

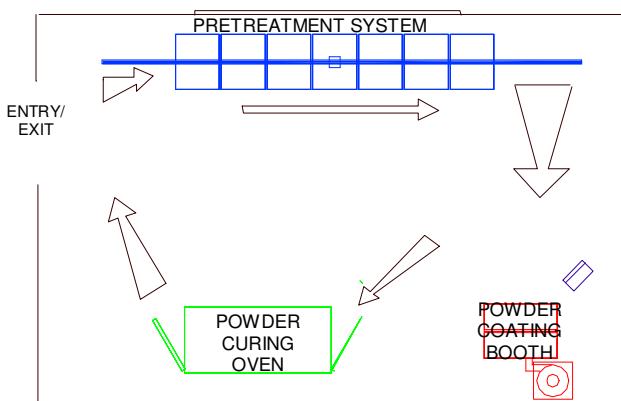
The Powder Coating Plant Process

Powder coating has today established itself as the most effective means of metal surface finishing. It has replaced liquid painting and various methods of electroplating due to the many advantages this process offers ...

- Substantial improvement to chemical corrosion
- Substantially improved resistance to mechanical abuse – better scratch resistance, abrasion resistance and mechanical wear and tear
- Cleaner process for improved environment
- Faster process for better productivity through the paint-shop
- Requires less skills for high quality coatings
- Guarantees uniform and consistent results
- Substantially improved aesthetics for higher sales value of the finished product
- Requires lower energy per Meter² of surface coated
- Requires lesser care in storing and packing due to the toughness of the coat
- Is cost-effective

Powder coating is a simple process requiring minimal skills and training. The articles to be coated are first cleaned of all foreign matter from the surface. Mild steel components need to go through a phosphate conversion coating. Aluminum components go through a chromate conversion coating. This, known as **pretreatment**, is employed for improved bonding of the powder coat to the material being coated to provide a longer life to the coat. The method employed usually is a dip in chemicals and water in various tanks. Occasionally, the process may be automated through a spray pretreatment process.

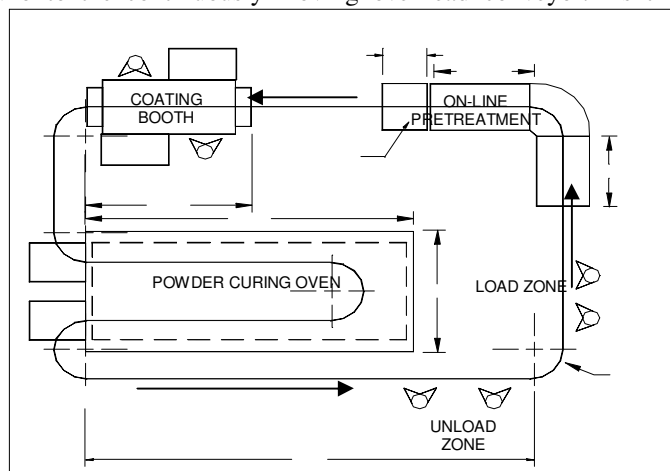
A batch powder coating system:



The 'pretreated' articles are **jigged** and hung into the coating booth on a fixed or rotatable jig-holder. The manual coater **coats** the components from all sides. The articles are then moved out onto an oven trolley (or directly into the oven). The trolley, if used, is rolled into the oven when full. In the oven, at a temperature of 180-220°C, in 10-15 minutes, the powder melts, polymerizes fuses and cures into the final tough uniform and consistent powder coat that has high aesthetic value. At the end of the curing schedule, the trolley is rolled out of the oven and allowed to cool down. The articles are then removed out from the paint-shop.

