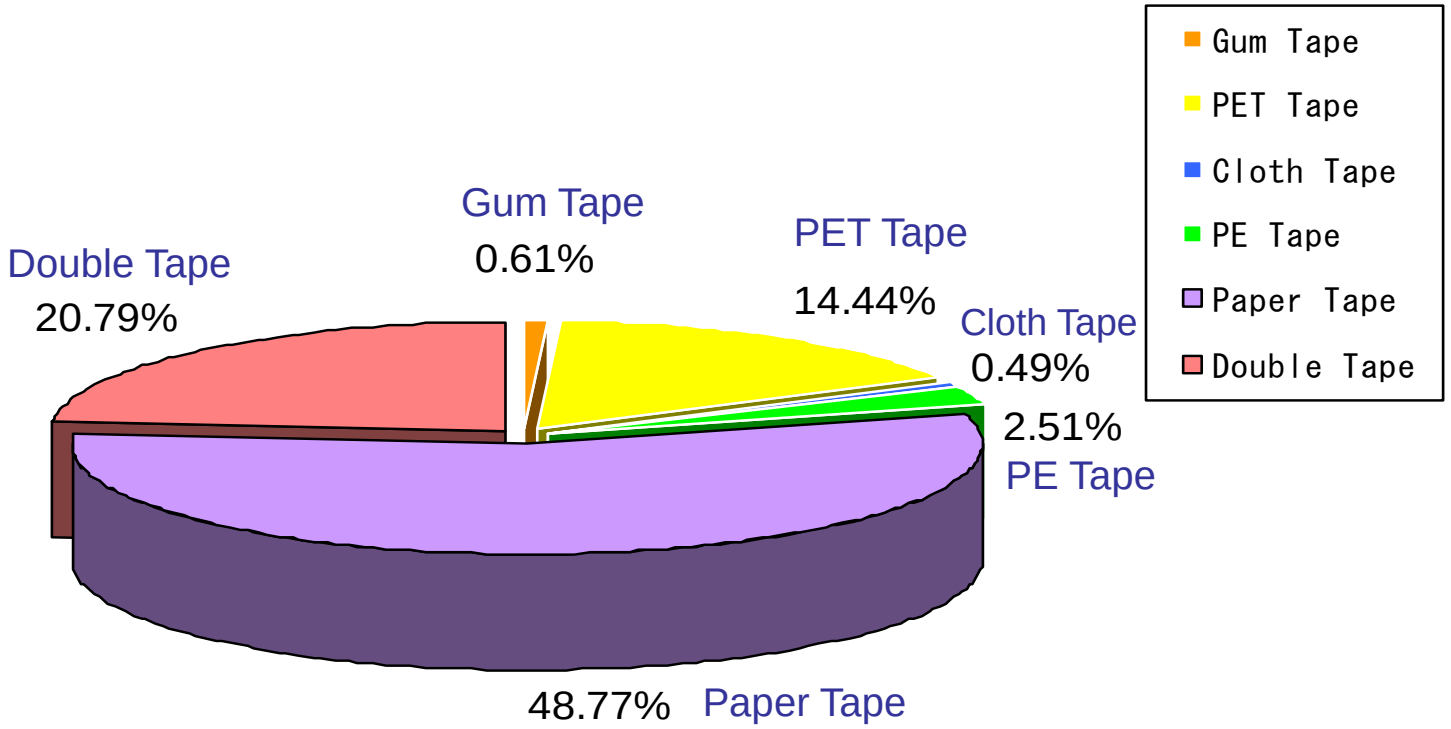


Figure 4 2016 Adhesive Tape Sales Amount - Others

Taiwan's Adhesive Tape Market

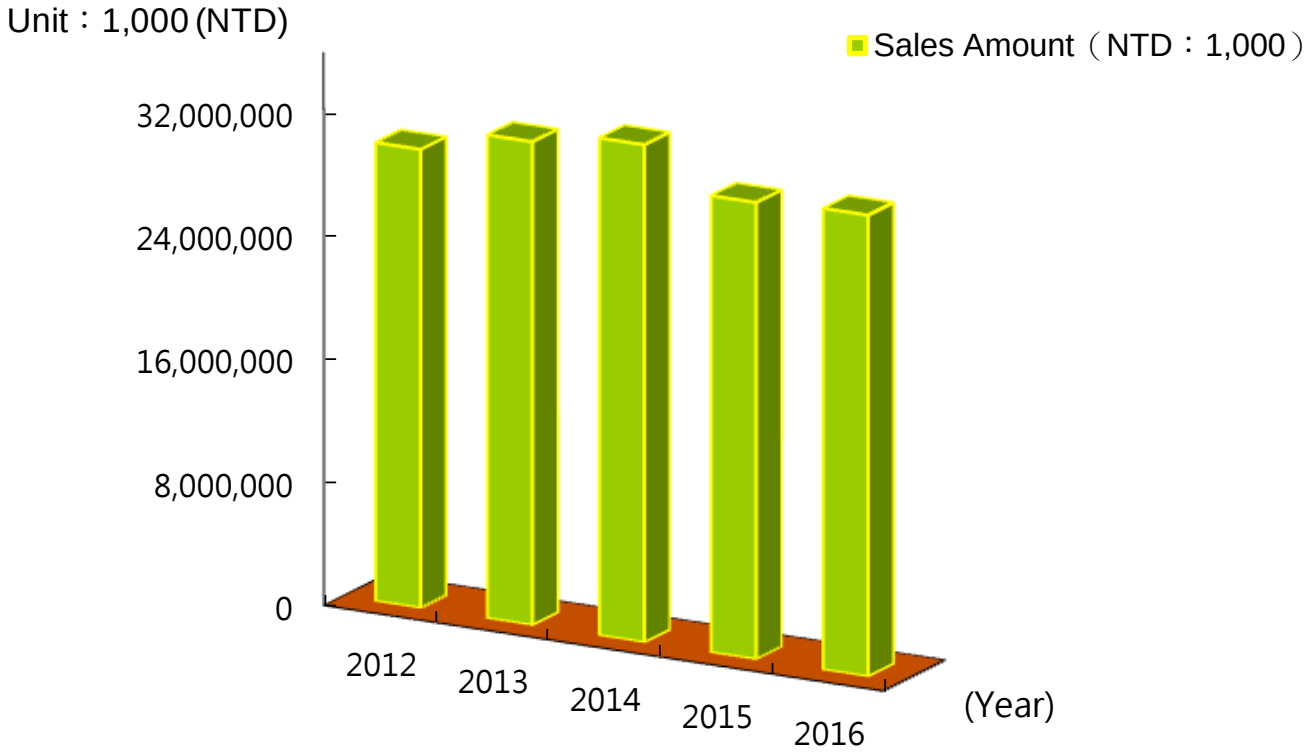


Figure 5 2012～2016 Adhesive Tape - Sales Chart

