Paints: secondary raw materials (recycled)

Context and objectives

A company manufacturing "building" paints (as opposed to industrial paints: the finishing requirements and application techniques are not the same) is seeking to formulate paints to fit into a sustainable development and circular economy approach.

By summarizing, it seeks to formulate:

1. A paint using waste or recycled raw materials

2. Titanium-free paint

3. Still in this sustainable development approach, the company is looking for a way to mechanize the application of powder paint, a product it has developed, and which can be modified according to the application process. It wishes to work on the best way to spray this paint and wishes to find a device (gun, airless,...) which would allow to spray the paint in liquid form and spray it on the support intended to receive it.

The company is looking for:

A) Development of a paint from "waste" raw materials

- The spirit of this development is not to continue to draw on the earth's resources but to reuse what man has already used.
- Waste or recycled materials will be used as a substitute for fillers or resin: these wastes will be the raw materials for the paint formulation.
- The paint obtained from these waste or recycled materials will have to meet the same criteria as so-called "conventional" paint. Good covering power, good opacifying power, in aqueous phase, good slip, slightly gelled texture, comply with eco-label standards and particularly a yield of 8 to 10m²/l, be A+ and VOC as close as possible to 0. (Cf. technical constraints below).
- The colour of this paint will not be calibrated due to the nature of the raw material supply (vs. traditional white paint). The paint obtained from these waste or recycled materials will probably have a greyish-white colour. This paint will be used in decorative and protective surface applications where the whiteness of the paint will not matter and a colour as described above is acceptable: parking lot, cellar, ...

B) Titanium-free paint formulation

- Removal of titanium from paint

C) Mechanization of powder coating application

- Pistol for powder painting: it must concomitantly mix the powders with water and then project the result onto the substrate. In fact, the paint in its composition contains products that must be liquefied to form an opaque, covering, homogeneous film once projected onto the wall. (No premixing)
- If a complete system is designed, the solution will be considered even more carefully (see the rewards section). Typically a solution combining a powder product, spraying equipment and water, the result on the wall should give the same appearance as a paint.

Examples of possible solutions

Below are examples of solutions already considered by the company. This information is given as examples and should not restrict the scope of the solutions considered by the solvers:

A: Substitution by waste or recycled materials, fillers or resins

Recycled materials

- Recycled plastic
- Recycled paint - Recovered from industrial paints

By-products of other industries

- Sawdust
- Glass beads
- Precipitated carbonates
- Smoke
- Ashes from waste incinerators
- Sludge from water precipitation
- Kaolin
- Shellfish powders

B: Existing solutions for the removal or reduction of titanium

- Stacking of loads

- Changes in wording

- Poly potassium silicate
- Clay
- Casein
- Use of white fillers (Italian marble, magnesia,...)

- No heavy metals (zinc,...)

C: Guns for powder mixing (two-component mixture) - coatings

- Feeding

- Shut-off hopper
- Filter grid

- Fluidization chamber

- Rebound plate
- Humidity detector

- Nebulization, provided that it can be applied in situ and not only in the industrial field

- Electrostatic spraying, triboelectric charging, electrostatic charging
- Additive gaseous fluid
- Corona discharge - corona electrode
    - Negatively charged ions
    - Buzzard
    - Corona effect
- For a complete system, white fillers, casein, ...

Existing - solutions already tested without success

- Recycled paint (the technical constraints were not respected for the tested solution, this does not exclude recycled paint solutions if the technical constraints listed below are respected)

- Pulp (but paper as an ingredient may be accepted)

Technical constraints

For points A, B and C:

- Paints of equal quality

- Good covering power

- Good opacifying power, in aqueous phase

- Good slippery

- Slightly gelled texture

- Comply with eco-label standards

- Yield from 8 to 10m²/l

- Being A+

- VOC closest to 0

A

- Aqueous phase

- Applicable brush, roller and spray gun (spray gun imperatively)

- No biocides in raw materials

- A REACH registration on the raw materials used will be necessary due to current regulations (Material Safety Data Sheets).
- Not carcinogenic
- Know the composition

- Finesse

  - Particle size 20 microns, regularity

- Opacity

- Hedging rate, rate of return

- No smell

- Dried at a minimum temperature of 5°C

- Opacification test

- Hedging rate, rate of return

- Hardness test

- One year shelf life

B

- Opacification test

- Hedging rate, rate of return

- Hardness test

- One year shelf life

- Dried at a minimum temperature of 5°c

C

the mixture must not freeze at the gun outlet, the mixture must be a "real" paint with all the characteristics already mentioned above.

Economic Constraints

Materials up to 30% more expensive than current materials

Reward

Mass in %

A	Rate of "waste" raw materials in the formulation	10% 5 K€	20%= 10K€	40% = 20K€	50% = 25K€
B	Titanium-free formulation	40 K€			
C	Pistol for Powder	15 K€			
	Complete system: components and pistol	30 k€			