plastics

Meech

INDUSTRY APPLICATION GUIDE

Plastics Industry

Static Solutions to Improve Production and Profitability

www.meech.com

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Meech International

More than 6000 customers worldwide have benefited from the expertise and product-based solutions provided by Meech International. With an unparalleled knowledge of the effects of static in manufacturing processes, the company has developed an impressive portfolio of static control and cleaning systems. These are designed to enable customers to improve their own production processes and hence profitability.

Throughout the world, businesses benefit from Meech expertise. A truly international company, Meech has its headquarters in the UK and additional operations in the USA, Belgium, Hungary and China, supported by a worldwide distribution network covering over 50 countries.

Meech has built its present success on offering its customers outstanding levels of:

- Applications Knowledge
- Flexibility of Approach
- Innovation
- Speed of Response

...and these are the qualities that will continue to underpin future growth.

Meech Technology

For further information, please refer to the Meech web site (www.meech.com) or the “Static Electricity: Causes and Cures” booklet.

Static Elimination

Meech provides solutions based on both AC and Pulsed DC technologies for optimum static control. AC technology takes normal mains voltage and boosts it (typically to 7kV) through a special transformer. This high voltage is carried to an array of emitter pins to create a high energy “corona”. A very large number of positive and negative ions are generated following the AC cycle. A statically charged surface of either polarity passing close to this ion cloud will be quickly neutralised.

Meech special Pulsed DC technology transforms mains voltage into positive and negative outputs. Dedicated emitters produce alternating clouds of positive and negative ions. Frequency and ion balance (the relative proportion of positive and negative ions) can be adjusted to optimise long distance neutralisation for specific materials and process conditions.

Static Generation

Generating a controlled static charge on a non-conductive material will allow temporary adhesion between two or more surfaces of opposite polarity. A high DC voltage of up to 50kV (positive or negative, depending on the application) is carried to a 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.

Cleaning

Dust contamination presents major problems in a wide range of manufacturing industries. The removal of dust can be substantially improved by the use of static control systems. Meech “JetStream” technology combines a specialist knowledge of static control and air flow to provide a unique design of manifold with an integrated ionisation system. Driven by energy efficient fans, the JetStream produces a high velocity blade of ionised air capable of removing contaminants down to 1 micron.

Static Control Problems in the Plastics Industry

Problems with static electricity in the plastics industries are numerous. Processes where static charge can be an issue include injection moulding, blow moulding, thermoforming, rotational moulding, parts conveying and collection and assembly processes.

The primary problems resulting from high levels of static charge are:

- Dust Attraction & Contamination
- Process Control & Quality Problems
- Operator Shocks

Dust Attraction & Contamination

The attraction of airborne contaminates as a result of static charge on a substrate is becoming more and more of an issue as the quality standards of companies continue to be raised.

Dust and particulates attracted by the static charge on the part can result in high and expensive scrap rates. This is especially the case if the material is to be used in the medical or food packaging industries, or in the painting of automotive or white goods.

A recent stipulation of food packaging companies is also that static control equipment cannot use air to assist long range ionisation, for fear of blowing additional contaminants on to the products to be neutralised.

Process Control & Quality Problems

The cost penalties associated with uncontrolled static charge in manufacturing processes are many and varied. Static can force companies to run their machines at much slower speeds than might otherwise be the case. This is because static charge can be a direct cause of production problems such as parts sticking to each other in the conveying process, resulting in jams or product misbehaviour.

Operator Shocks

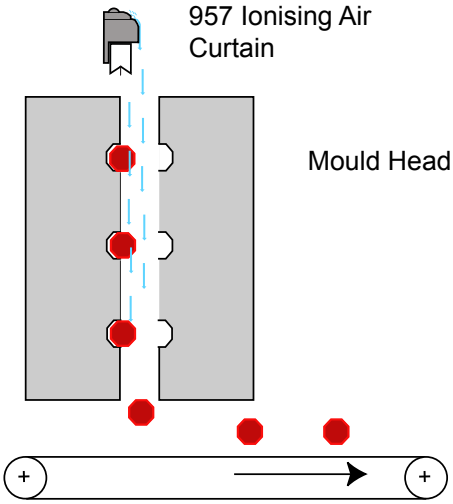
This is becoming increasingly significant as companies strive to improve health and safety standards.