Taiwan's Adhesive Tape Export Market

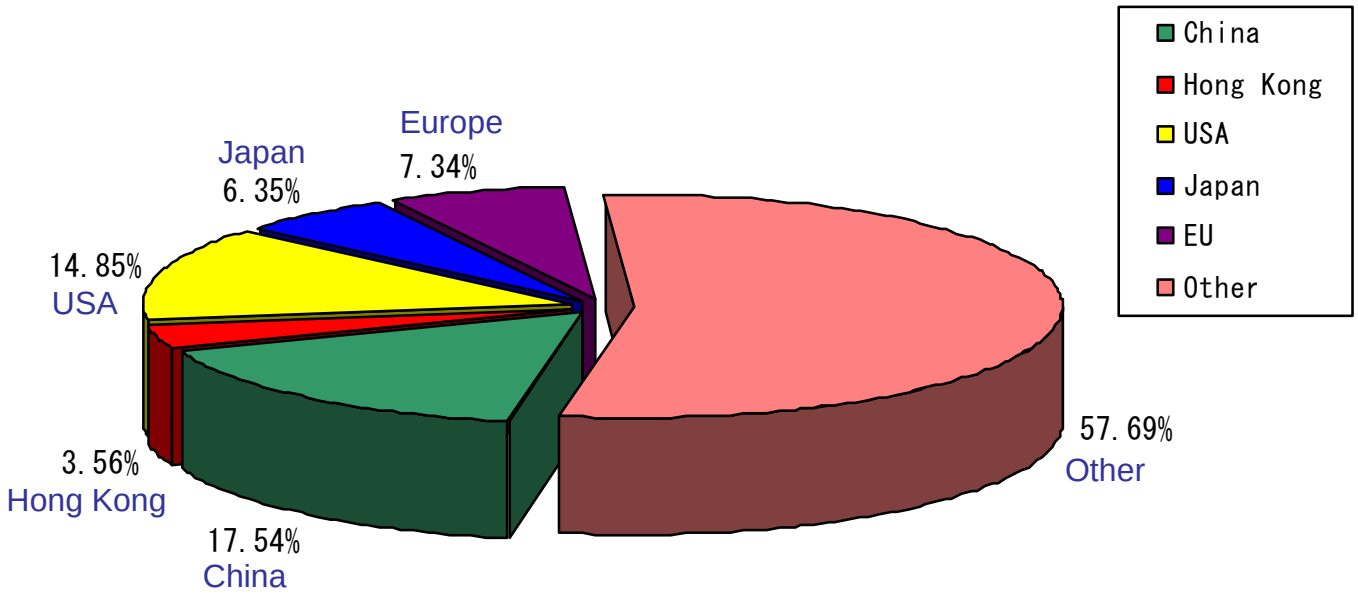


Figure 6 2016 Adhesive Tape Export Area Distribution

Taiwan's Adhesive Tape Export Market

Unit：1,000 (NTD)

