

## Static Generation

A guide to the benefits of static generation  
and its uses within multiple applications



# All about Meech

Established in 1907, Meech International is one of the world's leading manufacturers of static control, compressed air technology and web cleaning systems, both contact and non-contact.

The company has its headquarters in Oxfordshire (UK), with subsidiaries in the USA, Belgium and China, and offices in Hungary, India and Singapore. These offices are backed up by a distribution network and together operate in over 80 countries. Meech products are used in a vast range of industries including:

Aerospace	Medical
Automotive	Packaging
Food & Beverage	Pharmaceutical
Converting	Plastics
Electronics	Printing

Meech has specialised in industrial electrostatic control for over 50 years. This experience has led to R&D that matches changing customer needs. Meech pioneered the industrial use of pulsed DC technology for static control and now has thousands of systems installed in the plastics, converting, printing and packaging industries.

Static electricity is most commonly caused by friction, pressure or separation, with examples ranging from the unwinding of plastic film to everyday shocks from cars and door knobs.

Unchecked, static electricity can cause productivity, quality and safety problems throughout industry. Electrostatic attraction or repulsion generates dust contamination and product misbehaviour and an electrostatic discharge can shock operators, start fires and destroy electronic components.

The Quasi AC Hyperion range helps in achieving low and stable offset voltage that is a requirement in the electronics industry where electrostatic discharge control standard requires ionising devices with offset voltage of less than +/-35V.

Meech provides solutions to control static in virtually every production situation. The product range includes ionising bars, blowers, guns and nozzles, as well as ionising air curtains, power supplies and test & measuring equipment.

# We've got the world covered

Wherever you are in the world you'll find Meech hard at work, providing a wide range of businesses with specialist expertise. From the headquarters and technical centre in the UK, our manufacturing subsidiary in the USA to the sales and marketing offices in Belgium, Hungary, China, India and Singapore we've got the world covered. Our global network of distributors are carefully selected, fully trained and on call to provide in-depth technical support – wherever you're based.

# Outstanding quality as standard

Quality is at the heart of every Meech system. We always work to the highest possible quality standards in everything we do: manufacturing, customer support and technical know-how. Our quality management system is certified by BSI to ISO9001. Products manufactured by Meech are also appropriately certified to international standards which include CENELEC EN 60950, UL/CSA (CUL) and CE. We also hold ATEX and UL"EX" approvals for use in hazardous environments. So, you can be sure you've chosen a solution and a company that will meet your own exacting standards.

# All the experience you need

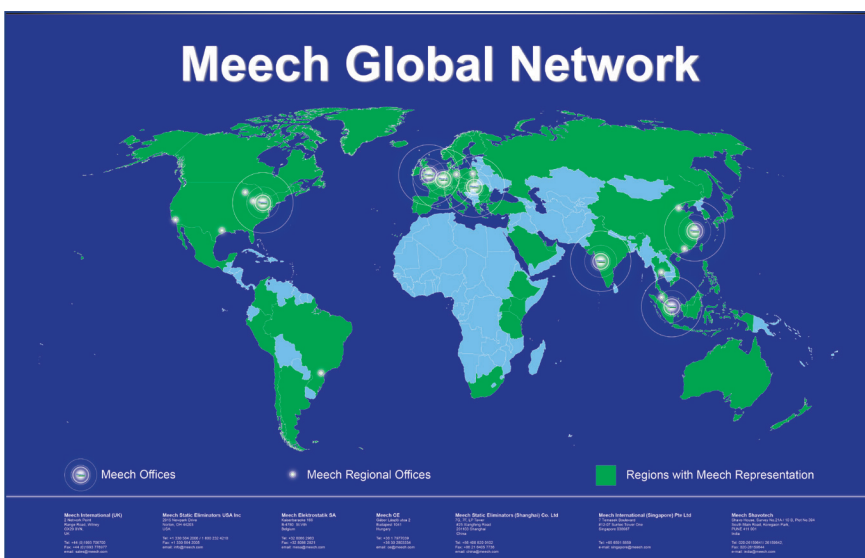
Meech has been at the forefront of innovation within the industry, earning a worldwide reputation for consistently designing, manufacturing and marketing products that offer unparalleled performance and technical superiority. This experience and reputation has helped grow the global user list which now includes companies like: 3M, Amcor, Avery Denison, BP, Bruckner Group, Ford, GlaxoSmithKline, Honda, Nestle, Nissan, Procter&Gamble, RPC Group and Tetra Pak.

“Over the past nine months the static bars have proven to be more than efficient, so I can say we've been very satisfied with both the quality of the equipment and the service provided. We're confident that this installation will only benefit further the relationship between RPC and Meech.”

*Technical and Development Manager, RPC*

“We are very pleased with the results obtained. We managed to solve the problem existing in our production plant quickly; the feedback system manufactured by Meech guarantees the smooth running of the whole production process, and the products leaving our factory are of the world's highest quality”

*Process Engineer, 3M*



# What is Static Generation?

Static generation creates a controlled static charge on a non-conductive material that will allow a temporary adhesion between surfaces with charges of opposite polarity. A high DC voltage (up to 50kV) is safely produced and is connected to an array of suitably designed emitter pins to generate a “corona”.

The DC voltage may be positive or negative. The emitter pins are positioned within close proximity of a grounded surface or, for greater effect, a generator bar with emitter pins of the opposite polarity. The material(s) to be pinned are passed into the “corona”, resulting in bonding to the grounded surface or to the other material.



## Benefits of Static Generation

Controlled static generation can bring a number of benefits to production processes such as thermal lamination, labelling, packing, roll-to-roll changeover, cast film extrusion, etc.

Static generation equipment is able to effectively and reliably provide temporary bonding of materials with the result that in many applications the production processes can be optimised.



## How Temporary Adhesion is Achieved

The generation of a controlled static charge on a non-conductive material will allow temporary adhesion between two or more surfaces.

A high DC voltage of up to 50kV (positive or negative, depending on the application) is carried to the special array of emitter pins to create a “corona”. With the emitter pins positioned in close proximity to a grounded surface, material passing into the field will be charged and bonded to adjacent surfaces.

Examples of some of the benefits of static generation in industrial applications include the following:

- Ensuring material maintains its shape during production
- Preventing inadvertent movement of materials that can result in equipment malfunctions
- Ensuring multi-layer material alignment to ensure process optimisation
- Minimising scrappage from misalignment of materials
- Preventing inadvertent material movement during secondary step in production or assembly
- Ensuring that air is removed from between materials being bonded together

# Static Generation Range

## Hyperion IonCharge30 (15W) & Hyperion IonCharge50 (75W)

The IonCharge family of static generators from Meech includes the compact IonCharge30 and the larger, higher powered IonCharge50.

