

# PRODUCT PORTFOLIO FOR FILM INSERT MOLDING (FIM)

in Automotive & Electronics Industries



**T.A.O.**  
BANGKOK  
CORPORATION LTD.



[www.taobangkok.co.th](http://www.taobangkok.co.th)

**T.A.O. Your Trusted Partner.**



# Content:

## What is Film Insert Molding (FIM)?

Why FIM?

Differentiations between IMD and FIM

Development of FIM

Advantages of FIM and Incorporating Electronics functions – IME

## Film Insert Molding (FIM) Technology

FIM Process

Differentiations between Thermo-/Vacuum Forming and High Pressure Forming

## Products for FIM Technology

Applications

Product Solutions

Product Solution Partners

## Provided by TAO

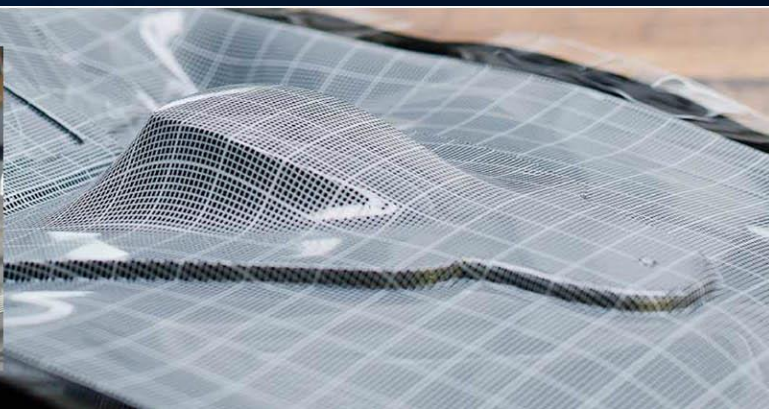
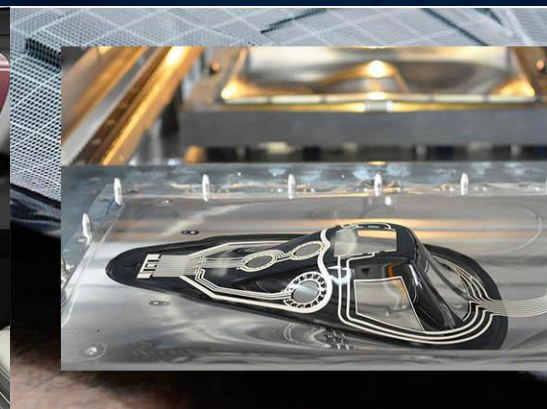
TAO Products & Accessories Directory

Service & Support

Contact

# What is Film Insert Molding (FIM)?

- A process for decorating plastic materials which later will be using a high pressure forming machine.
- Film products that allow both form and function in FIM applications
- This process is used in the automotive, electrical appliances, and medical devices industries.



# What is Film Insert Molding (FIM)?

## Differentiations between IMD & FIM



IMD

### **In-mold decoration (IMD)**

- is a decorative technology to use a transfer film from a roll transfer graphic in injection mold process.



KURZ  
NISEHA



FIM / IME

### **Film Insert-Molding (FIM)**

- The production method in which a printed sheet is formed (sheet-by-sheet) and then cut film is inserted inside a injection tool.

### **In-mold Electronics (IME)**

- Integrating electronics into plastics with conductive inks and encapsulate discrete semiconductor chips within molded parts.



niebling  
Formtechnologie

# What is Film Insert Molding (FIM)?

## Development of Film Insert Molding (FIM)



Cutaway panels to accommodate the switches



Interactive control surface



Deliver any colors and effects



Printed Electronic Circuit

With the advancement in designing automotive interior as well as the development of specialty films using in FIM technology, FIM can now deliver any color and variety of effects, even circuit printing, creating more than just a case of producing colored plastic shapes, its capability is also being used to create and enhance brand value.

# What is Film Insert Molding (FIM)?

## Advantages of FIM (1/2)



FIM enables one-step fabrication of plastic components with a decorated or functional surface.

Many manufacturers are looking for better materials, methods, and processes by which to manufacture their products. One alternative for decorating plastic products that is becoming more in demand includes Film Insert Molding (FIM).



Eliminate secondary decorating operation, e.g. spray painting, laser marking



High precision parts and reduce reject rate from secondary decoration.