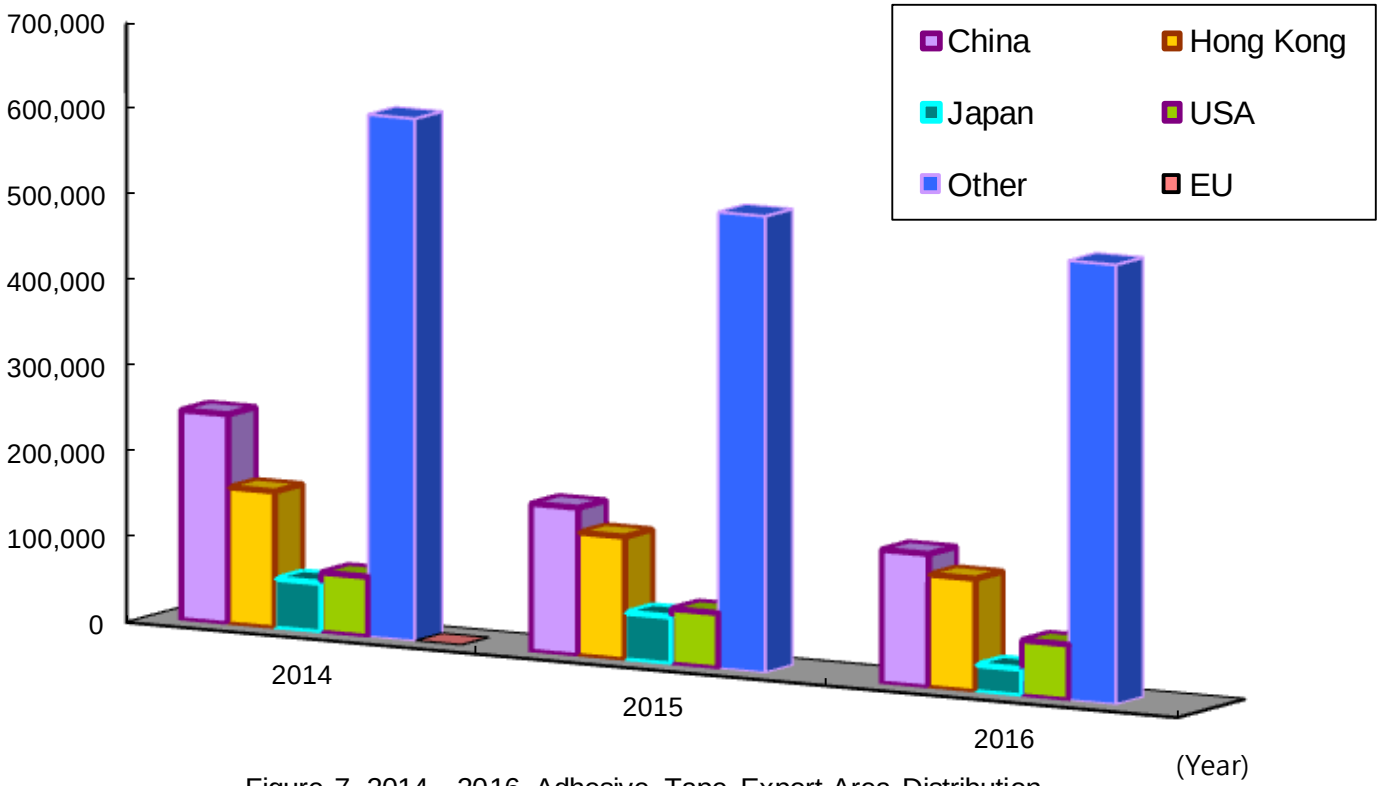


Figure 7 2014～2016 Adhesive Tape Export Area Distribution

Taiwan's Adhesive Tape Import Market

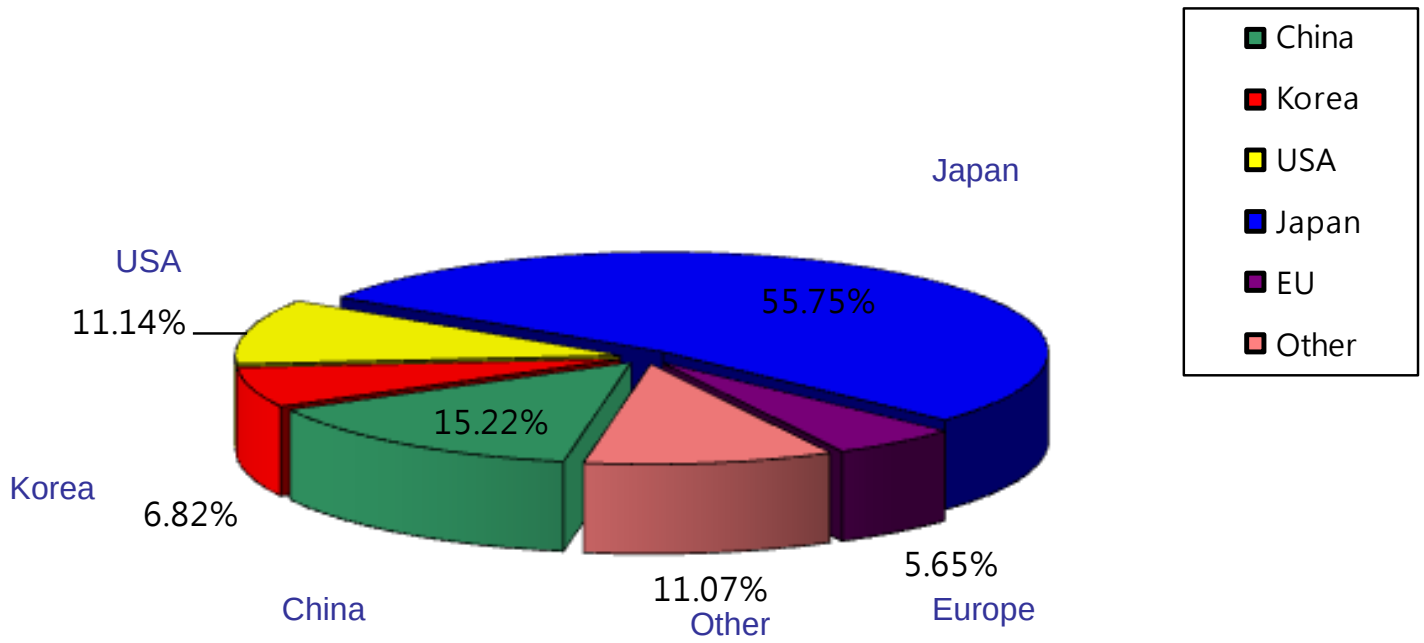


Figure 8 2016 Adhesive Tape Import Area Distribution

Taiwan's Adhesive Tape Import Market

Unit：1,000 (NTD)