IonCharge uses advanced high voltage technology and software for a controlled static charge via our range of static generator bars and pinning heads. IonCharge provides independently selectable voltage and current and the inclusion of a colour touchscreen interface provides simple adjustment and clear display of settings.

IonCharge is extremely versatile and effective for a range of applications and materials.



	Dimensions (mm)	Maximum Output Power	Output Voltage	Output Current
<b>DETAILS</b>	IC30: 122.5 x 58 x 180	IC30: 15W	IC30: 0-30kV	IC30: 0 to 0.5mA
	IC50: 231.4 x 126 x 268.5	IC50: 75W	IC50: 0-50kV	IC50: 0 to 2.5mA

## 994 CG Miniature IML Generator

The 994CG is the most powerful and compact IML generator Meech has ever produced.

Powered by 24V DC, it has outlet ports capable of connecting up to 4 x 994 Hydra IML Pinning Systems directly to the generator. The 994CG is available in a socket that utilises the Meech PVC plug.



	Dimensions (mm)	Output Polarity	Output Voltage	Max Output Current
<b>DETAILS</b>	Socket: 150 x 45 x 40	Negative	4 – 25kV Negative	500µA

## 994 IML Static Generator

The 994-IML Static Generator is a compact and lightweight system, it provides 0-20kV, Negative polarity with connections to suit the Meech Hydra.



	Dimensions (mm)	Output Polarity	Output Voltage	Max Output Current
<b>DETAILS</b>	190 x 171 x 45	Negative	0 – 20kV Negative	500µA

## 993R Spark Free Generator Bar

The 993R is a high performance generator bar used with the Meech range IonCharge30 and IonCharge50. Resistively coupled emitter pins deliver smooth, controlled pinning whilst spark free operation avoids tripping out on intermittent applications.



	Dimensions (mm)	Operating Voltage	Operating Current	Power Source
<b>DETAILS</b>	52 x 22 x Max length 3000	Up to 50kV DC	500mA	IC30 & IC50

## 995R IML Pinning Head

The 995 is designed to deliver exceptional pinning of multi-layer plastic.

Uses include bag making and flow-wrapping machinery.



	Dimensions (mm)	Operating Voltage	Operating Current	Power Source
<b>DETAILS</b>	995R: 208 x 107 x 50 995R IML: 155 x 65 x 30	Up to 50kV DC	500mA	IC30 & IC50

## 995 Claw Pinner & 995R IML Pinning Head

The 995 Edge Pinning Claw is a powerful pinning head intended for use on cast-film lines.

Pinning the edges of the cast film to the chill roller prevents necking of the film.

The integral switch on the 995R IML allows the operator to switch the system on only when pinning is required, making it ideal for manual IML applications.



	Dimensions (mm)	Operating Voltage	Operating Current	Power Source
<b>DETAILS</b>	995 Claw Pinner: 154 x 65 x 30	Up to 50kV DC	500mA	994 IML and IonCharge30

## IML Hydra Pinning Systems

### 994 Hydra Miniature IML Pinning System

The 994 Hydra is a miniaturized in-mould pinning system designed for applications where size and weight are restricted, due to its compact and lightweight design.

It is suitable for applications where small items are being moulded i.e yogurt cups or drinks containers. The standard system comprises a resistively coupled distributor with either two, four or six pinner cables.



	Dimensions (mm)	Weight	Power Source	Operating Voltage
<b>DETAILS</b>	Distributor with flanges: 40 x 27 x 15	53g	994 IML Generator / 994CG	With 994 IML: up to 20kV With 994CG: up to 25kV

# Options for Static Generation Equipment

## Industrial Network Module

The Meech2PLC network module was designed for use with the IonCharge30.

The interface has been developed to enable communication between compatible Meech equipment and the customer’s existing PLC (Programmable Logic Controller).

Meech2PLC offers Industry 4.0 interconnectivity. It allows compatible Meech equipment to be easily integrated into the customer’s existing PLC network, for easier access, control and monitoring.



## Industrial Network Protocols Compatible with Meech2PLC:

The following 5 industrial network protocols have been developed as standard to work with Meech2PLC and compatible Meech products (listed overleaf):

- **EtherNet/IP**
- **PROFINET**
- **PROFIBUS DPV1**
- **EtherCAT**
- **ModBus TCP**





# Options for IML Hydra Pinning Systems



## Hyperion BarMaster

A remote programmer designed to connect with any Hyperion product.

## 994CG Remote Setpoint Controller

Generates an adjustable 4-20mA signal to control the output voltage of the 994CG Compact Generator. M8 input and M12 output connections.



## 994 Hydra IML splitter box

Available in 2, 4, 6 and 8 splitter configurations. Can be used to power additional 994 Hydras from a single source for IML applications.

## Hydra HT Supply Cable 5000mm Male - Female

Additional extension cable to be used for direct plug-in from the Generator to the Hydra.



## Hydra HT Supply Cable 5000mm Male - Male

Additional extension cable to be used for direct plug-in from the Generator to the Hydra Splitter.

## M12-M8 Murr adaptor cable 1000mm for BarMaster to 994CG connection

Allows connection of BarMaster programmer to 994CG Compact Generator.



## Mini Din prewired cable 8 way

Compatible with the I/O ports on the 994IML. The prewired cable simplifies the connection to input and output signals.

# Static Generation Applications

## Wicketer Bag Making

### Problem

The addition of a gusset to the bag needs the material to be held in place to prevent the gusset from moving out of alignment.

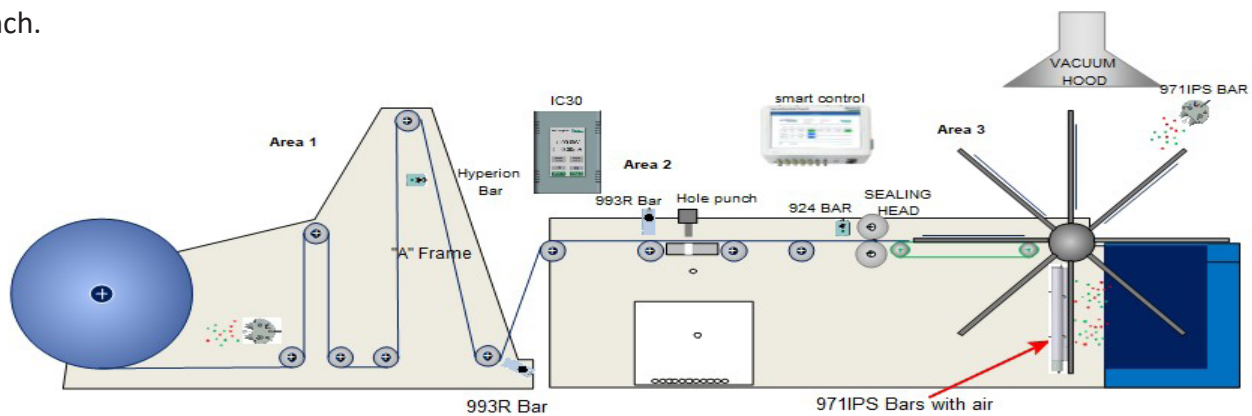
Where a reinforcing strip of plastic is required to strengthen the handle section of the bag, this needs to be held in position.