While static-related shocks can be painful, the effects are usually quite safe and short lived. However, the cost implications lie in the “recoil” reaction that is associated with the initial shock. When an operator receives a shock, there can be a moment of disorientation, bringing with it subsequent hazards such as collision with other operators and/or machinery.

Operator shocks are typically the result of an accumulated charge or “battery effect” occurring during the collection of parts in a bin or assembly area.

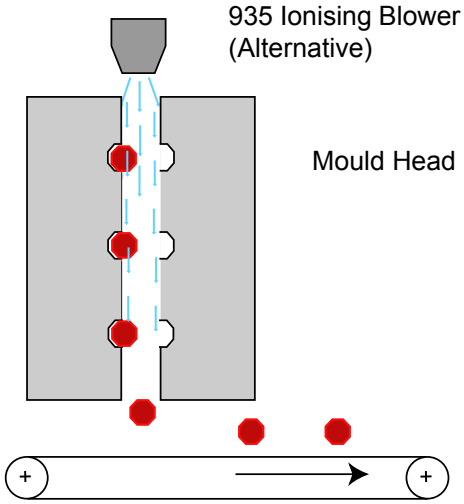
Applications

Injection Moulding



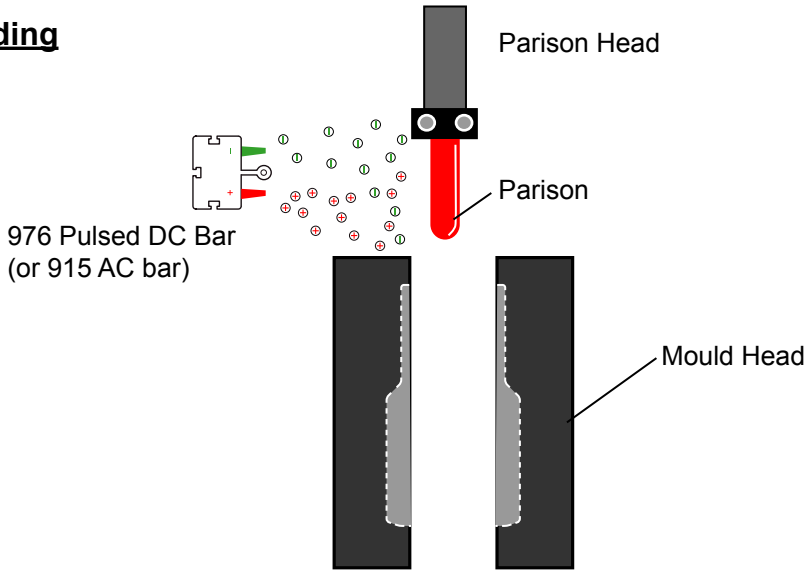
Problem:
Small, light mouldings can stick to the face of the tool due to static charge. This can result in:

1. Mould damage.
2. Crushed parts.
3. Slower production speeds.



Solution:
A 957 Ionising Air Curtain positioned either above or to the side of the problem area will neutralise the static charge and help remove the parts. Air may be pulsed through the air curtain only when the tool is open. Alternatively, a 935 Ionising Blower can be installed as shown.

Parison Blow Moulding



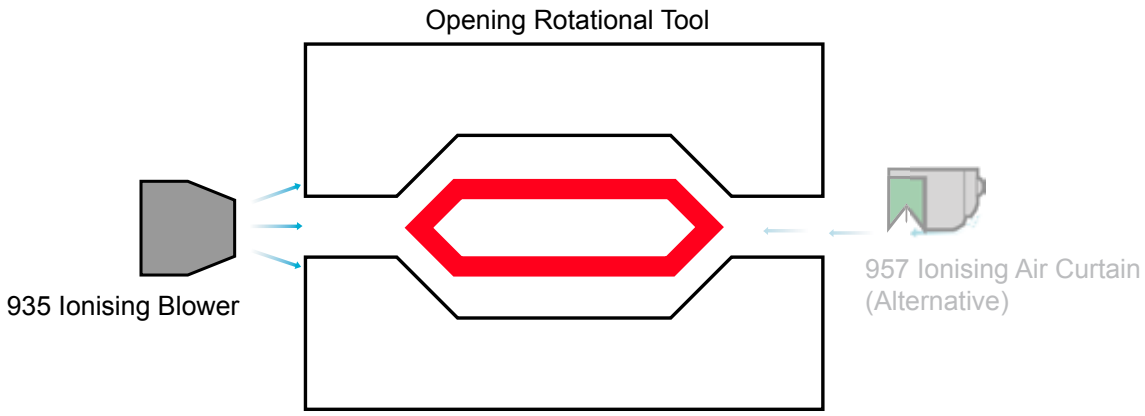
Problem:
As molten plastic parisons drop toward an open tool, high static charges cause the following problems:

1. Mulitple parisons will repel each other.
2. Single parisons will attract to the tool.

Solution:
The use of a long range Pulsed DC System delivers widespread ionisation without the requirement for an air delivery system. This is ideal for very thin gauge parisons which are prone to being prematurely cooled or misdirected by the slightest of airflows.

Applications

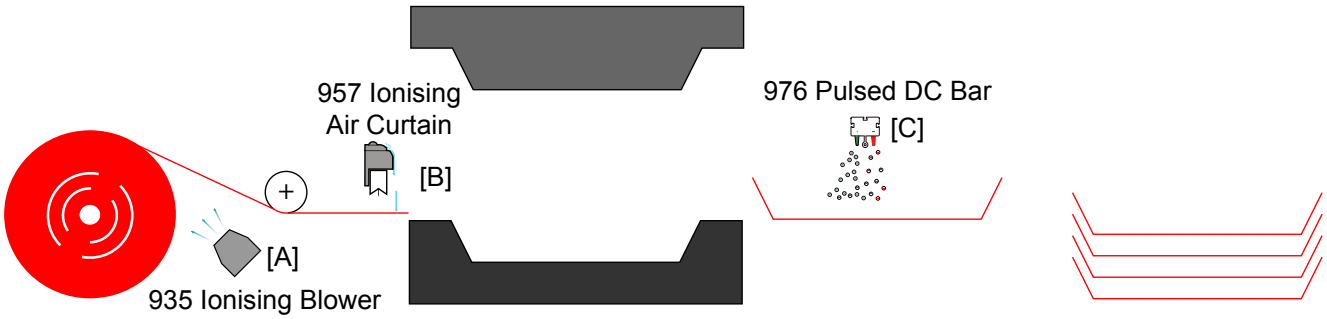
Rotational Moulding



Problem:
Large mouldings such as rubbish bins, plastic lawn furniture, toys, plastic pallets and containers can develop very large static charges. When the tool is removed from the part, the static charge can cause severe operator shocks and can attract dust from long distances.

Solution:
The normal solution is the installation of a 935 Ionising Blower of sufficient size to neutralise the charge on the part as the tool is taken away. A 957 Ionising Air Curtain or 954 Ionising Gun are alternative solutions.

Vacuum & Thermoforming



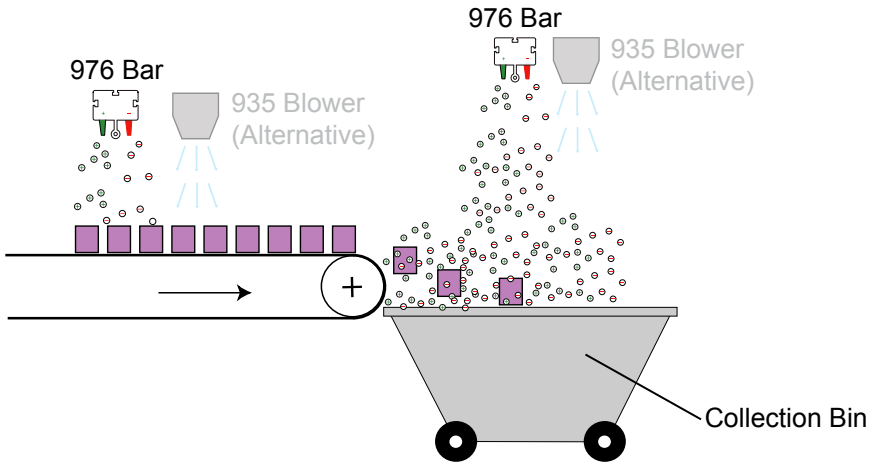
Problem:
A complete thermoform line has several static related problem areas:

1. The unwinding of the material causes dust attraction which is later impregnated into the thermoform.
2. As the forms exit the tool, the static charge can cause additional dust attraction or stacking problems.