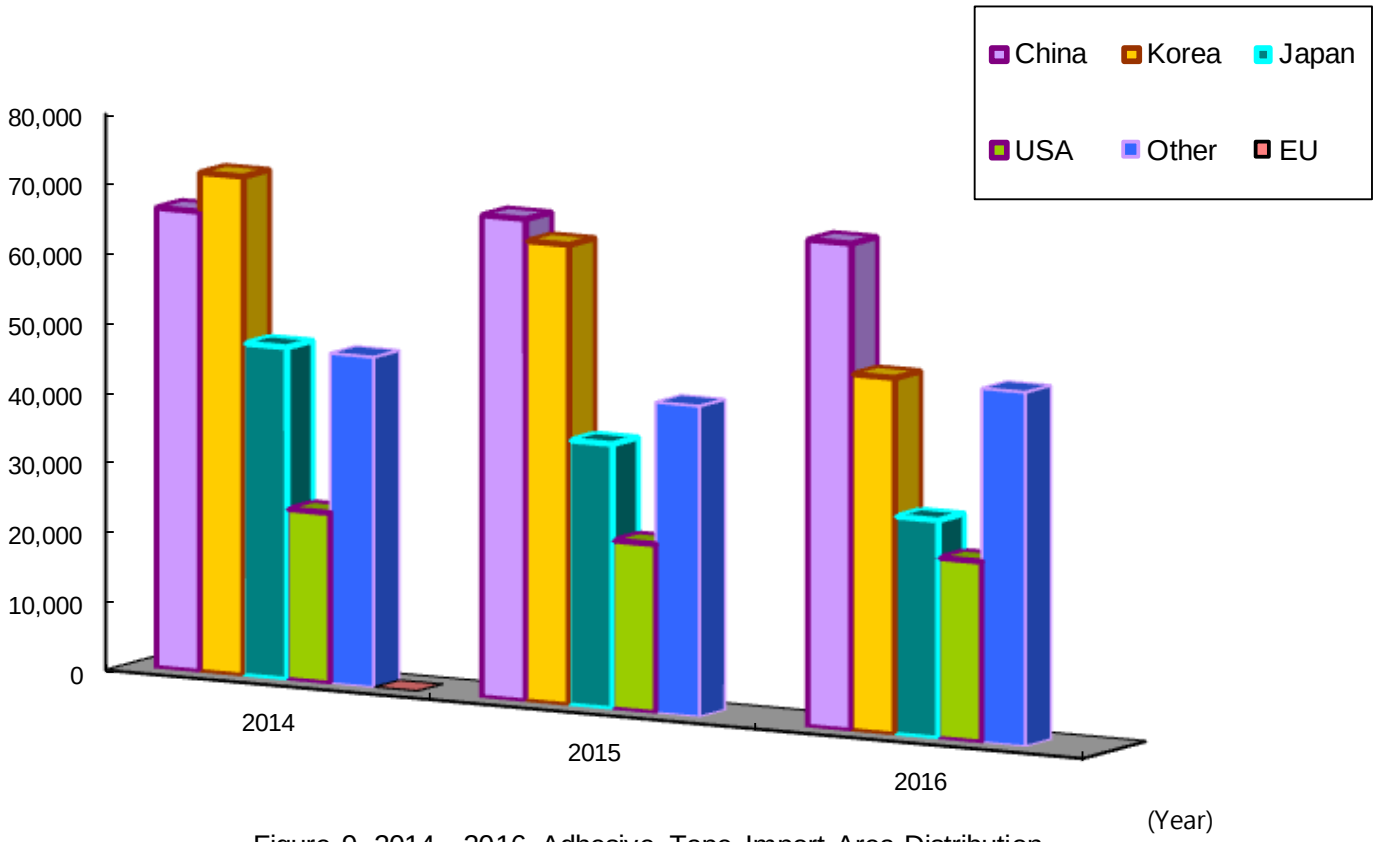


Figure 9 2014～2016 Adhesive Tape Import Area Distribution

The Future

1. We expect a slow growth rate CAGR(Compound Annual Growth rate) about 2% in the next few years.

2. Increasing solvent replacement with emulsion toward VOC reduction policy.