The punching of a handle through the material can cause the material to separate and stick to the punch.

### Solution

Applying a static charge to bond only the gusset in position, will prevent material movement and alignment issues.

Applying a static charge to reinforcing strip and web will temporarily lock the two layers into position. Applying a static charge to punch area of the material temporarily bonds the material together, preventing separation of the layers.



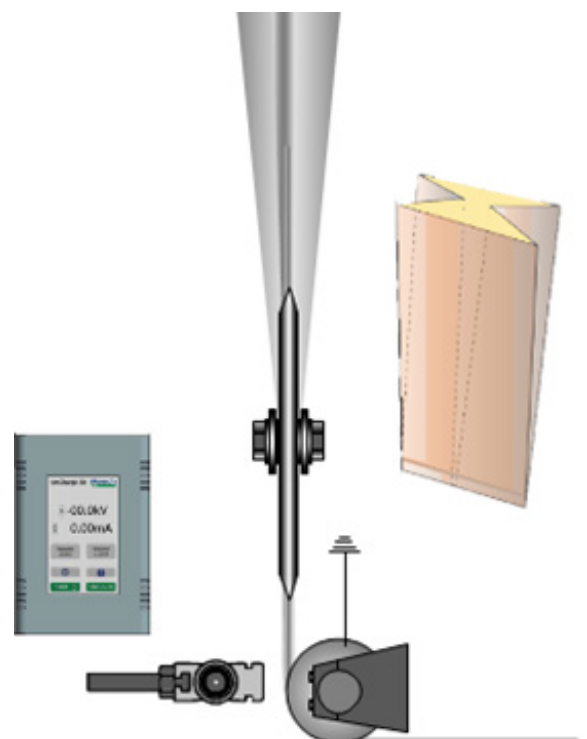
## Gusset Pinning for Carrier Bags

### Problem

Traditional carrier bags are manufactured from a continuous web of material. In some cases, the material is folded to create a gusset along each side. The web passes through a sealing head to form individual bags. As the web travels through the machine prior to the sealing head the folded gusset can slip out of shape. This is generally caused by air entering the folded gusset and opening it up. This results in bags being sealed with an incorrect gusset, causing waste and loss of production.

### Solution

The gusset can be pinned together to stop it slipping out of position prior to sealing by installing a Meech 993R generator bar opposite a metal roller (ground). This results in the bags being sealed correctly, reducing waste and downtime. The 993R bars are connected to a generator to provide powerful pinning.



# Compensation Stacking

## Problem

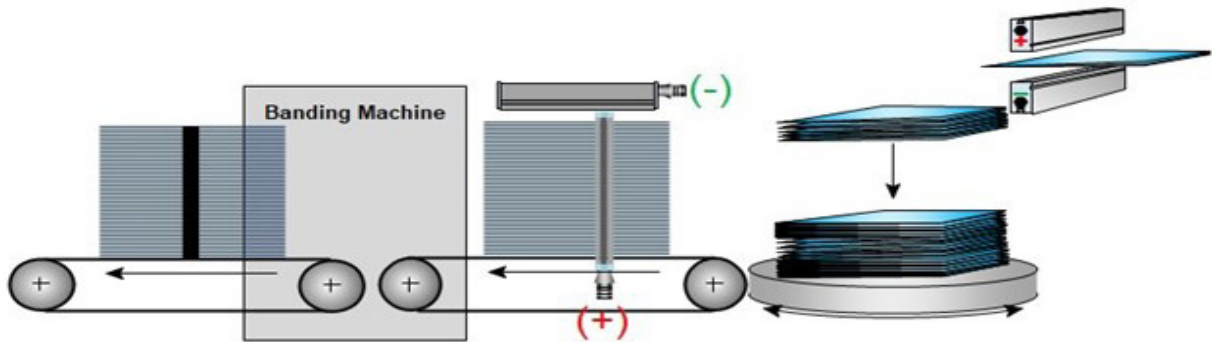
Stacks of magazines and books are created in compensating stackers. Magazines/books are fed into the compensating stacker where they are collated into a stack.

The stack is then transferred by conveyor to either a strapping machine or automatic palletizer. The magazines/books often slip as the stack travels along the conveyor, resulting in incorrect stack heights, stacks falling over or poor stack presentation.

## Solution

Static is used to 'pin' the magazines together, thus ensuring that it stays in perfect shape for the next operation. Each magazine entering the stacker is charged so the bond together as they are stacked.

As the stack transfers to the strapping process a further charge is applied to the stack ensuring the transfer process to be completed without the stacked magazines from misaligning. This saves considerable manpower that is otherwise needed to re-stack the piles.



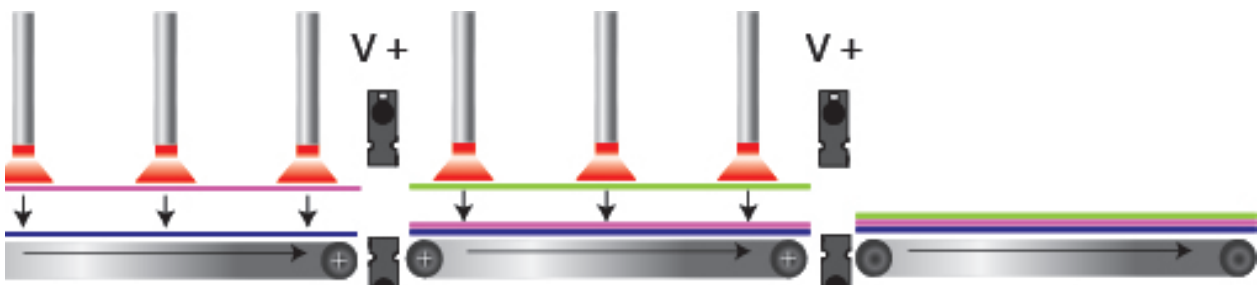
# Laminating Formica Worktops

## Problem

Laminated sheets used for furniture etc, are manufactured by attaching laminates to sheets of man-made board (MDF). A glue coated laminate sheet is fed on to a conveyor, the MDF board is then placed on top. A second glued laminate sheet is added on top. The laminate 'sandwich' travels along conveyors to the press where the finished product is formed through heat and pressure. Any air bubbles trapped below the laminate will cause surface blisters on the finished product. There are also possibilities of movement during conveying.

