FLEXIBILITY, PRODUCTIVITY AND QUALITY IMPROVEMENTS IN ELECTROSTATIC POWDER ENAMELING

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ELECTROSTATIC POWDER ENAMELING

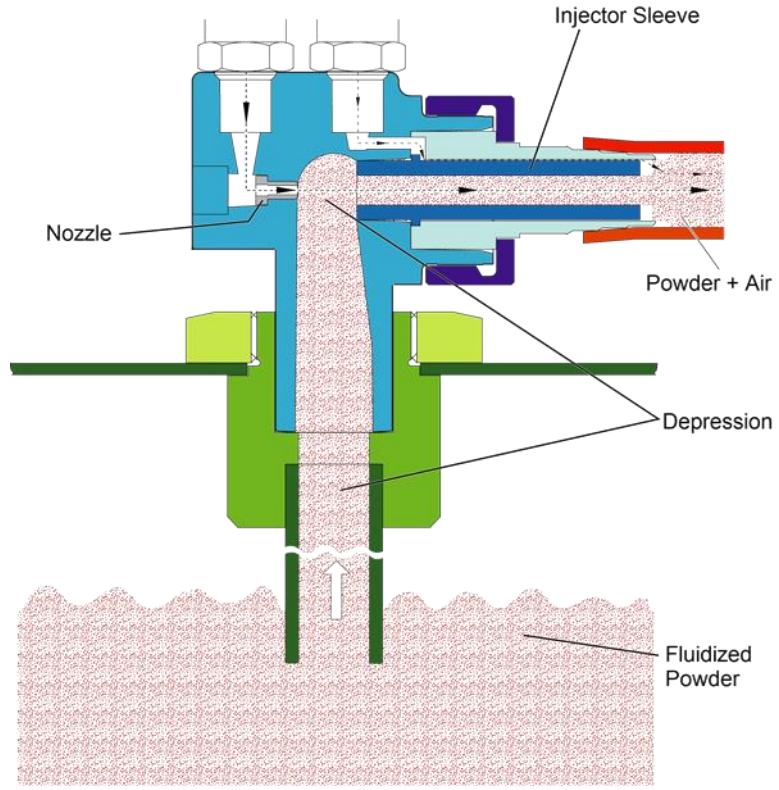
- Electrostatic Powder Enameling is a well known technology, widely used in many markets
- Some historical limitations have prevented its further development:
  - Powder conveying: irregular conveying, equipment wearing, maintenance costs
  - Powder charging: finishing defects (back-ionization)
  - Powder recovery: rigidity, reliability

- Today new technologies are available to overcome these limitations.

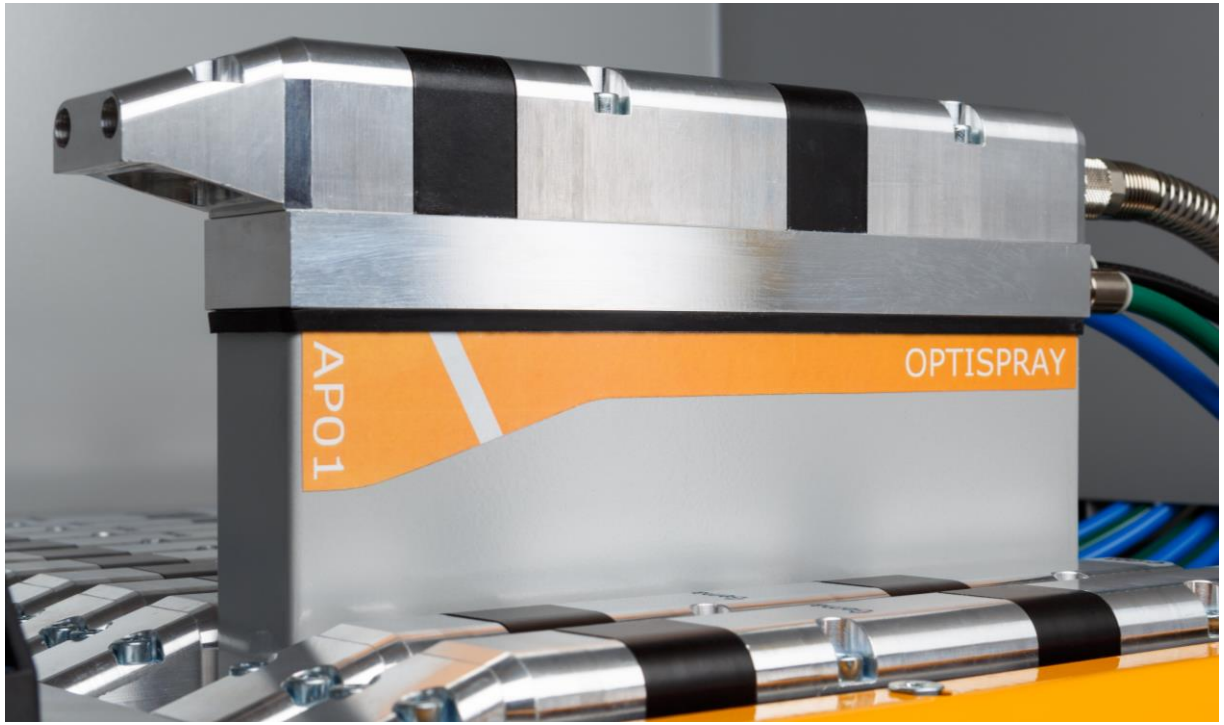
TRADITIONAL POWDER CONVEYING: VENTURI TECHNOLOGY