3. Special tape demands will increase in certain electronic applications.

Taiwan Trends of Functional Fim for PSA Industries

Trends of Film Application in the Tape Sector

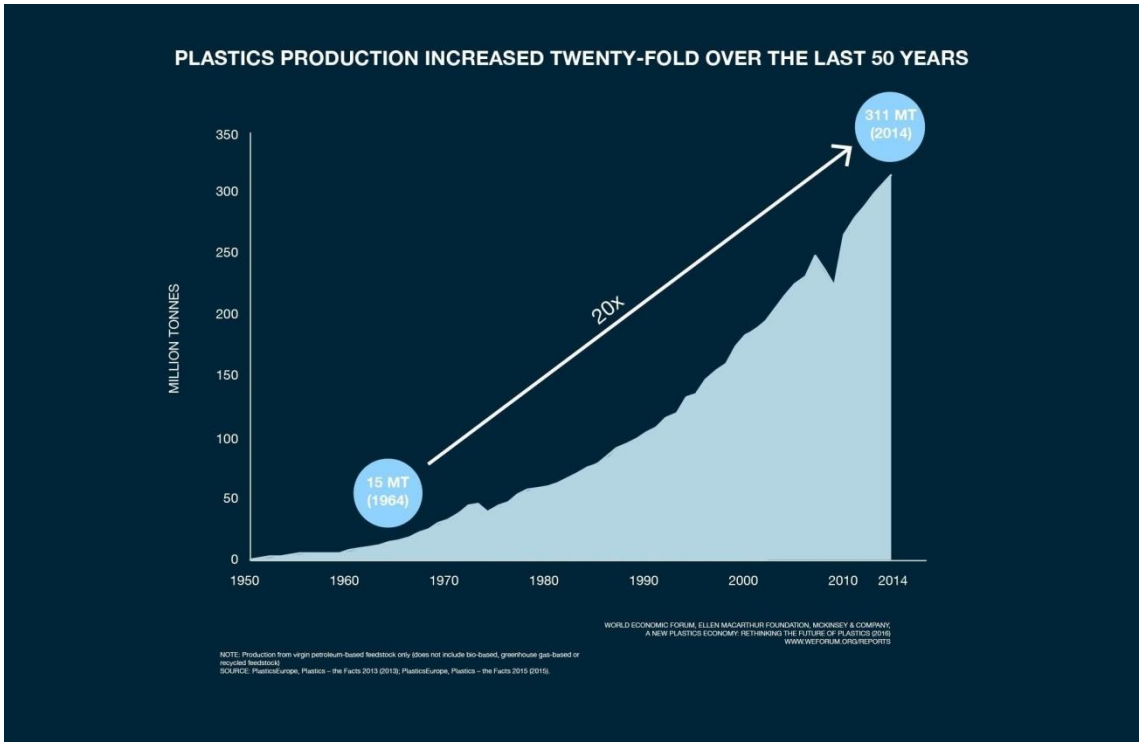
(Degradable Bopp Film)