## Solution

By installing generator bars opposite each other, the laminate sheets are pinned to the board at each stage. Reversing the bar polarity between stages ensures maximum electrostatic forces are applied driving out any trapped air as the stack passes between the bars.



# Turret Rewind Core Pinning

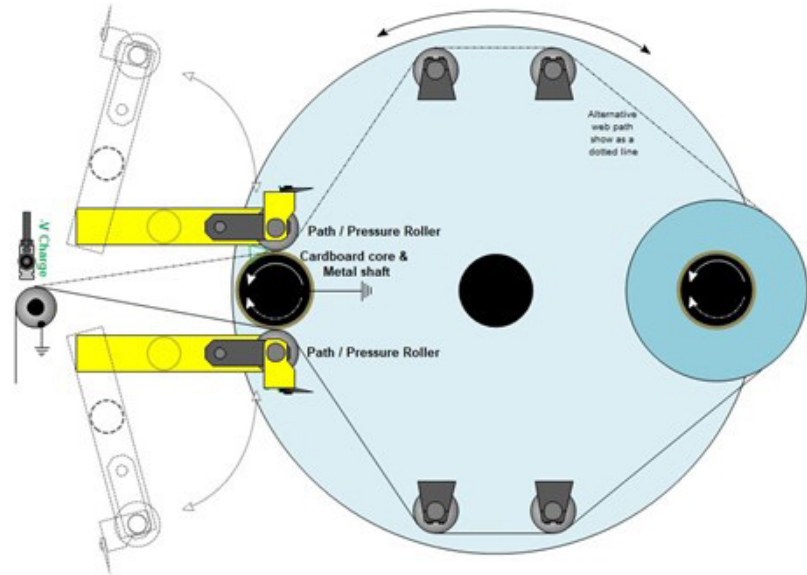
## Problem

Traditionally, web changes are done using adhesive tape wrapped around the core. The lead end of the web is then bonded to the core during change over.

A static charge can be used to bond the lead edge of the web to the core, but this can be difficult due to available space.

## Solution

Applying a static charge to the web as it passes over a grounded roller, prior to the splicing arm solves the problem. The pre-charged material will follow the web path up to the point the knife cuts the web. The static charge is then attracted to the cardboard core that is held in contact by the lay-on roller.



# Wine Bag with Metallised Film

## Problem

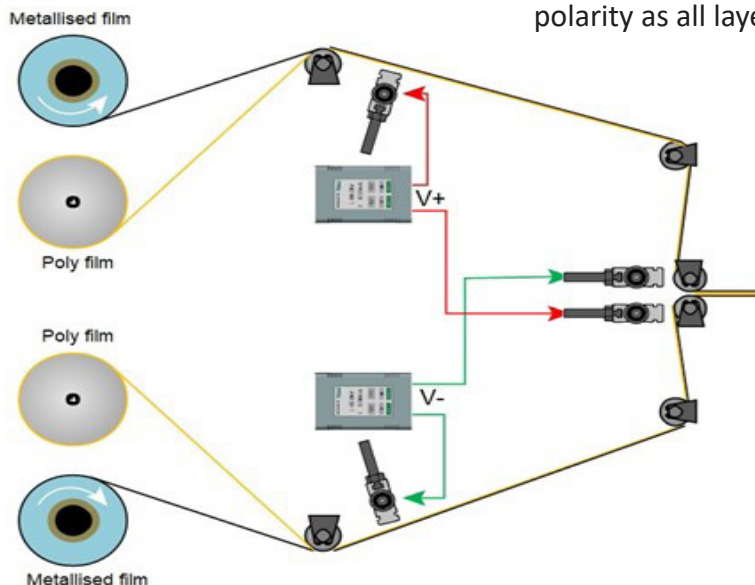
Metallised films are used to reduce the risk of ingress or oxygen through the film layers. The production of wine in a bag requires the use of multiple layers of film.

It is important to align the multiple layers and minimise the air trapped between the layers.

## Solution

Applying a charge to the poly-film layer and using the conductive properties of the metallised film as an earth potential, allows the layers to be bonded together.

To pull the layers together and remove any air pockets you will need to reverse the polarity of the charge on the different unwinds and then rotate the polarity as all layers are combined.



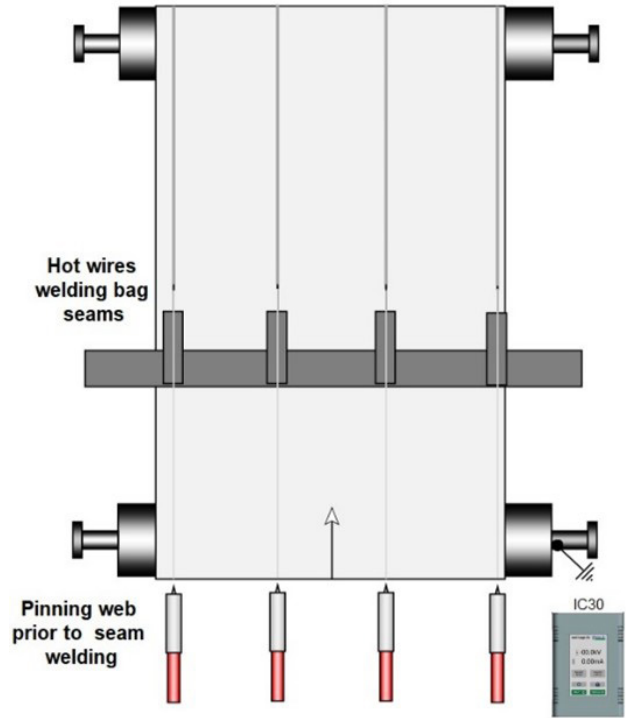
# Seam Welded Bags

## Problem

A slitting and welding process is needed when two wide webs are used to form bags on a roll. Alignment of the webs so they can be welded together may result in the webs separating during welding. Static pinning of the material will also cause issues with bag opening.

## Solution

A solution is to use localised static pinning along the seam, which will allow the bags to open easily for automated packing processes. The static charges to the 995 pinning heads is produced by a static generator.