High durability , e.g. chemical resistance and scratch resistance



FIM can create a huge variety of visual effects, e.g. surface texture, metallic or functional printing



Decoration can be changed by simply inserting different printed films from shot to shot.



Environmentally friendly, with the reduction of raw material such as metals, circuit wires, etc., resulting in decreased danger in case of a car accident.



Unique and sophisticated appearances

# What is Film Insert Molding (FIM)?

## Advantages of FIM (2/2)

### TACTOTEK

Overhead control panel

#### Comparison

##### How it was done before

- 35mm part thickness
- 64 parts + PCBA
- 470-gram weight



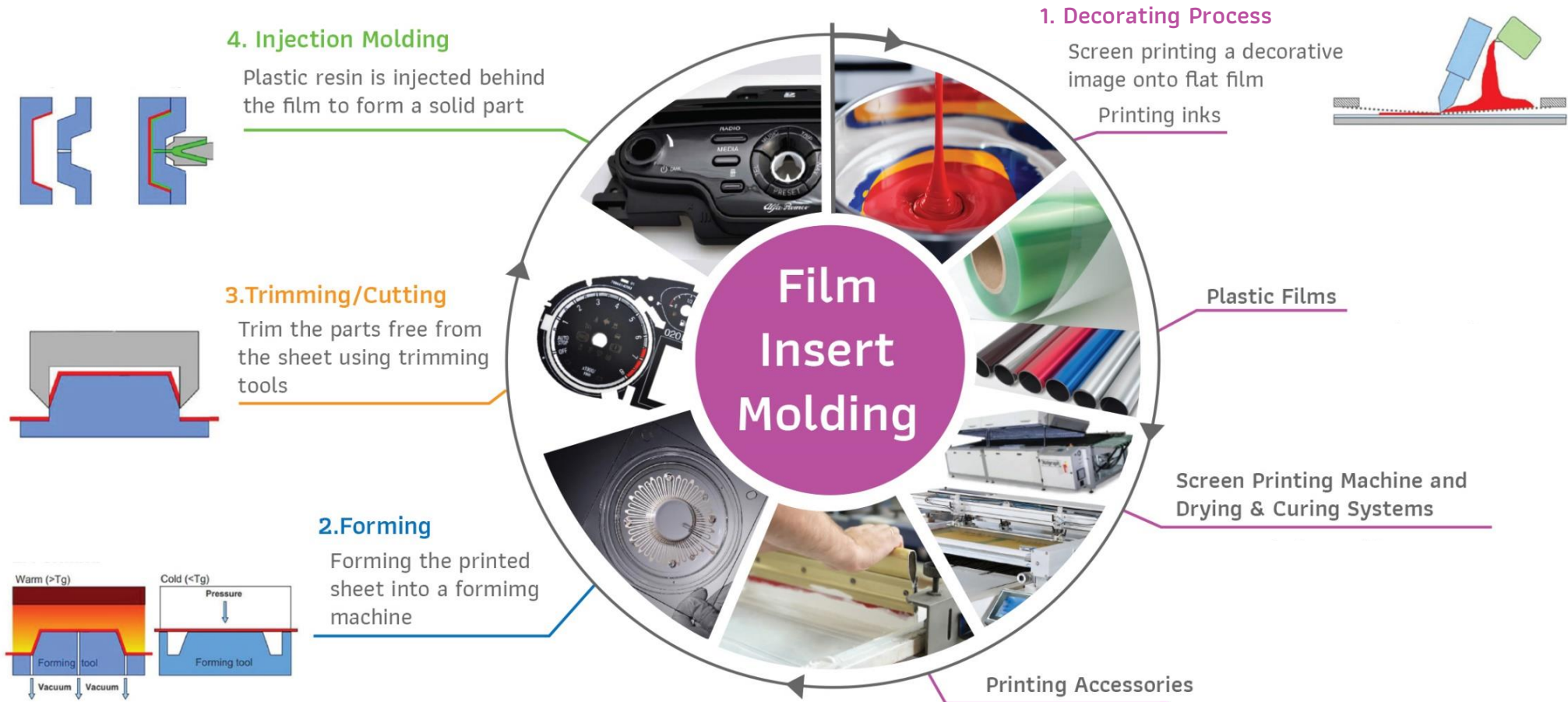
##### Doing it with IMSE

- 4mm part thickness (~90% reduced)
- 1 molded part + PCBA
- 200-gram weight (~58% reduced)

# What is Film Insert Molding (FIM)?

## Film Insert Molding Process (1/2)

### Processes and Materials of FIM



What is Film Insert Molding (FIM)?