Product of YC Group

Taiwan Trends of Functional Fim for PSA Industries

- Increasing on line commercial activities, more packaging tape demand for parcel service.
- Figure declared package 1 billion pcs per day, annual 365 billions.
- Packaging tape consumption 25 billions meters, which is 625 round the globe.

Taiwan Trends of Functional Fim for PSA Industries



Since 1964, plastic production has increased 20 fold reaching 311 million tonnes in 2014

Between 1950 and 2015, more than 6,700 MMT of plastics were produced most of these still exist somewhere: as functional products, but also in landfills or as litter in the natural environment.

Taiwan Trends of Functional Fim for PSA Industries

Plastic waste will reach 12 billion tones by 2050.

About 60% of that, has already ended up in landfill or polluting the environment.

8.3 billion metric tones of plastic has been produced in the 65 years

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Decomposition time

Product	Time
Banana skin	10 days
Apple core	60 days
Tissue Paper	28 days
Old news Paper	42 days
Orange skin	180 days
Cigarette butts	4,380 days
Aluminum can	36,500 days
Plastic bottle	164,250 days
Plastic Bag	365,000 days
Polyform	3,650,000 days
Glass Bottle	3,650,000,000 days

Taiwan Trends of Functional Fim for PSA Industries

Can we be part of waste reduce program?

Taiwan Trends of Functional Fim for PSA Industries

Definition of Green products are:

*Energy efficient, durable and often have low maintenance requirements.
*Free of Ozone depleting chemicals, toxic compounds and do not produce toxic by-products.
*Often made of recycled materials or content or from renewable and sustainable sources.
*Obtained from local manufacturers or resources.
*Biodegradable or easily reused either in part or as a whole.

Taiwan Trends of Functional Fim for PSA Industries

- How Tape manufacturer contribute toward global environmental issue
- Sustainable packaging is no longer focused on just recycling
- Green material: Degradable Bopp Film
- Down size thickness and width (25micron → 22micron?)
- Spec: Reduce adhesive with improved adhesion performance

Taiwan Trends of Functional Fim for PSA Industries

Introduction of degradable Bopp Film

1. Degradation in 24 months after production.
2. Non toxic
3. Maintains standard physical film properties

Taiwan Trends of Functional Fim for PSA Industries

Degradation Definitions
Polymer degradation is a change in the properties—tensile strength, color, shape, etc.—of a polymer or polymer-based product under the influence of one or more environmental factors such as heat, light or chemicals.

These changes are usually undesirable, such as cracking and chemical disintegration of products or, more rarely, desirable, as in biodegradation, or deliberately lowering the molecular weight of a polymer for recycling. The changes in properties are often termed "aging".

In a finished product such a change is to be prevented or delayed. Degradation can be useful for recycling/reusing the polymer waste to prevent or reduce environmental pollution.

Degradation can also be induced deliberately to assist structure determination.

Polymeric molecules are very large (on the molecular scale), and their unique and useful properties are mainly a result of their size.
Any loss in chain length lowers tensile strength and is a primary cause of premature cracking.