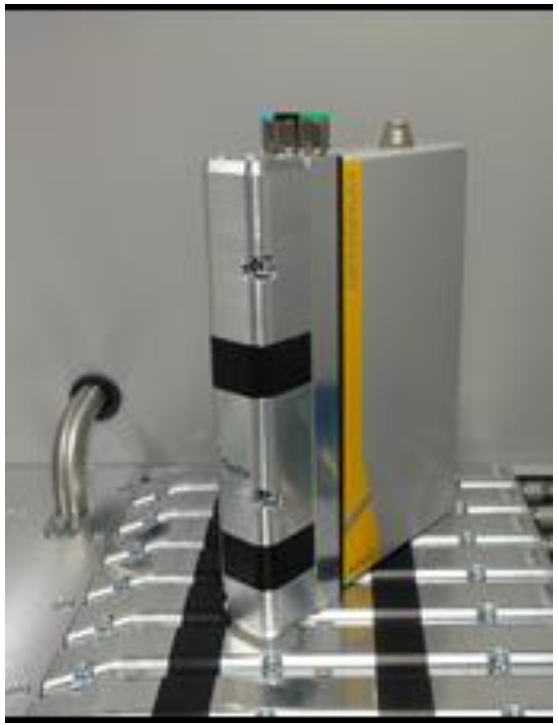
- Nozzle blows air into the injector sleeve
- This creates depression in the injector chamber that sucks powder from the fluidized hopper
- Powder + air is conveyed to the gun

- Powder progressively wears out the injector sleeve and hose:
  as injector sleeve wears out, performance decreases!
- Large powder output requires more air through the injector:
  possible application problems, lower transfer efficiency!



