Application guidelines for metallic and effect powder coatings
1.0 Introduction

Jotun metallic and special effect powder coatings stand out with their superior optical depth, lustre and unique visual appeal. From the subtle matte of products such as the Aurora Collection to the stunning brightness and mirror like surface of Ultra Shine, Jotun's metallic and effect products will be sure to add a touch of class to your finished article. Like all metallic coatings, due to the 'flip-flop' nature of the pigments involved, they can typically seem to vary in appearance depending on the viewing angle and type of light which can add to their visual appeal.

It is important to mention that whilst special procedures and stringent quality control measures are in place to maintain a certain batch to batch consistency, due to their nature, the reproducibility during production of metallic effect powders is more difficult than that for solid colours.

Metallic and effect powder coatings can generally be produced in 2 ways, through a dry blend process or through a bonding process. Whilst dry blending involves simply adding and mixing the effect material into the base powder coating, the bonding process involves bonding or sticking the metallic or effect pigment onto the base powder particles through a temperature controlled, mechano-fusion process to improve the stability of the final powder.

When it comes to application, in general, metallic powder coatings are more sensitive to variations in application conditions than solid coloured powders, dry blended powders much more so than bonded powders. The line conditions, gun settings and type of equipment used can have far more influence when spraying metallic and effect coatings than when spraying solid colours and thus a lot more care and attention is needed when using these coatings.

This document is intended as a guide for the applicator, to inform the user of the various parameters that can influence the outcome and aesthetic appearance of an object coated with metallic or special effect powder coatings, and to effectively manage those parameters in order to achieve the optimum end result.

2.0 Application parameters

The final appearance of any item coated with metallic and effect powders can be affected by some or all of the following parameters:
- Earthing of the line and the part to be coated
- The guns and charging equipment used (from varying manufacturers)
- The hopper and level of powder in the hopper
- Cleanliness of the coating line and jigs (hangers)
- Gun settings; voltage (kV), current (µA) and transportation air
- Type of nozzle
- Spraying distance, orientation of the item to be coated
- Line speed and spraying technique
- Powder reclaim

The guidelines within this document are to advise on how best to manage these parameters to get an optimum and consistently good result time after time. Prior to application, the suitability of the entire coating line should be established by comparison with the reference panels that can be
supplied on request. Once defined, all of these parameters should be recorded, kept stable and checked regularly to ensure a consistent result. Be aware too, that results may also differ depending on shape, size, orientation, etc. of the part to be coated.

Whilst all of these parameters can be controlled to a great degree, in order to get the best result when you have a large project or multiple parts that must fit together after coating, it is best to ensure that you refer to a reference panel. If multiple batches are needed, then it is advised that parameters again be double checked on a non-significant part first to ensure consistency of appearance and finish.

3.0 Line and equipment considerations

- One of the most important considerations is the correct and efficient earthing of the coating line, the object to be coated, and all equipment used. The conveyor, jigs/hangers, oven, booth, guns and all ancillary equipment must be well earthed and all jigs/hangers should be clean. A good metal to metal contact is vital for efficient coating and to avoid sparks on line.

- It is recommended that only Corona guns be used when spraying metallic powder coatings. Whilst Tribo may have some limited success, metallic powders tend to coat the inside surfaces of Tribo equipment causing shorting or failure to charge sufficiently. Tribo equipment is not recommended and if you have to use it you should seek further advice from your Jotun representative. You will get a different end result when using Tribo and Corona equipment, so it is imperative that you use only one type for consistency of results.

- All equipment manufacturers have guns and application equipment that is perfectly suitable for use with metallic coatings, however, each may give a slightly different end result due to charging mechanisms, design, current use, etc. For best results, it is advised that you do not mix guns from different suppliers on the same project. For advice on specific equipment, you should contact the equipment supplier directly.

- On some Corona lines, ion collectors can be used to improve the flow of the finished powder, however, when spraying metallic coatings it is advised that you do not use these as they modify the electrostatic corona field and this can influence and alter the appearance of the final metallic effect.