# Hole Detection

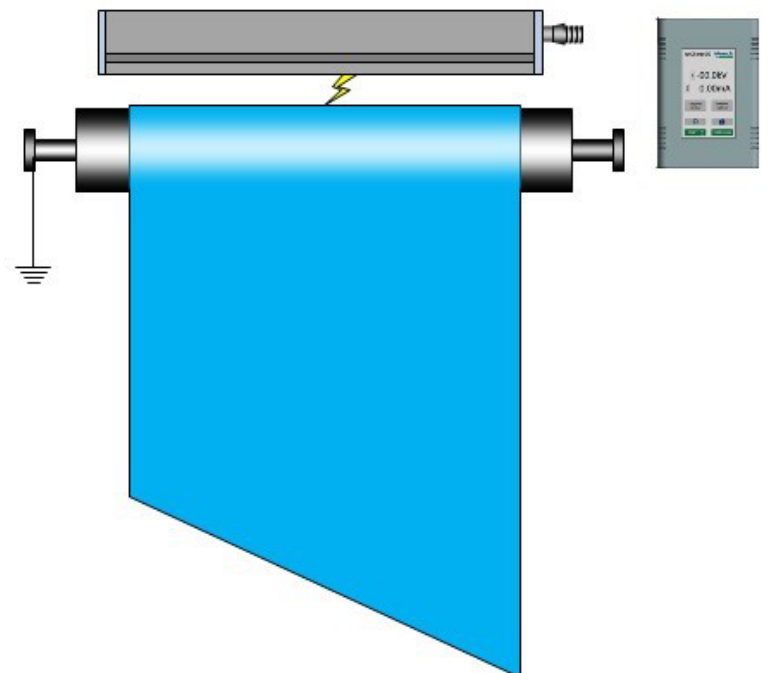
## Problem

Materials intended for use as a waterproof membrane can suffer with potential damage or defects during production. Identifying this damage is difficult and made harder when producing very wide material widths.

## Solution

As the material passes over a grounded roller, a static charge is applied to the membrane. Any weakness in the material thickness can result in a spark being generated. A Meech generator powering a model 993 bar will be required to detect this discharge.

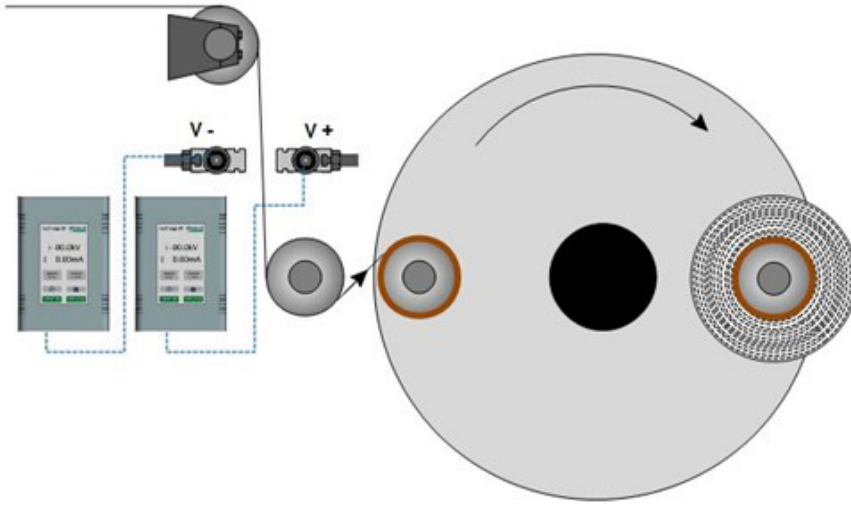
A signal can be output to the PLC which can record the number of material flaws. An inkjet marker can then show the location of the problem on the material for later correction.



# Bag on a Roll

## Problem

The build up of static charges during the process of rewinding bags onto a roll will cause the roll to balloon. This makes the roll larger and less attractive, increasing the box size and making transportation cost more expensive.



## Solution

Using positive and negative charge bars on either side of the bags, removes any trapped air within the bag. In addition, positive charges are attracted to the negative side during rewinding, helping to prevent the roll unwinding when ejected from the rewind.

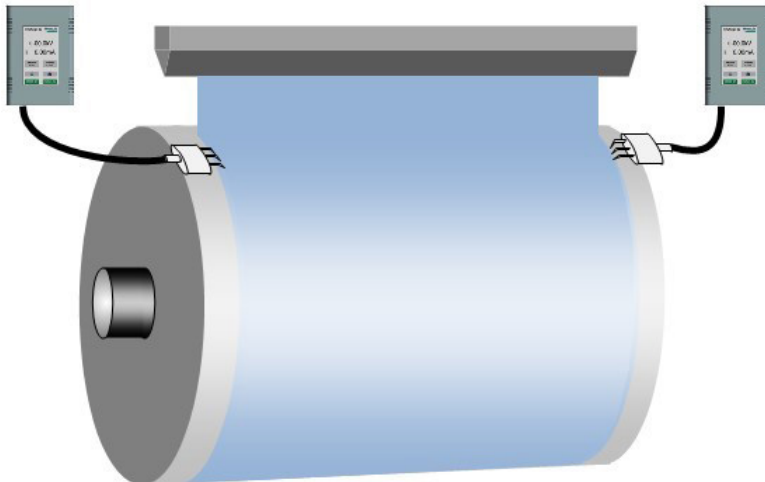
Using directly coupled 993 generator bars, one of the generators can be set to spark or perforation detection. This can produce a voltage output signal to the PLC to count the perforations (bags) as they are rewound onto the roll.

# Cold Roller Pinning

## Problem

Cast plastic film exits from the die in a semi molten hot state directly on to a chill roller. As the plastic cools on the roller, it shrinks in width – known as ‘Necking’.

This is undesirable as it makes the finished film uneven and impairs quality. Previously, compressed air jets have been used to hold the edges of the plastic.



## Solution

The use of electrostatic pinning reduces the compressed air usage, minimises film edge damage making greater use of the extruded film.

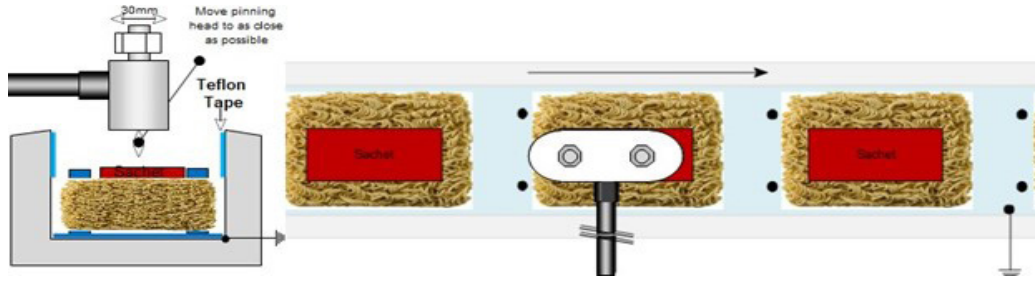
The Meech 995-CLAW is specifically designed for this application. Each side of the extruded film is pinned to the cold roller, locking into place stopping width shrinkage producing uniform thickness across the web width.

The 25mm diameter mounting rod allows the three flexible titanium pins can be positioned in an array to suit the application. Each pin is individually resistively coupled to provide powerful independent pinning, without the risk of sparks damaging the expensive roller.