NEW POWDER CONVEYING OPPORTUNITIES: SMART INLINE TECHNOLOGY

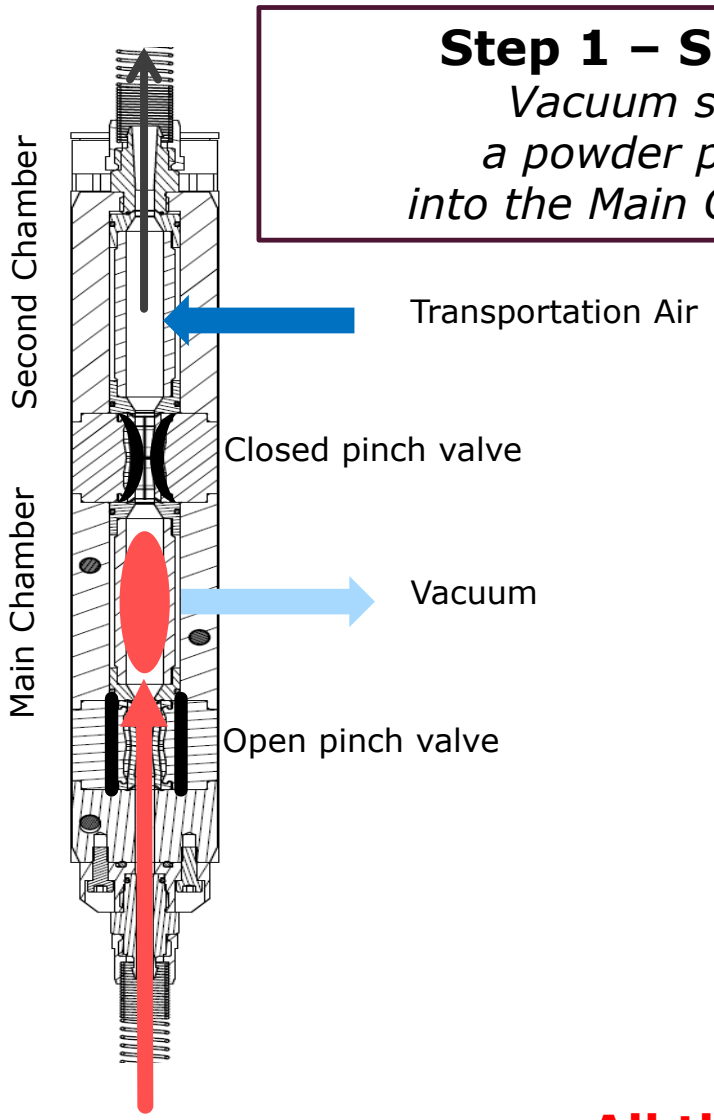




The smooth powder delivery improves the application,
which remains constant for a long time thanks to the wear-free technology.

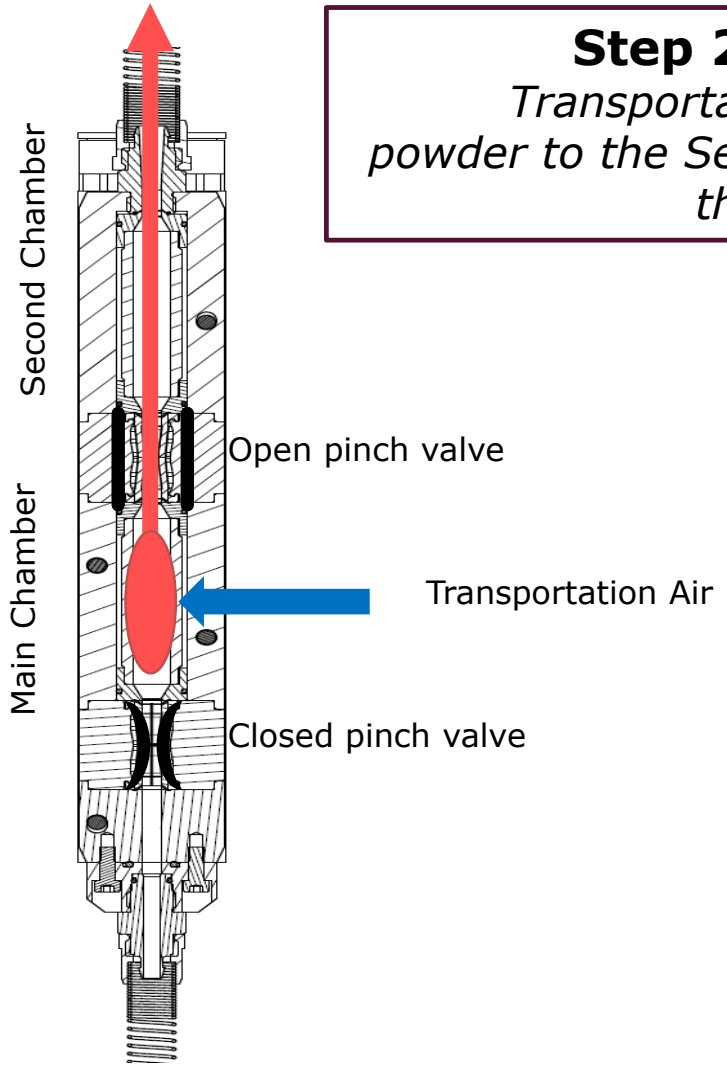
Step 1 – Suction

Vacuum sucks a powder packet into the Main Chamber.