A conveyORIZED powder coating system:

The 'pretreated' articles are jigged and loaded onto the continuously moving overhead conveyor. As the conveyor moves the articles through the coating booth, they are coated on all sides by manual and/or automated spray guns. The conveyor then carries the articles into the tunnel oven (or in a semi-automated version, the articles are offloaded for off-line curing). In the oven, at a skin temperature of 180-220oC, in 10-15 minutes, the powder melts, polymerizes, fuses and cures into the tough uniform and consistent powder coat that has high aesthetic value. At the end of the curing schedule, the article moves out of the oven (or the trolley is rolled out of the oven) and allowed to cool down through a cool-off zone. The articles are then removed off the conveyor and taken out of the paint-shop.



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The Powder Coating System

Complete powder coating systems come in two versions – a batch system and a conveyorized system. The primary difference is the mode of material movement from operation to operation. Powder coating itself may be by manually held spray guns or by automated guns fixed-mounted or reciprocator-mounted.

A complete powder coating system requires the following components:

PRETREATMENT SYSTEM – consisting of tanks or tubs containing chemicals or water in which the articles are dipped to clean and prepare the surface for powder coating. The size of the tanks depends on the size and quantity of articles to be coated. The specific process depends on the metal make-up of the article.

AIR COMPRESSOR – fitted with appropriate filters provides clean and dry compressed air to the powder coating system. A 3HP or a 5HP air compressor is normally adequate for a batch coating system using 1 coating machine. Conveyorized systems with multi-gun application may require a larger capacity air compressor.

POWDER SPRAY SYSTEM (also known as the powder coating machine) – is considered the heart of the powder paint shop. Normally an electrostatic powder spray system is used. This sprays electrostatically charged powder into the spray booth where the articles to be coated are hung. Electrostatic forces provide a uniform and consistent coating quality. Major strides have been made in the design of these machines offering major benefits to the user. RED LINE offers two state-of-art technology models – the **RED LINE No201** and the **RED LINE P0201**.

POWDER COATING BOOTH WITH RECOVERY SYSTEM – in which the actual powder coating is carried out. The efficiency of recovery of oversprayed powder for reuse decides the economics of powder coating. The efficiency of overall retention of oversprayed powder decides the pollution-free worthiness of the system. There are two types of powder recovery booths – **Filter Cartridge type** and the **Hyper Cyclone type**.

CURING OVEN – in which the powder coated articles are placed for 10 to 15 minutes at the recommended temperature for the powder to melt, polymerize, fuse and cure into the final finish of high aesthetic appeal with strong mechanical and chemical properties.

RED LINE powder coating equipments and systems are today considered to be some of the finest available. Each RED LINE powder coating equipment offers advantages and benefits few other systems can match.

Thousands of RED LINE equipments and systems are presently in use globally in countries like U S A and Canada in N America, Singapore, Malaysia and Indonesia in F E Asia, S Arabia, UAE< Bahrain in Mid East Asia in Sri Lanka in S Asia and Kenya and Tanzania in E Africa apart from India in direct competition with leading International brands worldwide. The advantages RED LINE systems offers include high levels of quality standards, consistent performance records of existing users and extremely reasonable prices.

Every component of your RED LINE powder coating system offers you unmatched technical as well as commercial benefits. The following pages will show you how you can benefit with a RED LINE system in your powder paint shop.

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The Pretreatment System

Pretreatment is used to prepare the metal surface of the articles before they are powder coated. Pretreatment achieves two basic goals ...

- Removal of foreign matter from the surface and
- Conditioning the surface to make it suitable for optimal quality coating results.

Attention to pretreatment is essential to maximize the benefits of powder coating. Depending on the application, varying degrees of sophistication of the pretreatment set-up may be employed – from a single stage cleaning process to a comprehensive multi-stage conversion coating deposition. The most popular means of pretreatment is by dipping the articles in tanks containing the appropriate chemicals or water.

Different metals require different processes and your choice of a pretreatment system will depend on the metal make-up of your articles to be coated.

