

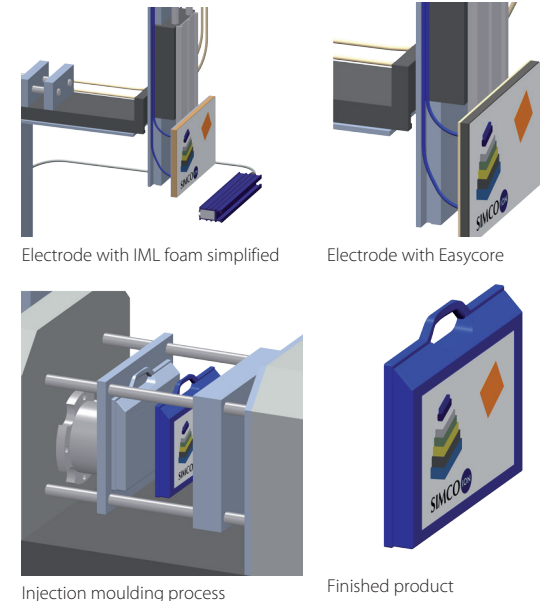
IML – In Mould Labelling – is an important process in the production of injection moulded products

A perfect example is packaging of food products and many plastic products for domestic use. Many products are produced with the aid of a static charge. Instead of printing directly or placing a sticky label onto the product, the print is achieved with a pre-printed plastic label.



How does IML work?

IML is a process step in the injection moulding process. A robot picks up a pre-printed label and places it in the mould, where it is fixed by means of electrostatic charging. After closing the mould, injection moulding of the product begins. During this process the label is fixed together with the finished product.



What is necessary to apply IML in an existing injection moulding machine?

- ✚ A suitable printed label
- ✚ A core with IML electrodes
- ✚ A charging generator
- ✚ A robot or other handling equipment for placing the labels

How does Simco-Ion contribute in this?

Simco-Ion has specialized in applying labels using static electricity. Thanks to years of experience in the IML process, Simco-Ion has developed special charging generators, IML electrodes and

IML electrode materials and charging techniques. A wide range of innovative products can help you optimise the IML process. Simco-Ion does not provide robots or other handling equipment for placing labels nor the labels themselves. Simco-Ion or a local branch office can however help you with advice and knowledge to realise your project. For contact information see www.simco-ion.co.uk/contact

Choosing a suitable label

The label is a very critical factor in the application of electrostatic in-mould labelling. The label must have a good surface resistance that is high enough to hold a static charge. On the other hand, the surface resistance should not be too high. Otherwise, high static charges might already occur during the production of the labels, causing problems when separating the individual labels from the handling tool.

The core with IML electrodes

An IML core may be constructed according to different principles and associated charging methods. Depending on a number of factors, the choice can be determined by:

- ⊕ the specifications of the label, dimensions and surface resistance
- ⊕ the speed of the injection moulding process
- ⊕ the shape and dimension of the finished product

What is IML foam and how is a core constructed?

IML foam is a foamed PVC material with a specific surface area and volume resistivity. Since the surface resistance is lower than that of the label, but higher than that of the mould, a label can be charged through contact with the foam and then transferred to the mould.

The adhesive force between the mould and the label is greater than between the label and the IML foam.

A core consists of a non-conductive plastic mould containing IML foam surfaces on those areas where the label makes contact with the core. Both the direct and the simplified charging method are possible with this method.

A core with electrodes

A core with electrodes comprises a non-conductive plastic mould containing strategically placed pin-shaped electrodes. This can be achieved using IML Spider electrodes or separate pin-emitters. This method only allows for the direct charging method.

What is Easycore and how can it be used to create a core?

The Easycore material is similar to the IML foam. However, this material consists of a cast resin and a hardener. It is a liquid mixture that can be poured into a mould.

A core is constructed by a mould made of non-conductive plastic containing cavities where the Easycore material is poured. With this construction a very accurate core having complex shapes and small dimensions can be constructed.

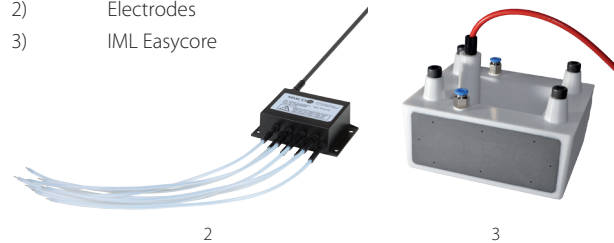
All mechanical operations s.a. drilling, grinding, milling etc are possible to make the core to the perfect shape and size.