Step 2 – Output

Transportation Air pushes powder to the Second Chamber and to the gun.

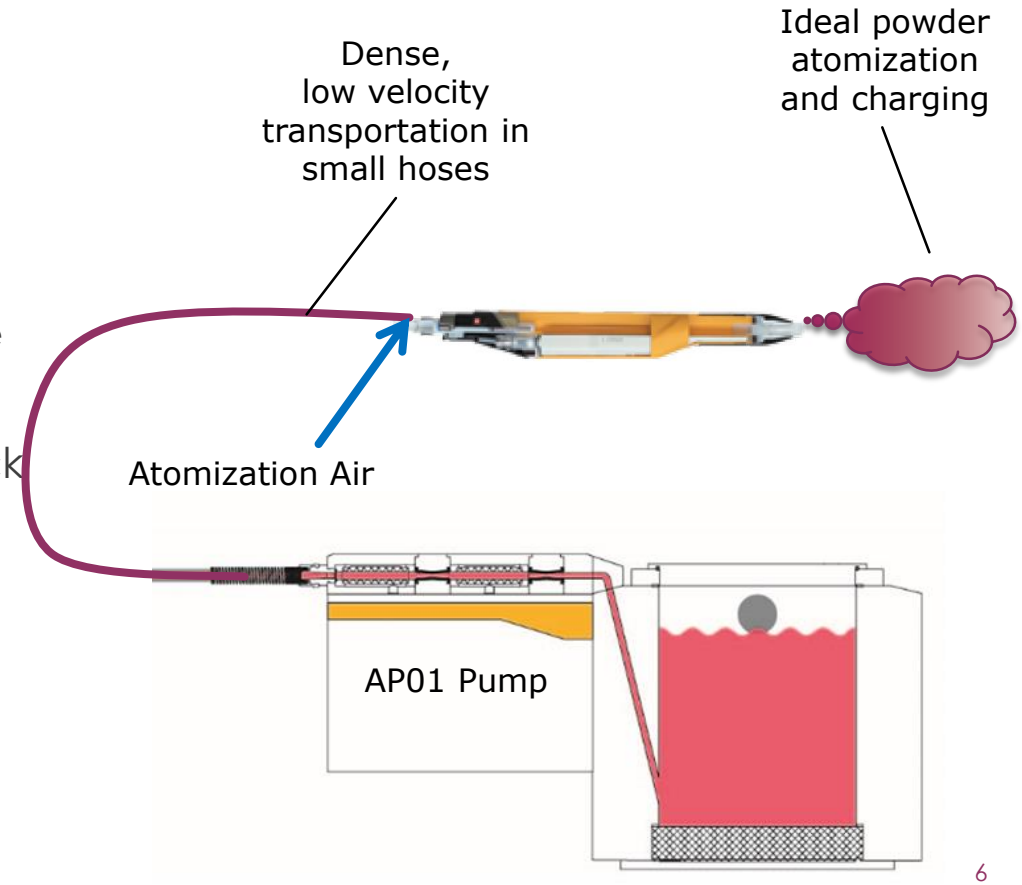


All this happens within 0.33 seconds!

SMART INLINE TECHNOLOGY

- Powder is conveyed from the pump to the gun with little compressed air.
- Powder velocity in the hoses is low, reducing wearing problems.
- Long powder hoses can be used without the need for more transport air.
- Optimal air amount for atomization is added just at the back of the gun.