# Noodle Packing

## Problem

Manufacturers of dried food products, which require additional sachets or cooking instructions to be wrapped inside the pack, have problems with the sachets or literature slipping or becoming separated. This failure to pack properly will cause manufacturing rejects. In this case study, dry noodles are packed with sachets of dried vegetables, oil and flavourings. These sachets are expected to stay in place on top of the noodles during an automated packing process. A failure at this point will lead to customer dissatisfaction and product / brand rejection by the consumer.



## Solution

Immediately after placing the sachets on to the noodle, a high voltage charge is applied to the product using a 995R pinning head. This causes the sachets to stick to the noodles below.

The electro-static charge will remain long enough to prevent the sachets slipping off the noodles allowing the product to be packed consistently and correctly.

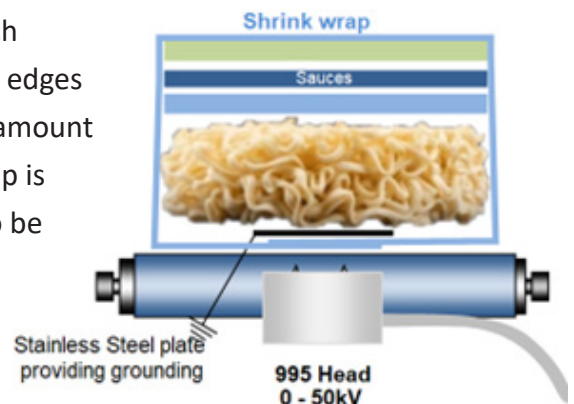
# Shrink wrap Noodles

## Problem

Horizontal over wrappers, wrap heat shrink film around a forming tube. Product passes through the inside of the tube in a continuous process to sit inside the film. Traditionally, the film needs to overlap by 20-30mm to create the continuous long seal. A narrower overlap is prone to separation during the shrink process. A wider overlap will create wrinkles making the packaging look unattractive, while adding to the material cost. This problem creates an unnecessary issue for FMCG manufacturers.

## Solution

Applying a charge to the film overlap locks the two surfaces together preventing separation. The charged film also allows for a much smaller tidier seam of 3- 4mm. As the film shrinks, the two overlapped edges bond together, producing a tidy edge stitch. This saves a considerable amount of film, making it very ecologically friendly and profitable. The overwrap is nearly invisible allowing the graphic designs and marketing message to be seen clearly.



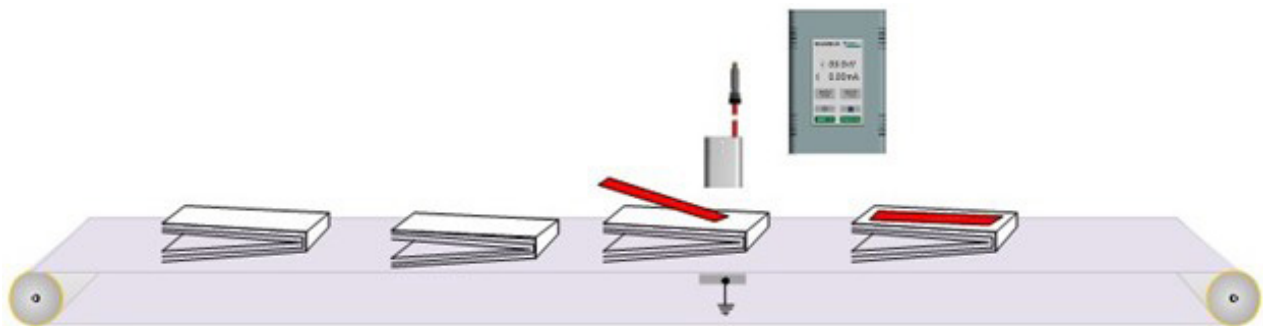
# Label Insert Pinning

## Problem

When loose pages are being added to magazines or product prior to packing, they can easily move out of alignment, making poor presentation or cause machine stoppages. Being able to temporarily hold the items together without damage speeds up machine processes.

## Solution

A localised static charge can be applied to the loose pages as they are introduced into the production process. This local charge holds everything together preventing movement allowing the next process to proceed without issue. A Meech 994 Mini 4 pin charging head and generator are ideal for tacking small, localised areas.



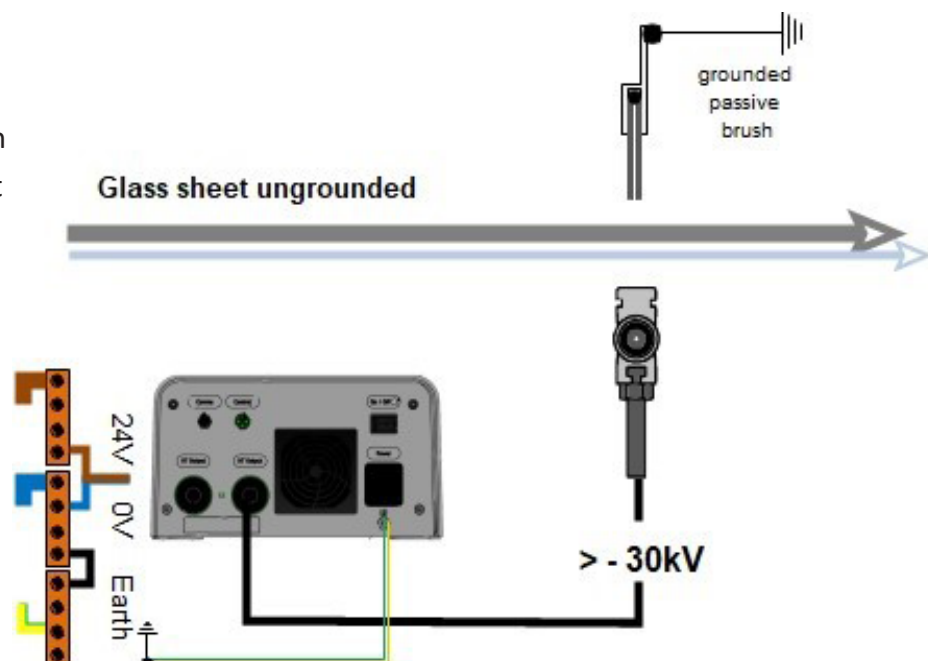
# Interleaf Nonconductive Material

## Problem

Materials such as glass may require a protective or polarised film to be applied to the surface during production. The prevention or removal of air bubbles will be an important part of the production process.

## Solution

Passing the material between a static generator bar and grounded passive brush applies a static charge. This charge pulls the film towards the grounded brush creating a nip force, driving any air backwards from between the film and glass.