How Degradable Works

Polypropylene resin + degradable additive

Bixially Oriented Process (Bopp Film)

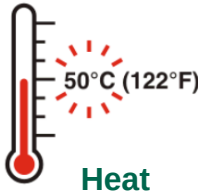
UV Light

Converting (end product)

Degradable after 24 months

O_2

Oxygen



Heat

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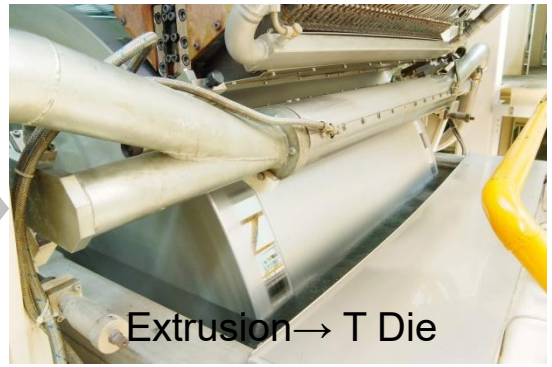
How degradable Bopp film being produce



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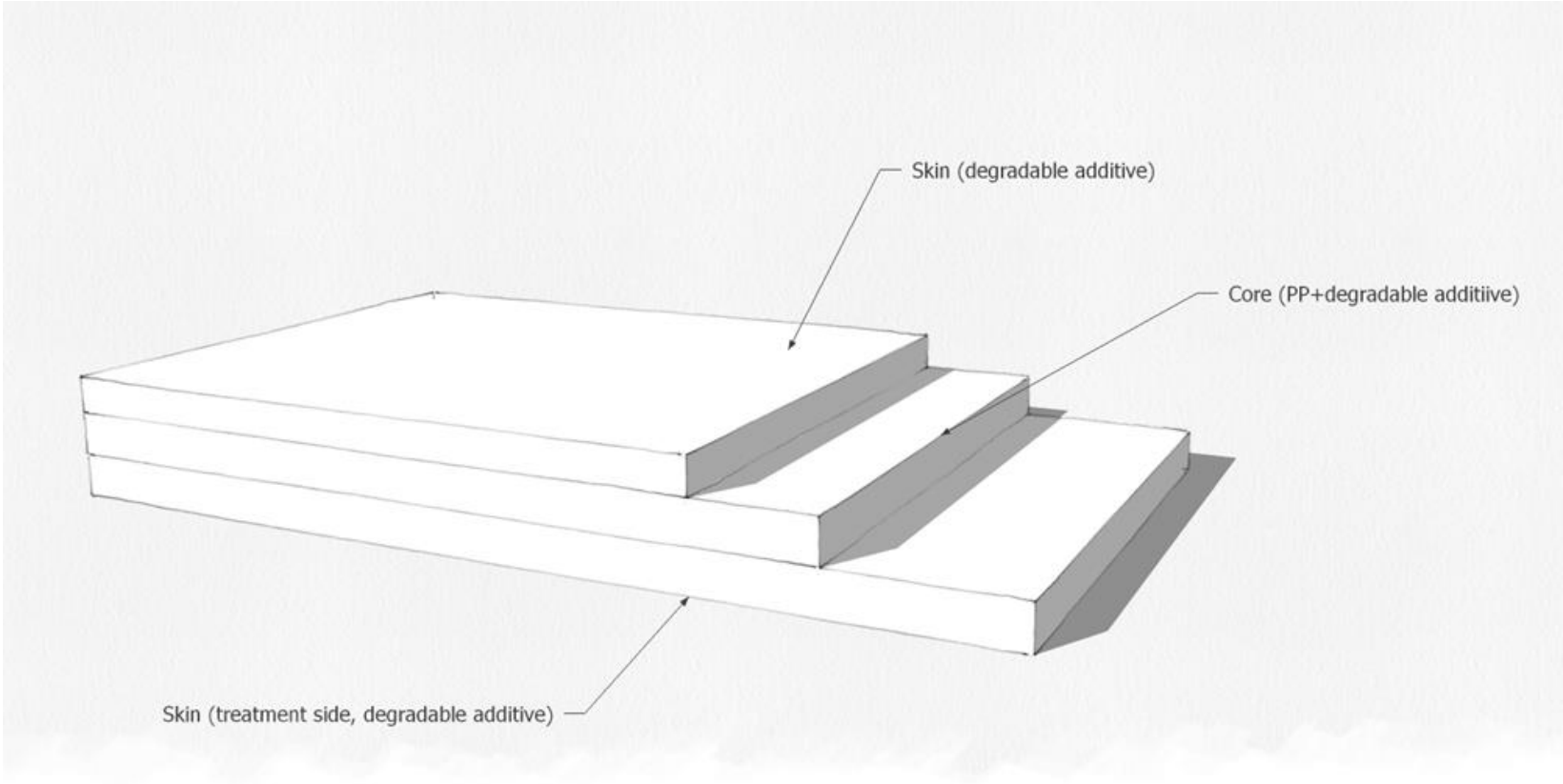
Degradable Bopp film structure



