## Description

### Image



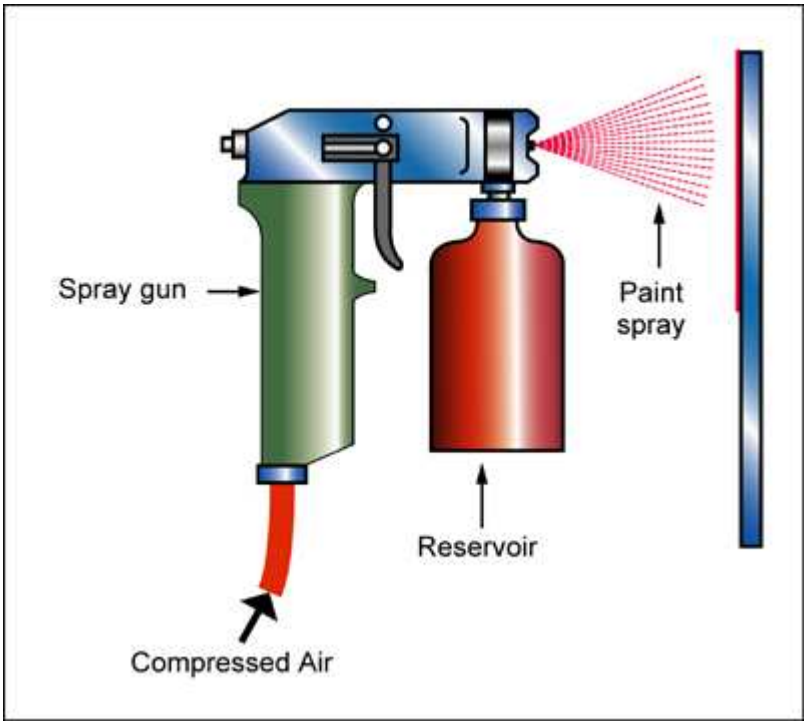
### Image caption

(1) Paint Spray Gun © Granta Design (2) Pantone ink © Itkannan4u at Pixabay [Public domain] (3) Jaguar F-Type at Mondial De L'automobile Paris 2012 | Paris Motor Show 2012 © Nan Palmero at Wikimedia Commons (CC BY 2.0)

### The process

In ORGANIC-SOLVENT BASED PAINTING, the coloring materials (pigments) are suspended, together with the binding agents (resins), in a volatile organic solvent (VOC). When spread thin over a surface, the solvent evaporates; the resins hold the pigments in place to form a decorative and protective coating. Some few paints are not much more than this today. Watching paint dry is a synonym for boredom. But modern paints are far from boring. New developments now give formulations that dry in seconds, have fade-resistant colors, soft textures, visual effects, powerful protective qualities, and much more. But there is a problem. Solvent-based paints are environmentally bad, so bad that their very future is under threat.

### Process schematic




### Figure caption

Organic solvent-based painting

## Material compatibility

| | |
|---|---|
| Ceramics | ✓ |
| Composites | ✓ |
| Foams | ✓ |
| Glasses | ✓ |
| Metals - ferrous | ✓ |
| Metals - non-ferrous | ✓ |
| Natural materials | ✓ |
| Polymers - thermoplastics | ✓ |
| Polymers - thermosets | ✓ |

## Function of treatment

| | |
|---|---|
| Corrosion protection (aqueous) | ✓ |
| Corrosion protection (gases) | ✓ |
| Corrosion protection (organics) | ✓ |
| Electrical insulation | ✓ |
| Decoration | ✓ |
| Color | ✓ |
| Reflectivity | ✓ |
| Surface texture | ✓ |

## Economic compatibility

| | |
|---|---|
| Relative tooling cost | low |
| Relative equipment cost | medium |
| Labor intensity | medium |

## Physical and quality attributes

| | | | | |
|---|---|---|---|---|
| Surface roughness (A=v. smooth) | A | | | |
| Curved surface coverage | Good | | | |
| Coating thickness | 0.591 | - | 7.87 | mil |
| Surface hardness | 10 | - | 16 | Vickers |
| Processing temperature | 49.7 | - | 212 | ℉ |

## Process characteristics

| | |
|---|---|
| Discrete | ✓ |
| Continuous | ✓ |

## Supporting information

**Design guidelines**

Solvent-based paints give the smoothest, most uniform coating and the greatest control of color - the automobile industry and most product designers insists on them. Metallic paints mix flake aluminum powder in the coating; the trick is to have the coating thin enough that the metal flakes lie in a plane so that the color does not 'flip' when viewed from different angles. But there is a taste, too, for 'traveling colors'. Color is determined by the differential absorption and reflection of the various wavelengths of light; the color seen is that at the least absorbed wavelength form the angle of view. Traveling colors use additives to change the absorption-reflection characteristics from various angles.

### Technical notes

Paints are applied by brushing, dipping or spraying, and can be applied to virtually any surface provided it is sufficiently clean.

### Typical uses

About half of all paints are used for decorating and protecting buildings, the other half for manufactured products, most particularly cars and domestic appliances; marine applications create important market for high-performance corrosion and anti-fouling formulations; 'printers inks' are paints that play a central role in publishing and

### The economics

Painting is cost effective. The equipment costs are low for non-automated painting, but can be high if the equipment is automated. Paints are a $75 billion per year industry.

### The environment

Emissions from the evaporating solvents from solvent-based paints (VOCs) are toxic, react in sunlight to form smog and are generally hostile to the environment. Auto manufacturers and others are under increasing pressure to meet demanding environmental standards. The solvents must now be recaptured, burnt or recycled. There is growing incentive to replace them by water-based paints (but they dry slowly) or dry polymer coatings (but they cannot yet offer the same surface quality).

## Links

MaterialUniverse

Reference