Film Insert Molding (FIM) Process (2/2)

**Video: Niebling's High Pressure Forming (HPF) of functional films**

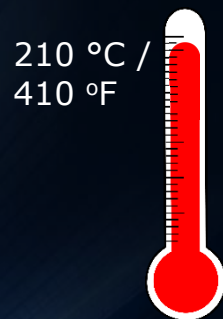


# What is Film Insert Molding (FIM)?

## Differentiations between Thermo-/Vacuum Forming and High Pressure Forming (1/2)

### Thermo- / Vacuum Forming

- Material is heated up to the melting temp.
- Material becomes very soft.
- Vacuum & low pressure (6-8 bar / 90 psi)



6-8 bar /  
90 psi



### High Pressure Forming by Niebling

- Material is heated up to glass transition temp.
- Material becomes formable (with stable core)
- High pressure heated air (90 bar / 1300 psi)

150 °C /  
300 °F



90 bar /  
1300 psi



# What is Film Insert Molding (FIM)?

## Differentiations between Thermo-/Vacuum Forming and High Pressure Forming (2/2)

### Thermo- / Vacuum Forming

- Higher material distortion
- Less precision / less repeatability
- Evaporation of humidity (water spots)
- Glue between laminates suffer
- Printed (electronic circuit) inks/solvents suffer
- Surface treatments suffer (e.g. hard coat)

### High Pressure Forming by Niebling

- Low material distortion
- High precision / high repeatability
- No evaporation of humidity
- Glue between laminates resists
- Printed (electronic circuit) inks/binders resist
- Surface treatments stay (e.g. hard coat)



## Automotive parts



Decoration – Enabling surface design & technology trends by innovative toolbox for the automotive industry.