# Web Pinning

## Problem

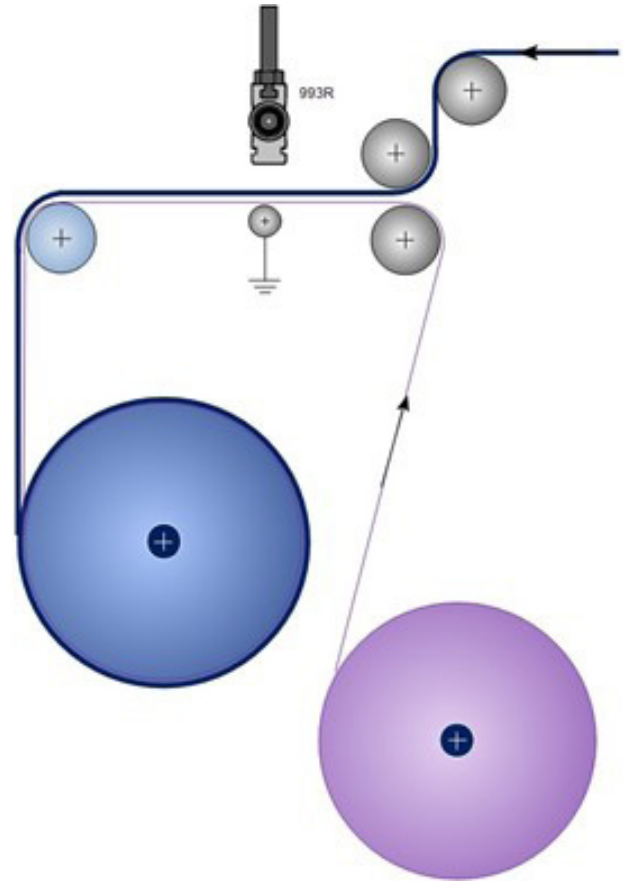
To reduce production errors and scrap material, it is important to control web alignments during the production process to ensure exact positioning.

Secondly, there is a need to prevent damage to the material during separation.

## Solution

Using electrostatic pinning will create a temporary bond between layers, whilst also allowing the materials to be separated without damage.

Static neutralisation may be required to remove any unwanted charges later in the process.



# Static Charging Powder Glue Applicator

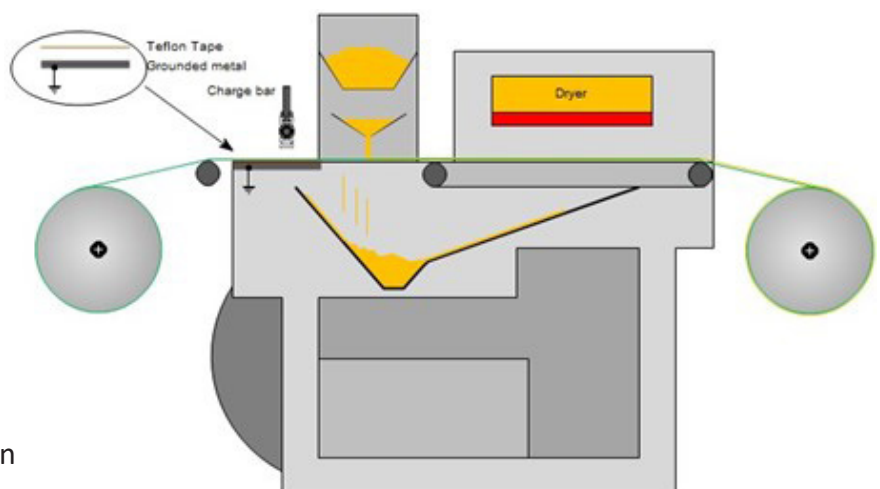
## Problem

During the processing of elastic for clothing a polyurethane adhesive is applied to the elasticated fibres to assist with the production of weaving into the fabric. Due to the diameter of the elastic applying enough powder to the elastic is problematic.

## Solution

Charging the elastic prior to entering the coating processes attracts the polyurethane powder in an even coating to all surfaces.

Selection of the charging head or bar will depend on the width of the coating area. Control of the level of charge is controlled by the generator using constant current or voltage mode.



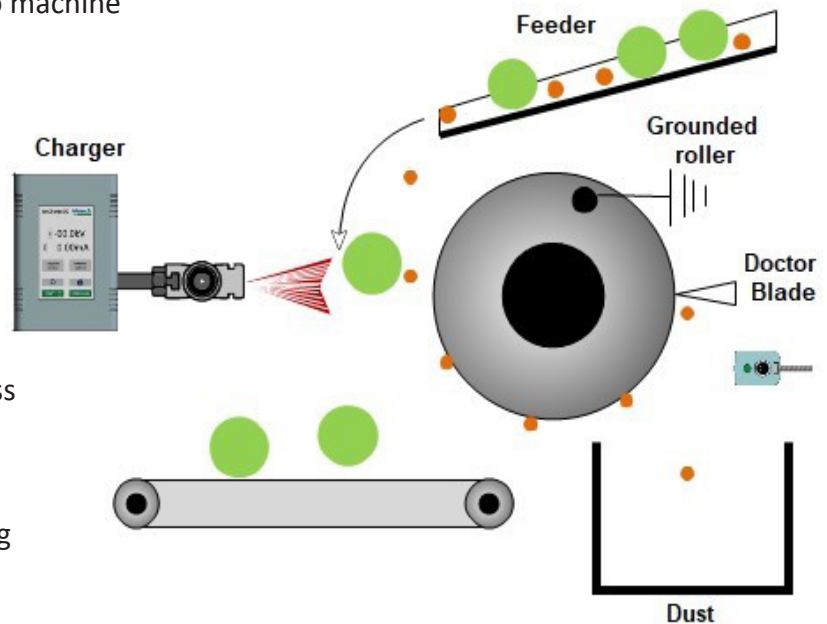
# Peanut Chocolate Sorting

## Problem

Processing chocolate or peanuts requires waste product or dust, resulting from processing, to be removed. If the waste chocolate is not removed, the conveyors roller and other parts of the machinery can be coated in chocolate, leading to machine stoppages and loss of productivity.

## Solution

Applying a charge to the product as it feeds past a grounded roller causes the small lighter particles to stick to the roller, whilst the larger heavier particles pass through the electrical field to a conveyor below. As the grounded roller rotates the waste material is removed by a doctor blade or brush and neutralised before being collected for recycling or reprocessing.