Solution:
Installing a 935 Ionising Blower or long range 976 Pulsed DC Bar in Position [A] will prevent dust attraction. A 957 Ionising Air Curtain at Position [B] will ensure that the film is clean before entering the machine. A long range 976 Pulsed DC Bar or 935 Ionising Blower at Position [C] will neutralise the forms so that they will stack evenly.

Applications

Conveyor & Bin Ionisation

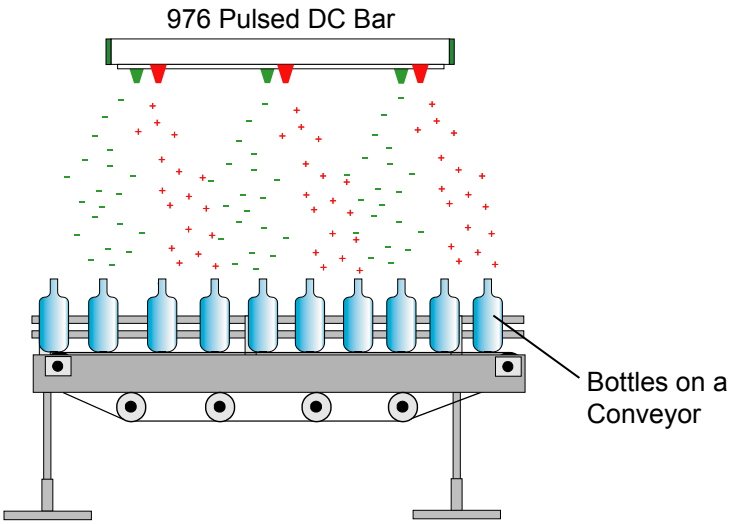


Problem:
The cooling and conveying of plastic parts will accumulate a very high static charge. This results in:

1. Dust attraction on to parts on the conveyor and in the collection bin.
2. Severe shocks to personnel as a result of a “battery effect” in the collection bin.
3. Parts sticking to the conveyor belt.

Solution:
A 976 Pulsed DC Bar positioned over the conveyor and collection bin will neutralise the static charges. Mouldings release readily from the conveyor into the collection bin without further dust contamination. Productivity is improved and operator shocks are eliminated. A 935 Ionising Blower System can also be used as shown.

Bottle & Parts Conveying



Problem:
Blow molded plastic containers such as bottles can experience problems on conveyors and at packing stations such as:

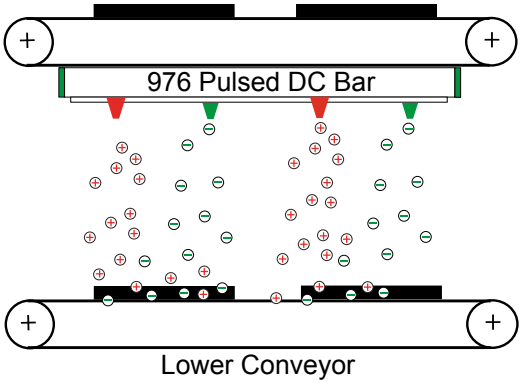
1. Contamination due to dust attraction.
2. Products falling down and disrupting flow.
3. Operator shocks.

Solution:
A 976 Pulsed DC Bar mounted over the bottle line will create a constant flow of ions to neutralise the moulded parts, the conveyor and the operators’ bodies via their hands and arms, which are regularly placed within the ionisation field.