IRON & STEEL:

Fair:

- 3-in-1 chemical (FRP lined)

Good:

- Derusting/descaling (FRP lined)
- Water rinse
- 3-in-1 chemical (FRP lined)

Excellent:

- Degreasing
- Water rinse
- Derusting (FRP lined)
- Water rinse (FRP lined)
- Activation (FRP lined) – optional
- Phosphating* (FRP lined)
- Water rinse
- Passivating

* a fine crystalline zinc phosphate coat of 1-2 gms/M² is recommended for optimum results

ALUMINUM:

Fair:

- Degreasing
- Water rinse (check with Chemical supplier)

Good:

- Degreasing
- Water rinse
- Chromate conversion* (FRP lined)

Excellent:

- the 'good' process plus nitric acid etching prior to chromate conversion

* Chromate conversion coat of 0.1-0.5 gm/M² is recommended

✓ **Note:** Anodized aluminum surfaces need to be only degreased.

ZINC ALLOYS:

After a degrease, a light phosphate coating is suggested. Generally electro-plated zinc surfaces present no special pretreatment requirements apart from degreasing and passivating. However, hot-dipped galvanized surfaces can affect the powder coating quality – increasing the degree of spangle decreases adhesion properties.

POROUS CASTINGS:

These surfaces present considerable challenges at the time of curing because of 'blowing off' of powder due to exhalation of entrapped air in the castings at higher temperatures. Pre-heating of the articles does, often help in reducing this difficulty.

RED LINE offers to supply complete pretreatment systems to meet specific needs. Please do contact us for any information or assistance you may require.

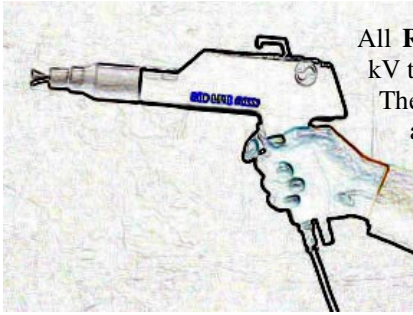
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The Powder Spray System



All **RED LINE** electrostatic powder spray systems use only the in-built 100 kV technology – benchmark technology in powder coating today – worldwide. The 100 kV integrated spray gun improves transfer efficiencies, productivity and powder consumption substantially when compared to other less-than-100 kV technologies.

RED LINE offers two models in the 100 kV stream – to assist you in choosing the one most appropriate to your specific needs ...

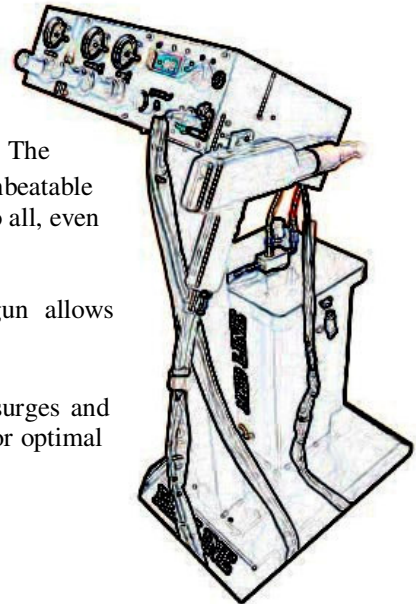
The RED LINE **NC201**:

With the **RED LINE NC201**, users now have access to the 100 kV state-of-art technology ion powder coating – at amazingly low prices. The **RED LINE NC201**, a full-fledged production machine, offers the unbeatable advantages and benefits of modern technology and makes it affordable to all, even the small powder coater.

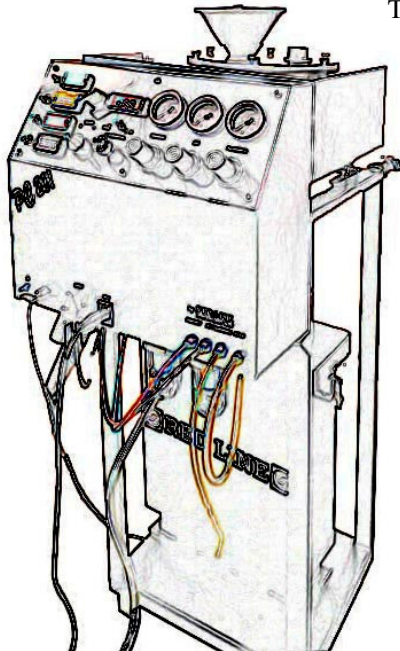
Light and well-balanced, the **201** 100 kV integrated hand spray gun allows effortless coating, hour after hour..