A simple selection method:

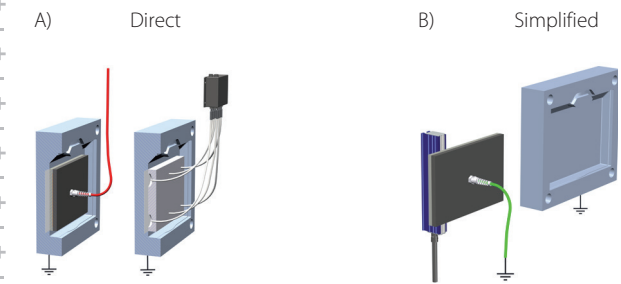
Product form / label form	Label dimensions	Speed	Label surface	IML core	Charging method
flat	small	N/A	default	1 + 3	A + B
	large	N/A	default	1 + 2 + 3	A + B
	small	high	default	1 + 3	
	large	high	default	1	B
	large	high	default	2	A
3D	N/A	N/A	1 side conductive	1 + 3	B
	small	low	default	3	A + B
	large	low	default	1 + 2 + 3	A + B

IML core:

- 1) IML foam
- 2) Electrodes
- 3) IML Easycore



Charging method:



Which charging generator is suitable?

The choice of the charging generator is determined by:

- ✦ the surface resistance of the label
- ✦ the speed of the injection moulding process
- ✦ the charging method used
- ✦ label format / thickness

Surface resistance label	Speed	Charging method	Generator
good	low	a	CM lite, CMME
	high	a	CMME
critical	N/A	a	CM5
good	N/A	b	CM5

How can the IML process be conducted with maximum effectiveness?

Speed and reliability are usually very decisive factors in the efficiency of the IML process.

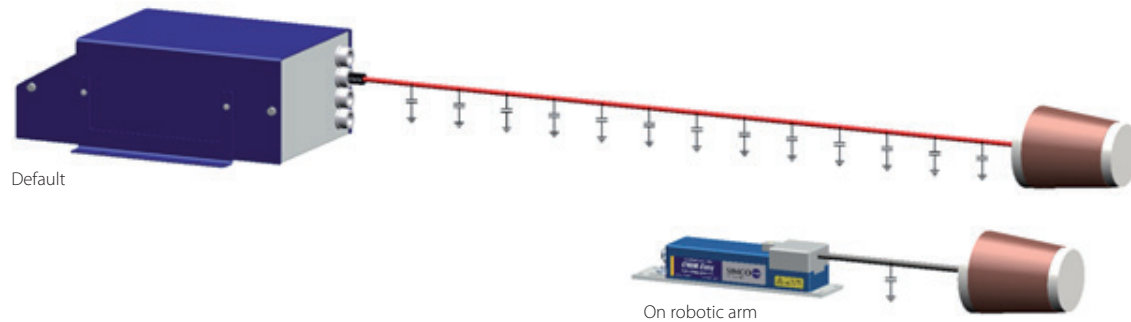
In order to optimize both of these factors, a number of restrictions can be minimized.

Minimizing the capacitance of the charging circuit:

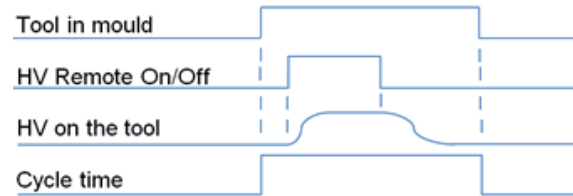
All components, electrodes, cable and charging generator used in an electrostatic IML circuit, together constitute a large capacitor having a particular capacitance. Before the label is being charged, the capacitor needs to be charged first. This takes time. By reducing the capacitance to a minimum, time can be saved.

This can be achieved by using a charging generator CMME placed closely to the IML electrodes or on the handling arm.

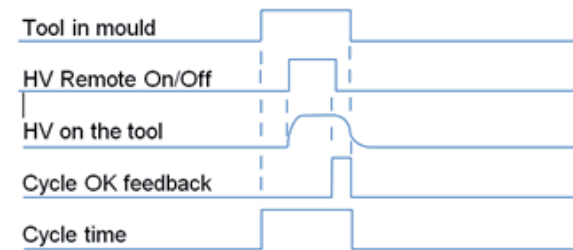
As a result the capacitance is limited, since no long cables are deployed and a smaller generator with less capacitance can be used.



Using a CMME will also increase the reliability. Long high voltage cables with the risk of wear or breakage are not needed. In addition to that, the CMME gives a unique signal "cycle OK", which allows for significant process optimisation. This indicates the time needed to charge the label and hence the cycle time can be optimised.



Default



On robotic arm