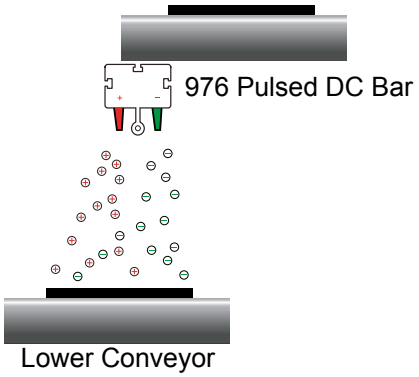
Applications

Small Parts Assembly & Conveying

Side View



End View

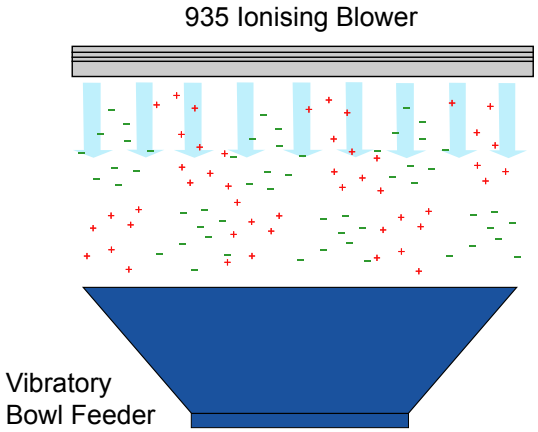


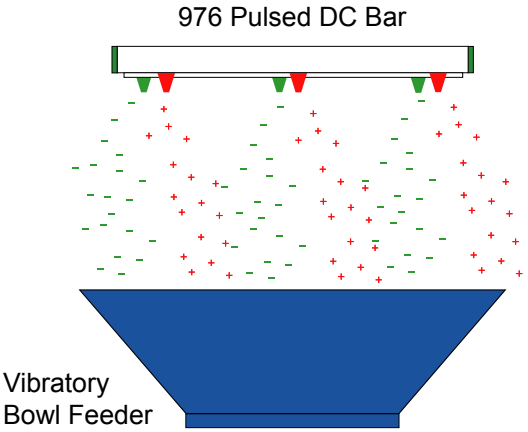
Problem:
Constant movement of parts during the manual assembly or conveying process can generate significant levels of static charge. This can result in:

1. Dust attraction.
2. Operator shocks.
3. Misbehaviour of very small parts so that they will not assemble properly.

Solution:
Installation of a long range 976 Pulsed DC Bar over the workbench or conveyor will alleviate the problem. The bar is typically mounted overhead, out of the way of the operator, and neutralises the charge on the part as well as the operator without the use of air.

Vibratory Bowl Feeders





Problem:
The constant friction generated by vibratory bowls can cause the following problems:

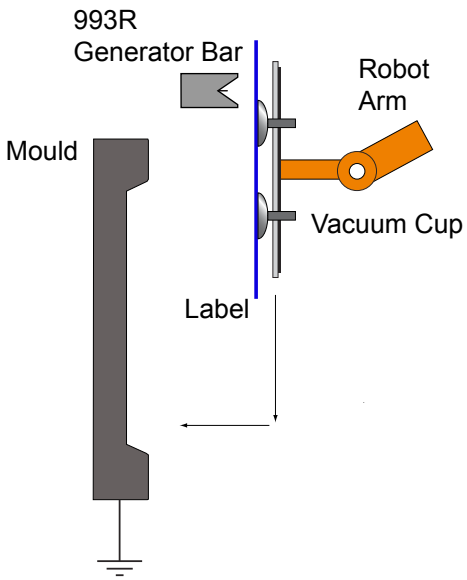
1. Opposite charged materials will cause “clumping” and not allow proper feeding.
2. Same polarity materials will cause small parts to be ejected from the bowl.

Solution:
The continuous ionisation created by either a 976 Pulsed DC Bar or 935 Ionising Blower will neutralise the charges as soon as they are generated. Choice of a bar or blower depends on whether an airflow is acceptable or not.

Applications

In-Mould Labelling

1.