- Advantages:
  - **Reduced wear**
  - **More regular powder transport**
  - **Improved application quality**

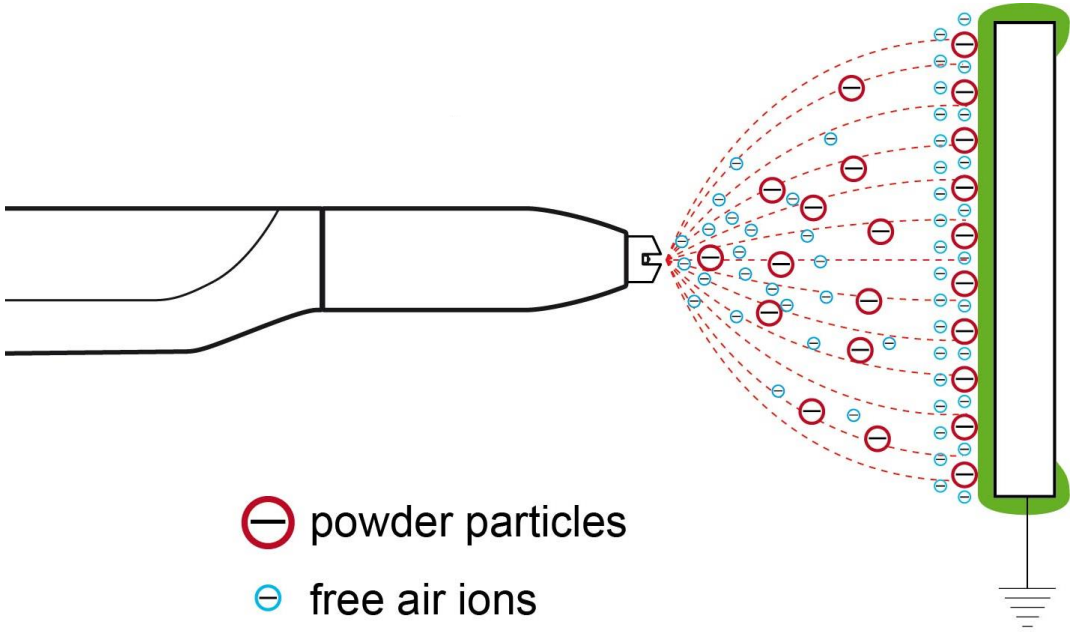


SMART INLINE TECHNOLOGY

- Powder output remains constant for a very long period of time.
- No wearing parts whose deterioration can decrease the powder output.
- Periodic maintenance is recommended for just a few components.
- Self-detection system identifies failures of key components.
- Advantages: **constant coating results, reduced maintenance cost**

CHARGING TECHNOLOGY: TRADITIONAL CORONA CHARGING

- The high voltage electrode emits a large number of electrons which create charged ions.
- Only a few ions charge the powder particles.
- The accumulation of free ions on the coating surface can create the **"orange peel" or "back-ionization"**.
- To avoid the problem the guns should charge the powder using less current, but
  - In traditional corona guns the electrostatic parameters regulation is not very precise.
  - The actual value of the charging current can vary within a significant range in comparison to the set value.
  - The parameters can be set only with a relatively large resolution (1 µA / 1 kV or more)



NEW CHARGING OPPORTUNITIES: PRECISE CURRENT CHARGING

- PCC is a new electronic technology that allows more precise electrostatic regulations.
- The electrostatic parameters are kept within a much smaller variation band in comparison to the set values
- As a consequence the parameters can be set with a smaller resolution (0.5 µA)
- Advantages:
  - **Improved application quality**
  - **Reduction of reject rate**
  - **New markets opportunities**

