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Technical Bulletin

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Swarf staining

Introduction

Swarf is the term given to the steel debris arising from cutting or piercing operations when using friction saws, abrasive discs, drills, etc., on steel products. Whilst comprising mostly fine steel particles mixed with abrasive media, in this context swarf may also be taken to include any other discarded steel objects such as rivet shanks, nails, screws and nuts, which may come in contact with coated steel products; i.e. COLORBOND® prepainted steel, ZINCALUME® aluminium/zinc/magnesium alloy-coated steel, and galvanised steel.

Swarf particles, if left on the surface, will corrode and cause rust stains which will detract from the finished appearance of the product. These stains are often mistaken for early deterioration of the coated steel product.

Fresh swarf stains are characterised by small red-brown coloured areas with a central dark spot (the remains of the steel particles). The surface will feel like sandpaper, and the particle may be lifted with a fingernail. An old swarf stain will appear as a localised red-brown stain, the steel particle having corroded away, and the surface will be smoother.

Prevention of swarf staining is the responsibility of the installer and following trades and it is strongly suggested that the recommendations contained in this bulletin are followed.

Generally, swarf particles come in contact with coated steel sheet products in three ways.

1. Loose particles left after cutting, drilling and riveting operations;
2. Hot swarf particles from abrasive disc cutting or drilling operations which may adhere to the finished surface; and
3. Loose particles which may be trodden into, or become embedded in, the surface films of prepainted and resin coated products.

Prevention

Cutting

BlueScope recommends the use of a cold cutting saw, with an appropriate tungsten blade, as it generates larger and cooler particles than abrasive discs.

Where possible, onsite cutting should be minimised by using factory supplied cut-to-length sheets. For complex (e.g. curved) cuts, such as those associated with roof penetrations, BlueScope recommends the use of powered hand shears.

Sheets cut on site should, where practicable, be cut on the ground, with the intended exterior surface of the sheet facing down.

Care should be taken to ensure hot swarf does not come into contact with nearby sheets.

DO NOT cut over the top of other coated products because debris may fall onto other sheets.

Where cutting must be carried out near sheets already installed, the area around the cut must be masked and the stream of particles directed away from completed work, or alternative measures taken to protect adjacent surfaces, i.e. dropcloth or similar.

Note: Some cutting methods may produce a burr, which must be removed prior to fixing.

Drilling

The area around the hole should be masked to shield the product from hot swarf.

Clean Up

The roof should be blown, vacuumed, swept or rinsed progressively to remove loose particles. Maximum care should be taken when attempting to detach swarf that has become stuck; this can be done, but do not attempt any action that is likely to remove the paint or metallic coating. Any damage to these coatings may lead to reduced life of the material.

When sweeping or rinsing into a gutter, clean out the gutter before leaving the job in order to prevent premature corrosion. On completion of the job, conduct a final rinse or sweep down to ensure that all swarf particles are removed.

Figure 1. Swarf staining

Many swarf staining problems arise not only from installers, but also from following trades working in the vicinity (see Figure 1 for example). Architects, builders and project managers need to be aware of this possibility and warn contractors accordingly.

Effect on performance

The effect of swarf staining itself on COLORBOND® steel products is generally aesthetic and may not be detrimental to the performance of the product. On prepainted steel surfaces, red oxides of iron are normally inert substances and do not attack the prepainted finish. These iron oxides are insoluble in water, and the stain will take considerable time to weather away naturally.

In severe cases, the product life may be affected where large swarf particles have penetrated the prefinished film and are in contact with the protective metallic coating.

On unpainted metallic coated surfaces, accelerated corrosion can occur over a small area as the zinc in the metallic coating sacrifices itself to prevent oxidation of both the swarf and, if allowed to continue, exposed areas of the steel base. Removal of swarf in the first place is the better alternative to the repair of damage.

Rectification

Metallic-Coated Steel Sheet

Brush the surface with a stiff bristle (not wire) brush to dislodge particles which must then be completely removed, not just swept into the gutter. Care should be taken to avoid removing any metallic coating. If the metallic coating is severely damaged by swarf corrosion, the affected area should be replaced, or overpainted following the recommendations contained in:

Technical Bulletin TB-2 Overpainting and restoration of exterior BlueScope coated steel products.

STEEL WOOL MUST NOT BE USED as it breaks up and becomes swarf itself. It must be noted that acidic products must not be used with ZINCALUME® steel or galvanised steel as excessive staining and corrosion will occur.

Prepainted Steel Sheet

Mild Staining

Clean the surface by washing with dilute mild household detergent and fresh water, then rinse well afterwards.

Severe Staining

1. The affected area should be thoroughly waterblasted with clean fresh water using a pressure not exceeding 400psi (2760kPa).
2. Stubborn particles may be removed by use of a damp microfibre cloth (terry towelling cloths or sponges are not effective). More stubborn particles may require a plastic-bladed paint scraper, if used with care.
3. Upon completion again wash the roof to remove any dislodged particles, ensuring gutters are also rinsed.

Note: After cleaning, some residual staining of the surface may remain, but if smooth to the touch it is not likely to cause concern regarding ongoing performance. It may be beneficial at this time to take photographs of the roof. After a period of 6-12 months, compare the original photos to the condition of the roof and if there is no apparent deterioration no further action is required. If the staining appears worse, consideration should be given to overpainting or replacing the affected material.

Very Severe or Extensive Staining

In these cases, where aesthetic factors are important, either replacement or overpainting may be the most appropriate solution. For advice on overpainting, refer to:

Technical Bulletin TB-2 Overpainting and restoration of exterior BlueScope coated steel products.

As air drying paints will weather more rapidly, and in a different manner to prepainted steel products, the whole visible area should be repainted.

It should be noted that all of the above remedial actions will not restore the product to its original state. Therefore, it is critical to ensure that the occurrence of swarf is avoided. In the event that swarf is produced, it should be removed.

Related BlueScope Technical Bulletins

Technical Bulletin TB-2 Overpainting and restoration of exterior BlueScope coated steel products.