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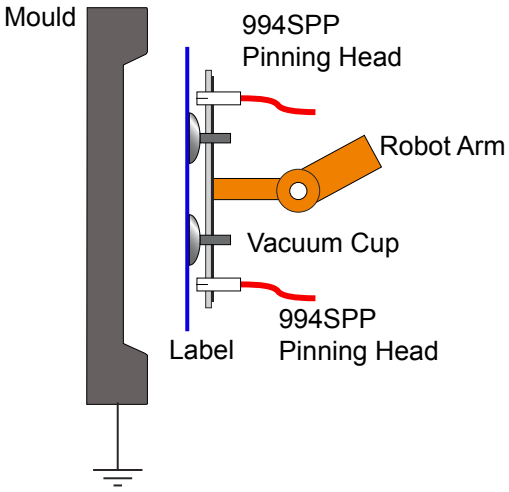
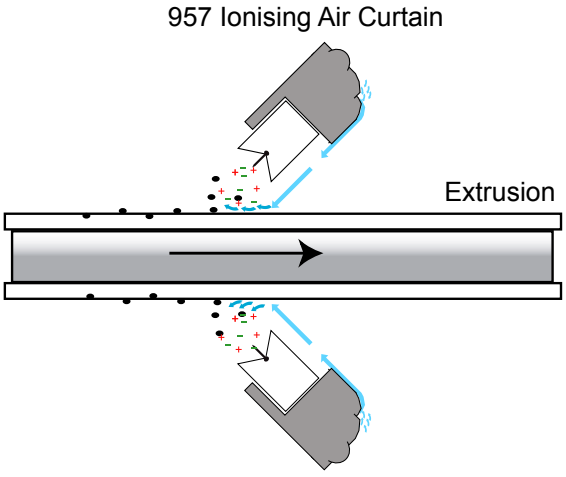


Problem:
Plastic labels do not adhere properly to the inside of the tool during the moulding process. This can occur due to static charge or the ineffective use of expensive air vacuum systems to hold the label in place.

Solution:
The label is picked up by the robot arm and is then either:

1. Passed over a static charging bar and placed into the tool.
2. Moved into the tool and “pinned” directly to the surface of the tool.

Dust & Contaminant Removal



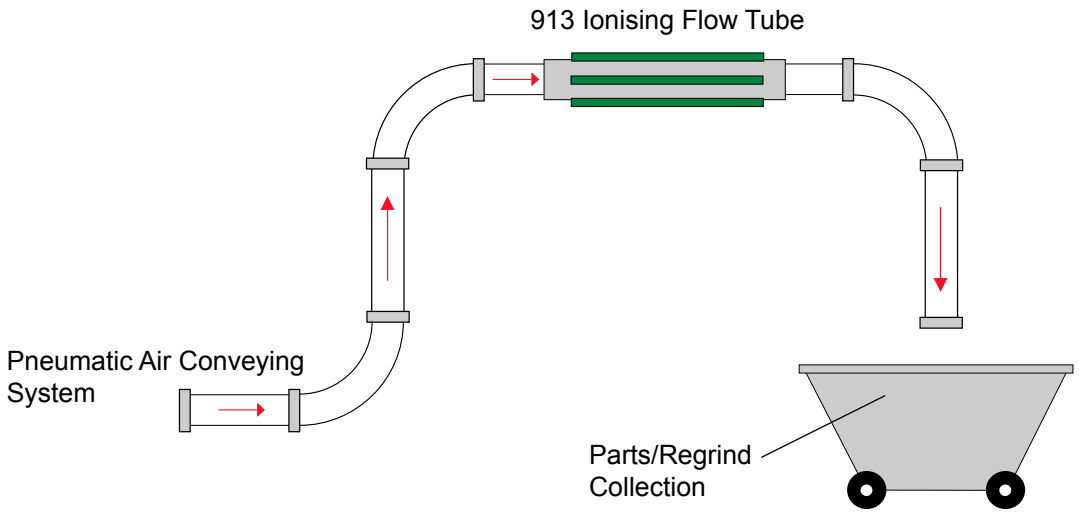
Problem:
Warm and highly charged extruded profiles become heavily contaminated by swarf or dust after sawing or cutting processes. This can lead to:

1. Operator shocks.
2. Charged swarf contaminating the machine and environment.
3. Statically attracted dust being carried to other parts of the process.

Solution:
Carefully positioned 957 Ionising Air Curtains can both release and neutralise swarf and also neutralise the profile, assuring a clean and static free section at the end of the extrusion line.