## Automotive Interior



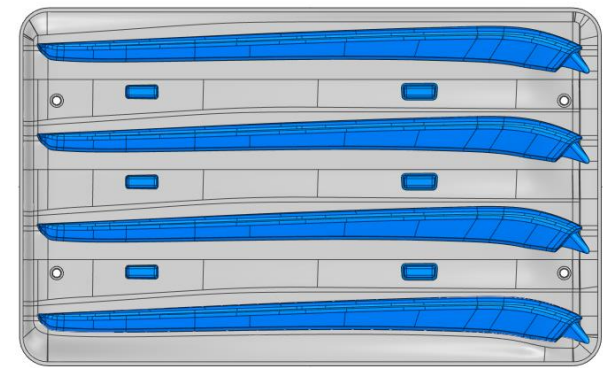
**BÖLA**

## Automotive Interior



- 102 cm / 40 inch -

### Automotive Interior

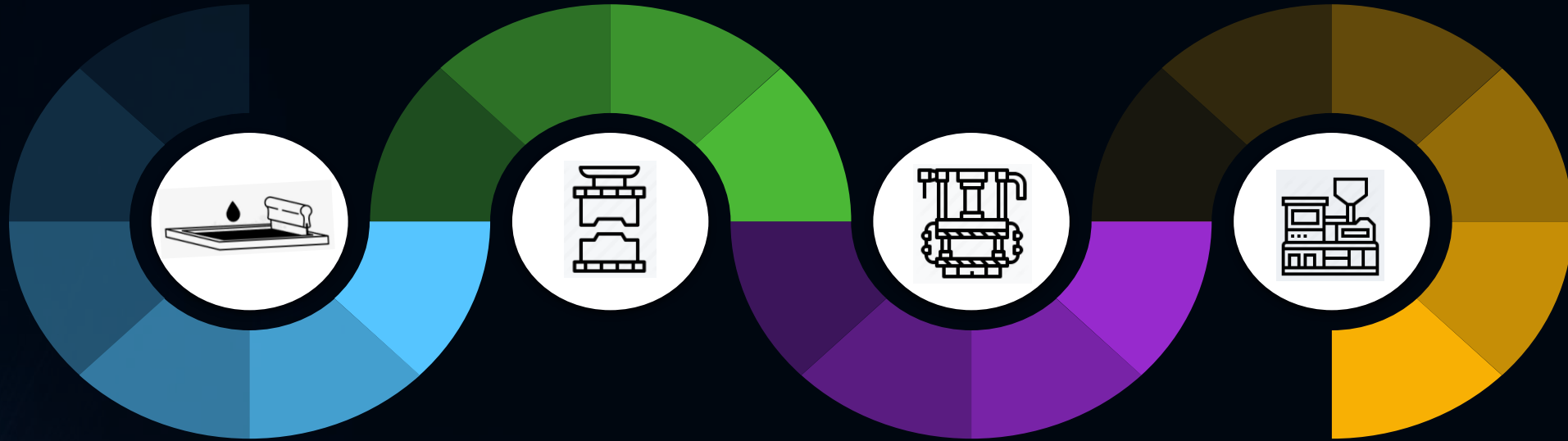


## Electronics



Consumer electronic products like household appliances.

The process runs through the key 4 stages:



### Printing Process

1. Plastic films
  - PC Film
  - Hard-coated film
  - Finished film, e.g. chrome, pattern, etc.)
2. Printing inks
  - Decorative ink
  - Functional ink (Printed Electronic Ink)
3. Pre-press & Printing Machine
  - Stencil & Squeegee
  - Printing Machine
4. Drying Systems
  - Hot Air, IR, UV curing

### High Pressure Forming

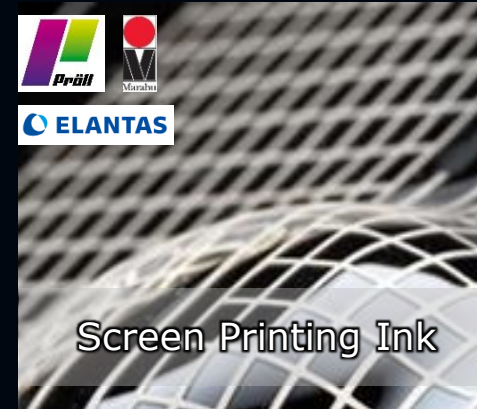
5. Forming Process
  - High Pressure Forming Machine
  - Forming Tools

### Trimming / Cutting

6. Cutting Process
  - Cutting Tools

### Injection Molding

7. Injection Process
  - Injection Tools



### SCREEN PRINTING INKS



**PROELL : NORIPHAN HTR N**

One component system - Enable to back-molded directly in injection molding process

More Info:



**PROELL : NORIPHAN PCI N**

Press ready, solvent based 1-component ink

More Info:



**PROELL : NORIPHAN XWR**

Halogen free ink system (back molding of screen printing films)

More Info:



**PROELL : AQUAPRESS**

Water-based two-component screen printable hotmelt adhesive

More Info:



**PROELL : NORIPHAN N2K**

Ink for second surface (back molding of screen printing films)

More Info:



**PROELL : NORIPRESS SMK**

Solvent-based screen printable adhesion promoter

More Info:



**PROELL : NORIPET**

Ink system for second surface IMD technology with polyester film

More Info:



### PRINTING ACCESSORIES

**Squeegee**



**Stencil**



### MATERIALS



**COVESTRO : MAKROFOL® DE**

High heat resistance, impressive toughness and elasticity over a wide temperature range

More Info:



**COVESTRO : BAYFOL® CR**

Blend films made from Polycarbonate and other engineering thermoplastics

More Info:



**TORAY : PICASUS**

Formable film with metallic luster

More Info:



**WAVELOCK : MTIA6236**

Three dimensional metallic decorative film

### SCREEN PRINTING MACHINE



THIEME 3000

#### THIEME 3000

**Features :**  
3/4 automatic screen printing machine with mobile printing table and variable print delivery



#### THIEME LAB 1000

**Features :**  
High precision screen printer with automatic screen alignment and automatic substrate alignment with CCD cameras

### DRYING & CURING SYSTEMS



**NATGRAPH :**  
**Air Force High Temp / IR Combination Dryers**



**NATGRAPH :**  
**Air Force UV Combination Dryer**



**NATGRAPH :**  
**Freestanding UV and Compact UV Dryers**

### HIGH PRESSURE FORMING MACHINE



#### NIEBLING: SAMK 400

**Features :**  
Semi-automatic High Pressure Forming is designed for the precise 3D forming of plastic films with maximum forming areas up to 400 x 245 mm.