The **RED LINE NC201** will absorb most power voltage spikes and surges and filter out most unwanted power signals. The control panel is designed for optimal performance without need for extensive operator training..

The machine that works and works and works – year after year after year



The RED LINE **PC99**:



The **RED LINE PC99** is a result of intensive study under actual shop-floor conditions in a wide range of user establishments for a variety of end-products. It is an advanced 100 kV electrostatic powder coating machine. It is packed with unmatched features.

[1] The detachable HV cascade in the 100 kV in-built generator is field-replaceable.

[2] The *ProSieve* (optional), an on-line high-performance powder sieving system, provides uncontaminated powder for coating.

[3] A set of back-up compressed air filters

Ask for a demonstration or a visit to a **RED LINE PC99** user near you and see how this machine can transform not only the quality of your work but also the profitability of your powder paint-shop.

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The Powder Recovery Booth

The equipment that decides the economical viability of your powder coating paint-shop is the powder recovery booth. The economies of your paint-shop depend on the genuine recovery of oversprayed powder **for reuse**.

If you are an end-user or using only a few colors (maybe 1 to 3), you want to closely study the possibility of using the DSP powder recovery booth as it offers advantages to you.

DELTA Series Filter Cartridge type:

RED LINE DELTA Series (DSP) recovery systems are the latest generation state-of-art filter cartridge type powder recovery systems. With effective cartridge type recovery system like the DSP booth, you are assured of at least 98+% (and virtually 100%) of recovery of powder. Conventional and often poorly executed recovery booths may not be able to offer more than 75-80% of recovery of reuse while making tall claims of 85 or even 95% recovery efficiencies. This is often the case with poorly designed and copycat cartridge type powder recovery booths.

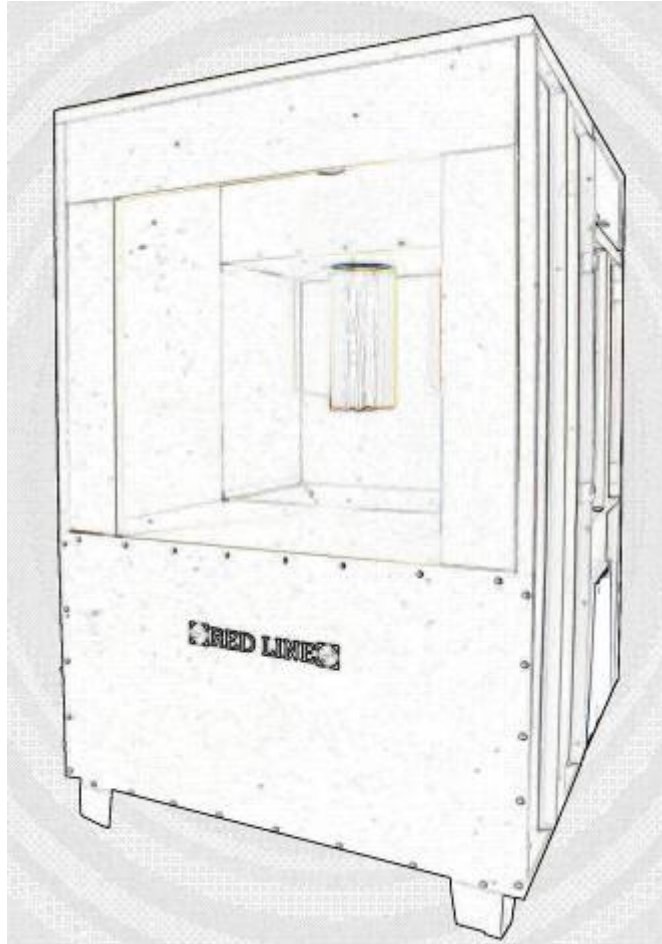
How the DSP powder recovery system function:

The powder overspray recovery system is located in the rear section of the powder spray booth (on the face opposite to the sprayer). The front section is the coating booth. The work-pieces, duly jugged are hung on the jig-holder in the coating booth (manually or on a conveyor) and sprayed with powder. A specially designed low-pressure, high capacity fan sucks air and the powder overspray through the coating booth to the recovery system in a horizontal flat airflow pattern. The specially designed PTFE coated polyester-based filter cartridges entrap virtually all the powder particles. The remaining powder particles, if any, are trapped in the final filters (if installed – optional), allowing

virtually clean air to the shop-floor atmosphere through the fan system. Electronically controlled high-pressure reverse pulse air jets located above each filter cartridge regularly and automatically clean the powder-laden filter cartridges. This throws the powder from the filter cartridges back into the powder spray booth and is collected in the powder bin located under the booth. This process, known as cartridge scavenging is a continuous and on-line process. The collected powder can be manually (or automated) sieved and reused.

Why the DSP booth:

- Highest recovery efficiency – lowest powder cost
- Quick colour change – save time in colour change
- Neat & compact – utilizes lowest foot-print on the shop-floor
- Easy-to-maintain
- Healthy and pollution-free environment



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If you are a custom coater (job-coater) or an end-user with a large number of colors, the appropriate powder recovery booth for you may be the **RED LINE Hyper Cyclone** type.

Hyper Cyclone type powder recovery booth:



RED LINE Hyper Cyclone (HC) type recovery booths are ideal for coaters employing a large number of colors with frequent color changes. These recovery systems offer genuine recovery of up to 95-98% of powder – depending on the powder being used. **HC Cyclones are designed for powder coatings** – unlike many cyclones available as ‘dust collectors’ – capable of collecting only the heavy powder particles and hence giving economic efficiencies of only 75-80%.

RED LINE HC booths are powder coated to provide a tough and smooth surface to the continuous flow of highly abrasive powders. The cyclone structure itself is designed and built using a **unique ‘break-away’ design** enabling quick dismantling for a complete cleaning for ease in color change. Added to this is that the entire booth is built in panel form for ease in transport.

As per International and national legal requirements for pollution control, every RED LINE HC booth is supplied with an **after-filter system as a standard accessory**. The after-filter system traps all the oversprayed powder not recovered in the cyclone and ensures that the air exhausted from the recovery booth is clean enough to be circulated back into the shop-floor.

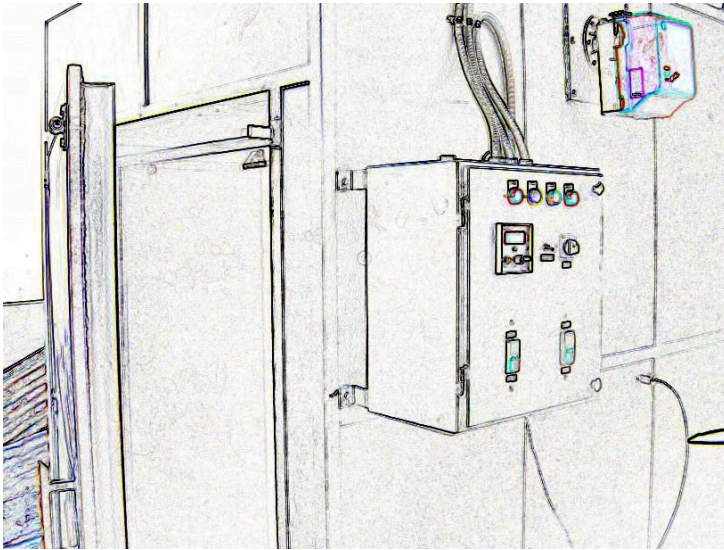
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The Powder Curing Oven