Applications

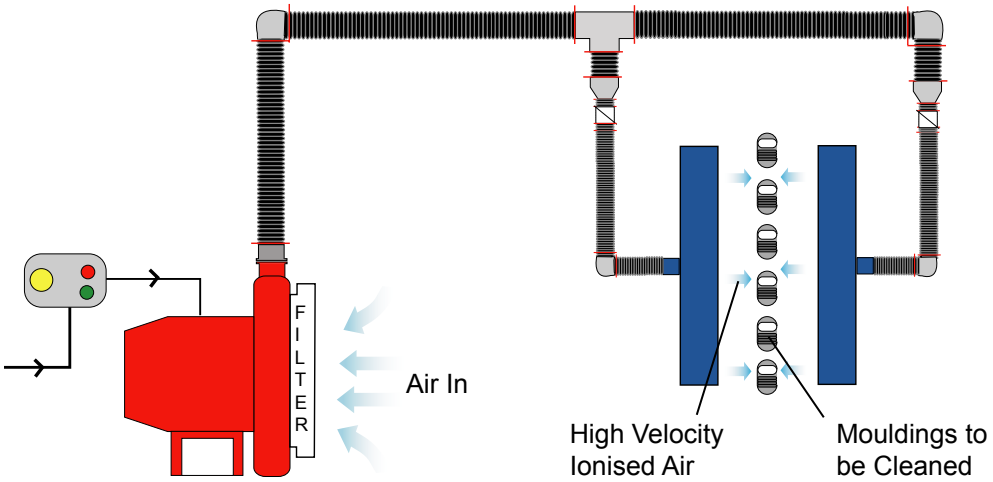
Plastic Waste Recycling & Parts Conveying



Problem:
The movement of material through ducting can result in static charges being generated due to friction between the material being conveyed, and also between the material and ducting walls. This can result in bridging and blockage of restricted openings.

Solution:
The installation of a 913 Ionising Flow Tube just prior to the area where blockages occur will neutralise the static charge and allow the material to flow freely through the ductwork.

Parts Cleaning



Problem:
Entrapment of particles in paint finishes or laminates can lead to expensive rejection rates. For very small items, compressed air driven cleaning systems can be economic and effective. For larger items this is often no longer the case.

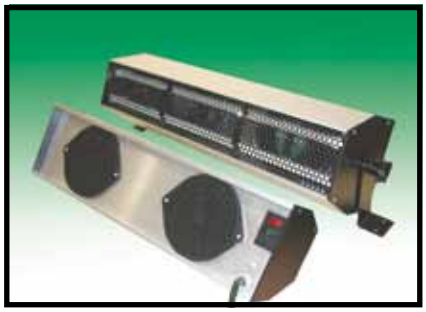
Solution:
The JetStream system provides an effective and economic solution for the removal of contaminants from product surfaces without the use of costly compressed air. This is achieved by directing filtered, dry, high velocity, ionised air to the contaminated surfaces via an external blower.

Product Summary

Model 983v2
The Model 983v2 has been designed to provide accurate measurement of static electrical charges.

Model 904
The Model 904 is a constant voltage power supply, designed to provide a 7kV source for Meech AC ionising equipment.

Model 915
The powerful performance of the Model 915 provides very fast decay times and effective ionisation up to distances of 152mm with a shockless design.

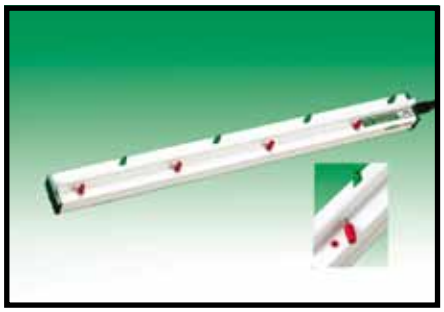


Model 935
The Model 935 Ionising Blower provides effective long range ionisation over a large area.

Model 957
The Model 957 is an extremely versatile unit that provides effective static neutralisation, dust removal, and sheet separation capabilities.

Model 954
The Model 954 is a hand held ionising air gun for neutralising static charge and removing dust contamination.

Product Summary



Model 976
The Model 976 Pulsed DC Bar is unique and has been designed to provide highly effective long range ionisation up to distances of 610mm. It is shockless and is easily maintained.

Model 977v3, 977CM
The Model 977v3 and 977CM Pulsed DC Controllers have been designed to operate with the full industrial range of Meech PDC equipment.

Model 993R
The Model 993R is a high performance sparkless Generator Bar used with the Meech range of high voltage DC static generators.

Model 992v3
The Model 992v3 Static Generator creates a controlled level of static charge to impart temporary bonding between materials.

Model 913
The Model 913 Flow Tube is designed to neutralise static charges in handling and conveying systems.

JetStream
The JetStream system provides a highly cost-effective surface cleaning solution.

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