More Info:



#### NIEBLING: SAMK 650

**Features :**  
SAMK 650 are designed for forming plastic films with maximum forming areas up to 650 x 400 mm.

More info:



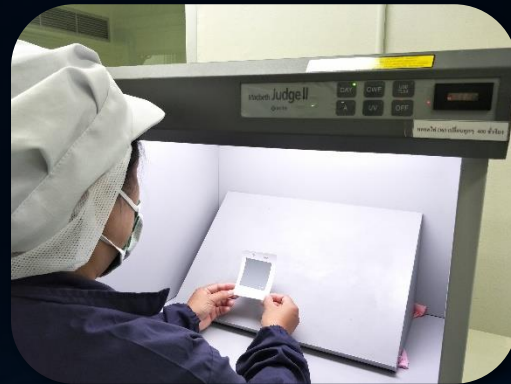
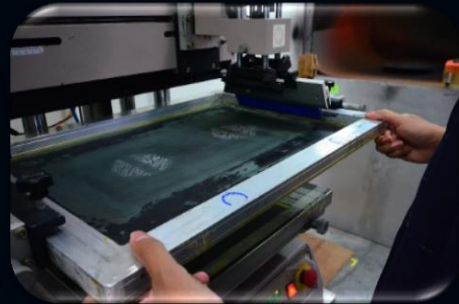
#### NIEBLING: SAMK 1200

**Features :**  
SAMK 1200 are designed for forming plastic films with maximum forming areas up to 1200 x 300 mm.

More Info:



## COLOR MATCH / LAB / QC



## WAREHOUSE & DELIVERY



## Tool Making



Another services that we provide you to fulfill the FIM's solution.

Niebling can design and build **the molds for forming and cutting tools** needed for the process on demand in their own tool construction department.

If required, we will support you for coordinating with Niebling and facilitating you in the design and building of **injection molding tools**.



Mother tool



Forming tool

Forming Tools  
with forming part



Cutting tool



Injection tool



**T.A.O.**  
BANGKOK  
CORPORATION LTD.




-  Customers
-  Business Partners
-  T.A.O. Bangkok Corporation Ltd.





 **ABOUT T.A.O.**

T.A.O. Bangkok Corporation Ltd. is the leading company in Printing, Packaging and Decorative Industries. The company operates more than 20 years in Thailand and over 6 years in Vietnam. Trusted by more than 18 of the world's leading manufacturers of 300 products, we are the authorized distributor and have been recognized by the local and international customers.


 **Services**

T.A.O. provides the consultation with requirement analysis as the customer-oriented to get end-to-end approach. Our services also include Color Matching, Quality Control, Customer Service and completed after-sales services to meet our customers' satisfaction.


 **Certificates & Awards**



Certified ISO 9001:2015



Awarded for Employees' Good Health Promotion



Awarded for "Zero Waste to Landfill according to 3Rs" – Good practice of waste utilizations Management

Provided by TAO

Contact



## T.A.O. Bangkok Corporation Ltd.

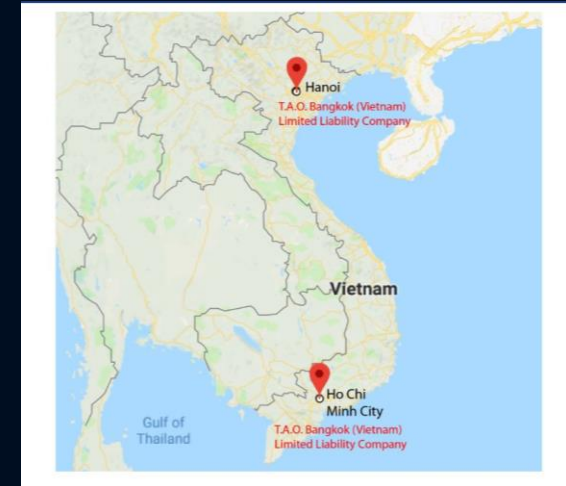


**BANGKOK** : Headquarter office  
Sinsakhon Industrial Estate, 30/11 Moo 1  
Khokkam, Muang, Samutsakhon 74000  
Tel: +66 (0)34 452 077-83  
Fax: +66 (0)34 452 076  
E-mail : [info@taobangkok.co.th](mailto:info@taobangkok.co.th)

## T.A.O. Bangkok (Vietnam) Limited Liability Company



**HANOI & HCMC** branch office :  
Villa 1-26, Nghia Do New Urban Area, Co Nhue 1 Ward, Bac Tu  
Liem District, Hanoi, Vietnam  
Tel: +84 24 6655 8339



Scan QR Code  
For more information