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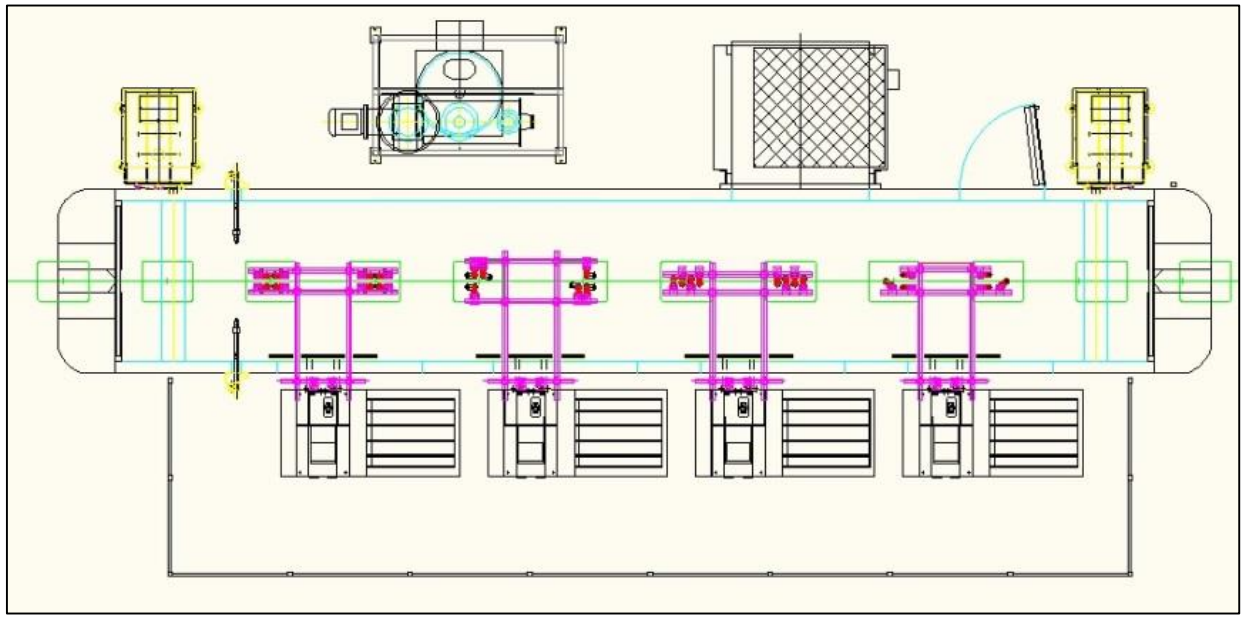
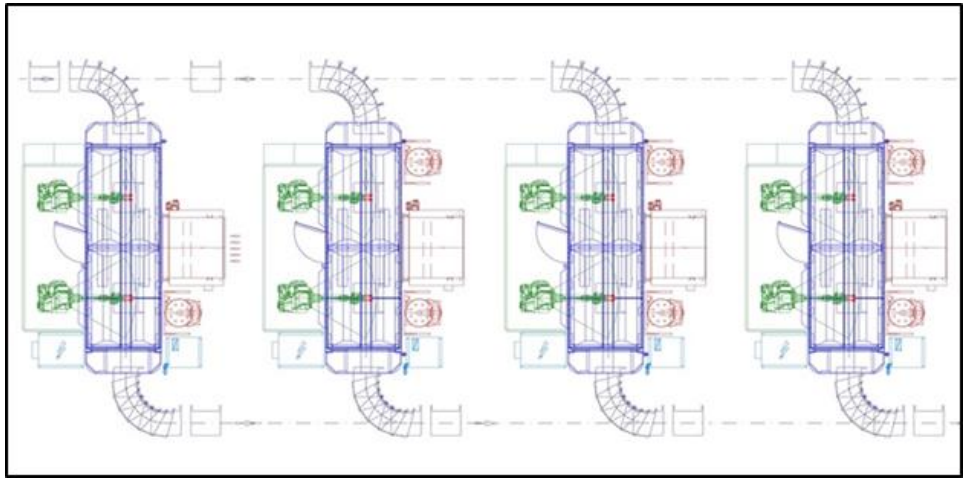
TRADITIONAL RECOVERY SYSTEM TECHNOLOGY: MASS PRODUCTION LAYOUTS

- System designed primarily for mass production
- Single booth for high line speed application with many guns, axes and application stations.
- Ideal for single model – single powder – high volumes production
- Limitations: **rigidity, high set-up time, reliability**



NEW RECOVERY SYSTEM OPPORTUNITIES: HIGHLY FLEXIBLE LAYOUTS AND SYSTEMS

- New Systems designed for higher flexibility
- Multiple small booths systems, installed in parallel, using flexible application and recovery systems, like robots.
- Easy to produce high variety of models with different powder types.
- Advantages: **improved line flexibility, improved line availability, quicker reaction to demand variations**



CONCLUSIONS

- The practical implementation of innovative technologies allows powder enamellers to overcome traditional limitations and difficulties and opens new application opportunities to the Powder Enameling Technology