- Wherever possible, automatic guns and reciprocators should be used. These will give the most consistent results. If manual ‘filling in’ is needed, e.g. on recessed areas or hard to reach areas, this should be done first, prior to using the automatic guns. This allows the final result to look more uniform.

- Line speed, number and orientation of guns and reciprocator stroke speed should be aligned so as not to create a zig-zag effect on the object and to ensure a good even coverage with an even film thickness.

- Wherever possible, it is recommended the guns be fitted with slot or flat nozzles rather than conical deflector nozzles. Metallic and effect pigments can build up on a conical deflector type nozzle and come away periodically causing spitting and uneven appearance of the final coating.

- A fluidizing bed should always be used when applying metallic and effect powder coatings. The fluid bed keeps the powder well mixed for transportation through the equipment. It is not recommended to use powder direct from the box, as some application equipment allows, as you may not get a homogeneous result. This is due to potential separation of contents in the box during transportation and storage. This is far more important for dry blended products than for bonded.

4.0 Settings and technique

- Spray gun voltage and current need to be monitored and adjusted carefully to suit the component being coated. Increasing the kV may result in a higher metallic appearance but
will also result in a faster build-up of metallic particles around the nozzle. Also, high kV will increase the risk of separation of the base powder and the effect pigment (more so in dry blended powder than bonded powder) and thus high kV settings should be avoided. It is recommended that kV be set around 50 – 80 with an optimum recommended of around 65kV. It will depend slightly on equipment used as to the best setting. Current should be set (if possible) to around 10 - 15µA, in order to get optimum flow and appearance of the finished coating.

- Powder transportation air should also be controlled. If it is too high, it can also lead to potential separation of components in a dry blended powder.

- Gun to object distance is more important when spraying metallic coatings. Optimum should be to set the guns 25 – 35cm (10-14 inches) from the surface to be sprayed. When spraying manually (if really necessary), again it is important to maintain an even gun distance from the part as you can get variations on edges, and back ionization if the gun is held too close. As previously mentioned, manual spraying should be avoided or minimized, but where necessary, it should be done before the automatic guns.

- Film thickness should be controlled and even as much as possible. Variations in thickness can lead to variations in appearance or edge effects.

- Nozzles, lines and equipment should be regularly cleaned, particularly in the event of any build-up of metallic pigment on gun tips etc. It is recommended to clean gun tips every 30-60 minutes if using dry blended powder.

- Where possible, the environment of the coating area should be controlled, particularly in terms of humidity. Applicators should be aware of the effect of high atmospheric humidity on the final finish.

- Once you have determined the optimum conditions to give the desired result, ensure that they are recorded and maintained to be sure of consistent results.

### 5.0 Reclaimed powder

One of the main advantages of powder coatings is that they can be reclaimed. With metallic and effect powder coatings however this is not always the case. Reclamation of the powder is one of the main differences between dry blended and bonded metallic coatings.

When using dry blended metallic and effect coatings, it is strongly recommended that the powder is sprayed to waste, i.e. it should not be recycled. This is due, in main, to the high risk of separation of the effect pigments and the base coat during the spraying process. Preferential charging of one component over another can lead to recycled powder changing colour and composition over time and thus consistency on large projects will be an issue. Picture framing and other charging effects can also be more pronounced with dry blended powder.

Bonded metallic and effect powder coatings can be recycled and this is one of their big advantages over dry blended powder. However there is still a need for some caution. The amount of reclaimed powder needs to be carefully monitored and ideally reclaim should be automated. It is recommended that recycled powder should be no more than 30% at all times. If the recycled powder level fluctuates too much, this could potentially lead to colour inconsistency over a large project. It is best practice to keep the hopper well charged and to maintain a 70:30 ratio of virgin powder to reclaim at all times. Reclaim can of course be less but should never be higher than 30%.

For more information or clarification, please contact your local Jotun representative who will be happy to assist. Powder school training can be provided on request.

Note: The information on this document is given to the best of the manufacturer’s knowledge, based on laboratory testing and practical experience. Jotun Powder Coatings reserves the right, without notice, to alter or change the content of these Guidelines. These Guidelines supersede all previously issued versions.