Taiwan Trends of Functional Fim for PSA Industries

品 名 Product Name	0.050mm 透明成品 T14D Degradable Film	
檢驗項目items	實測值 test value	品質標準 standard value
批(箱)號 Batch No	434353	–
原皮厚度(M/M) Base film Thickness	0.025	0.025
成品厚度(M/M) Overall Thickness	0.049	0.050
上膠厚度(M/M) Adhesive Thickness	0.024	0.025
初期黏度(cm) Initial Tack	1.0	2.0↓
對鋼黏著力(kg/in) Peel Adhesion	0.81	0.65↑
紙板保持力(min/15*25mm) Holding Power	33分	32分↑
抗拉強度(kgf) Tensile Strength	8.41	7↑
伸長率(%) (Elongation)	153.7%	110%↑
脫膠 Adhesive Peel Off	NO	NO
檢驗結果評定 Overall Comment	■合格 QUALIFED □不合格 NO QUALIFED	

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1. Degradable PP Clear Film (T14D) (left) vs. Control PP Clear Film (right) before exposure

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2. Degradable PP Clear Film (T14D) (left) vs. Control PP Clear Film (right) after thermal exposure of previously photo-oxidized film

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Test Data

PHOTO-DEGRADATION

FTIR – Degradable PP Clear Film (T14D) vs. Control PP Film before and after UV Exposure

SAMPLE	ADDITIVE	KETONE PEAK HEIGHT (CARBONYL BAND REGION 1715±cm^{-1}) AFTER QUV EXPOSURE (hr)									
		time zero	48h	72h	96h	120h	144h	168h	192h	216h	312h
Degradable PP Clear Film	T14D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.06
Control PP Clear Film	NONE	0.00	No test data								0.00

Please see Spectra 1.

TENSILE ELONGATION - Degradable PP Clear Film (T14D) vs. Control PP Film before and after UV Exposure

SAMPLE	ADDITIVE	TENSILE ELONGATION AT BREAK (%) AFTER QUV EXPOSURE (HR)									
		time zero	48h	72h	96h	120h	144h	168h	192h	216h	312h
Degradable PP Clear Film	T14D	161	158	141	130	88	63	22	16	11	<5
Control PP Clear Film	NONE	169	No test data								60

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THERMAL DEGRADATION

FTIR - Degradable PP Clear Film (T14D) vs. Control PP Film before and after Thermal Exposure of Previously Photo-Oxidized Film

SAMPLE	ADDITIVE	KETONE PEAK HEIGHT (CARBONYL BAND REGION 1715±cm^{-1}) AFTER QUV AND HEAT-AGING EXPOSURE (days)		
		Time zero	OUV initiation	QUV+70C Oven (end degradation)
Degradable PP Clear Film	T14D	0.00	0.02 (9 days)	0.16 (13 days)
Control PP Clear Film	NONE	0.00	0.00 (9 days)	0.00 (13 days)

Please see Spectra 2.

MELT INDEX - Degradable PP Clear Film (T14D) vs. Control PP Film before and after UV and Thermal Exposure

SAMPLE	ADDITIVE	CONDITION (°C/KG)	MELT INDEX (G/10 MIN) AFTER QUV (HR) AND HEAT-AGING (DAYS) EXPOSURE		
			Time zero	QUV	QUV AND HEAT-AGING
Degradable PP Clear Film	T14D	230/ 2.16	4.56	>200 (312h)	>200 (13 days)
Control PP Clear Film	NONE	230/ 2.16	4.72	21.3 (312h)	5.6 (13 days)

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Conclusion:

Bopp Film with degradable additive will onset degradable within 24-36 months after manufacturing date when disposed of in an environment Where UV light, heat and oxygen are present.

Taiwan Trends of Functional Fim for PSA Industries

Together we can make the world better

Thank You , Danke , Teşekkür Ederim, dank u,
Merci, Gracias, Grazie, ありがとゥ,감사합니다, 謝謝，谢谢

Presented by

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