Powder curing ovens from **RED LINE** – whether fuel-fired or electrical – are extremely energy efficient, lowering the power bills as well as saving scarce fossil fuels. Ovens from **RED LINE** are guaranteed for stated performance characteristics. Uniform temperatures throughout the entire internal working area of the oven ensure uniform powder curing. This becomes a very critical factor in powder coating. Lower than required temperatures may mean an incomplete powder curing process, leading to the powder coat peeling off (and the product suffers unnecessarily). Higher than stated temperatures could lead to the powders' important resistance to chemical corrosion and mechanical abuse components

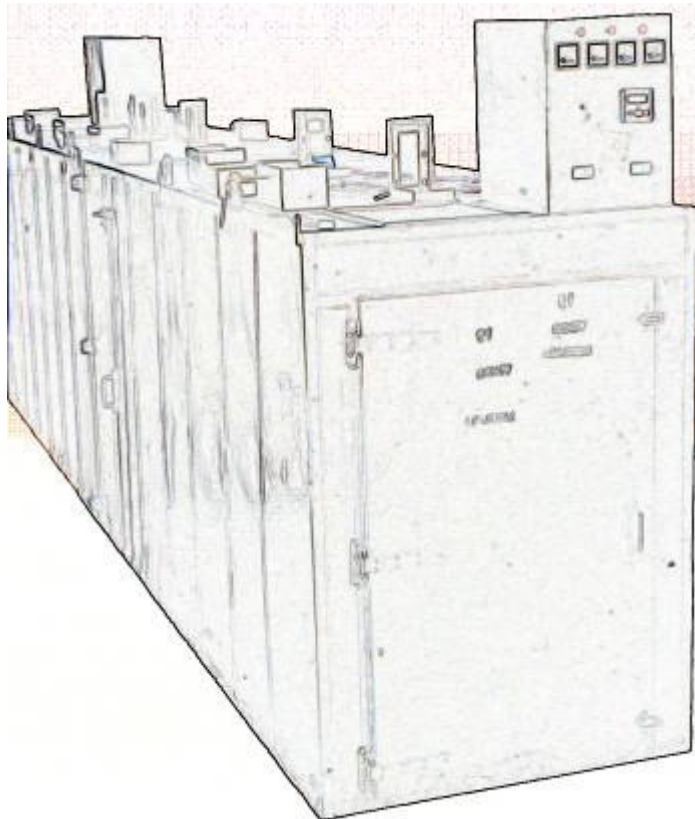
burning off. This would translate into a lower life to the product being coated.

Each RED LINE powder-curing oven is customized to individual needs to maximize the utilization of the equipment. All RED LINE ovens have circulation airflows inside the oven of critical design. It is high enough to ensure that the temperature inside the oven is uniform while at the same time, low enough to ensure that airspeeds inside do not reach levels where there is a fear of the uncured and to-be-cured powder particles being blown off of the surface of the components inside the oven.

RED LINE offers electrical convection ovens starting from small box type ovens of size 0.9M x 0.9M x 0.9M to large box type ovens of size 6.5M x 1.5M x 1.5M. Larger ovens are available in two choices of heat energy source – electrical and/or fuel-fired. RED LINE conveyorized tunnel ovens are offered with fuel as the source of heat energy. RED LINE's fuel fired hot air generators are some of the most energy efficient hot air generating systems available. These can be supplied as a separate entity or integrated with the oven itself to save on valuable shop-floor space.

All RED LINE ovens are built on a strong and solid structure. These ovens can be supplied as single piece equipments or in disassembled state to be assembled on site. Often the size of the oven and/or the mode of transport/shipment will decide this.

RED LINE ovens (or for that matter, all powder curing ovens) are not meant for liquid painting or varnish curing ovens and should not be used for such applications.



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