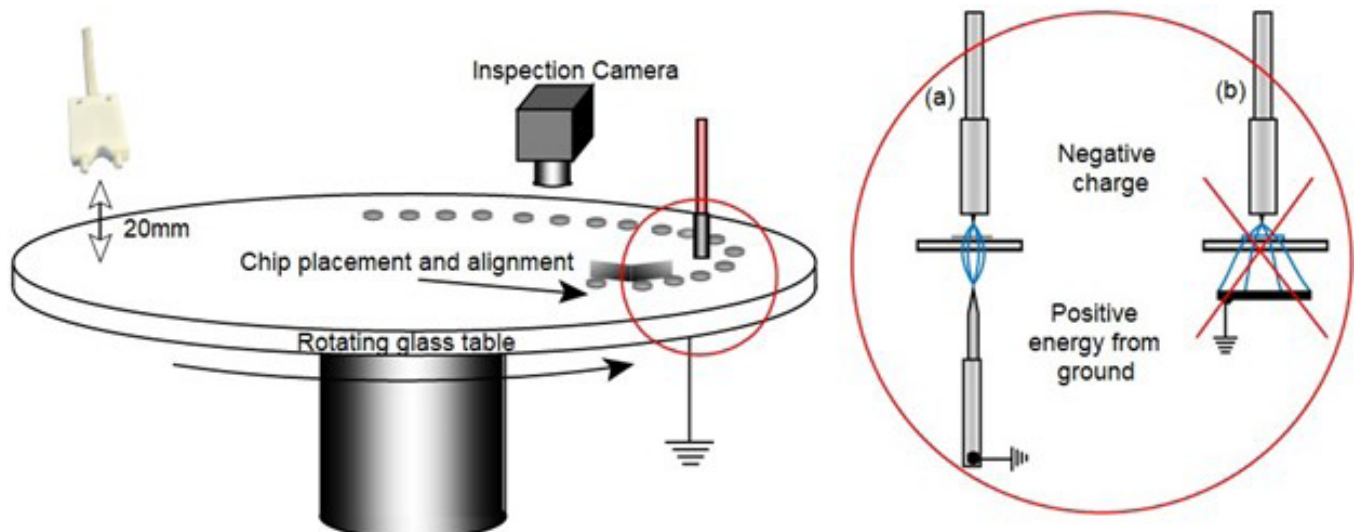
# Pinning Inspection Table

## Problem

Precise alignment of components prior to inspection (silicone chips) by a quality control inspection camera is imperative. Any misalignment will result in unnecessary product scrappage.

## Solution

As the component is positioned on a rotating table, applying a charge to the component will temporarily bond the component to the table. This will ensure that the component placement is consistent. After inspection and removal of the component, the table must then be neutralised prior to the reapplication of more static charges.



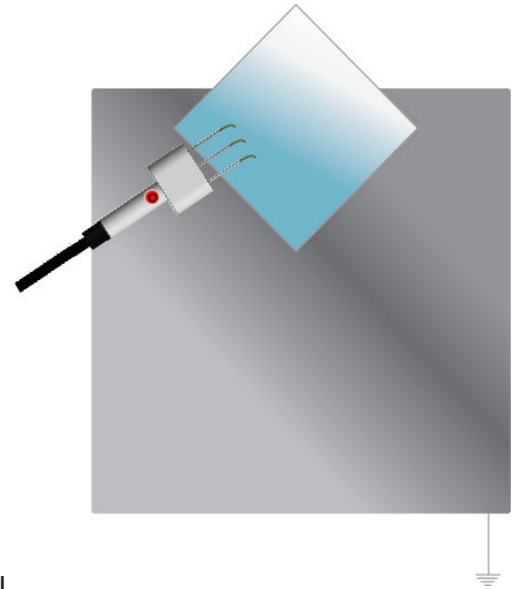
# Hand Pinning 20kV

## Problem

IML label printers and companies using IML labels need to ensure that the materials being used are suitable for the application. Whether this be testing of ink, lacquer, plastic film or a finished label, it is important that the conductive properties are suitable. The failure to ensure material suitability is likely to result in product scrapage, loss of production and customer dissatisfaction.

## Solution

Applying a charge to the material stock held against an aluminium sheet will allow the material to support the aluminium when the label is lifted. The use of a hand-held pinner and static generator will remove the risk of incorrect materials being used in the production of IML labelled products.



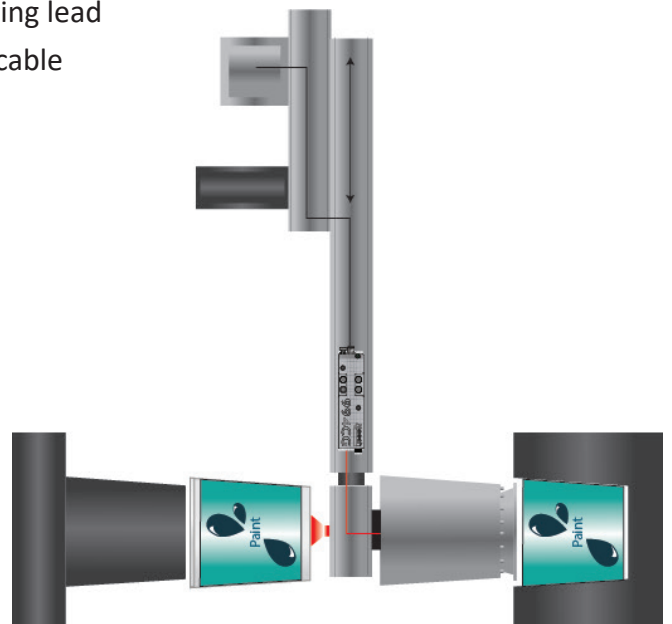
# IML (Label Placement) 25kV

## Problem

There are a number of problems within mould labelling such as short mandrel working life, high manufacturing costs, long manufacturing lead times, high scrap rates, product contamination and high voltage cable damage.

## Solution

In order to overcome the common problems within the industry, Meech developed the Hydra System. Relocating the generator to the end of the robot arm removed the need to run high voltage cables through the cable track next to low voltage signal wiring which prevents cable being damaged. The mandrel design was also reinvented to allow the resistively coupled pins to charge the label as the mandrel exited the cavity, ensuring total surface charging of the label. Altering the charging cycle to suit the Hydra system, has the benefit of speeding up the cycle time, whilst reducing the risk of producing poor quality products.



# All you need, from the best in the business

Meech is also a leading provider of:

- **Industrial Static Control Systems** – Eliminating unwanted static or creating a controlled static charge in industrial processes can increase productivity, reduce waste and enhance quality.
- **Web Cleaning Systems** – Typically used within the printing and packaging industries to remove contamination, improve print quality and increase productivity.
- **Air Technology Equipment** - Industrial compressed air products that are energy efficient, reduce noise levels, cut costs and provide efficient cooling.
- **Surface Cleaning Systems** - IonWash, IonRinse and JetStream Air Knife Systems – Energy efficient 3D surface cleaning systems that are used for contamination and surface moisture removal.

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