

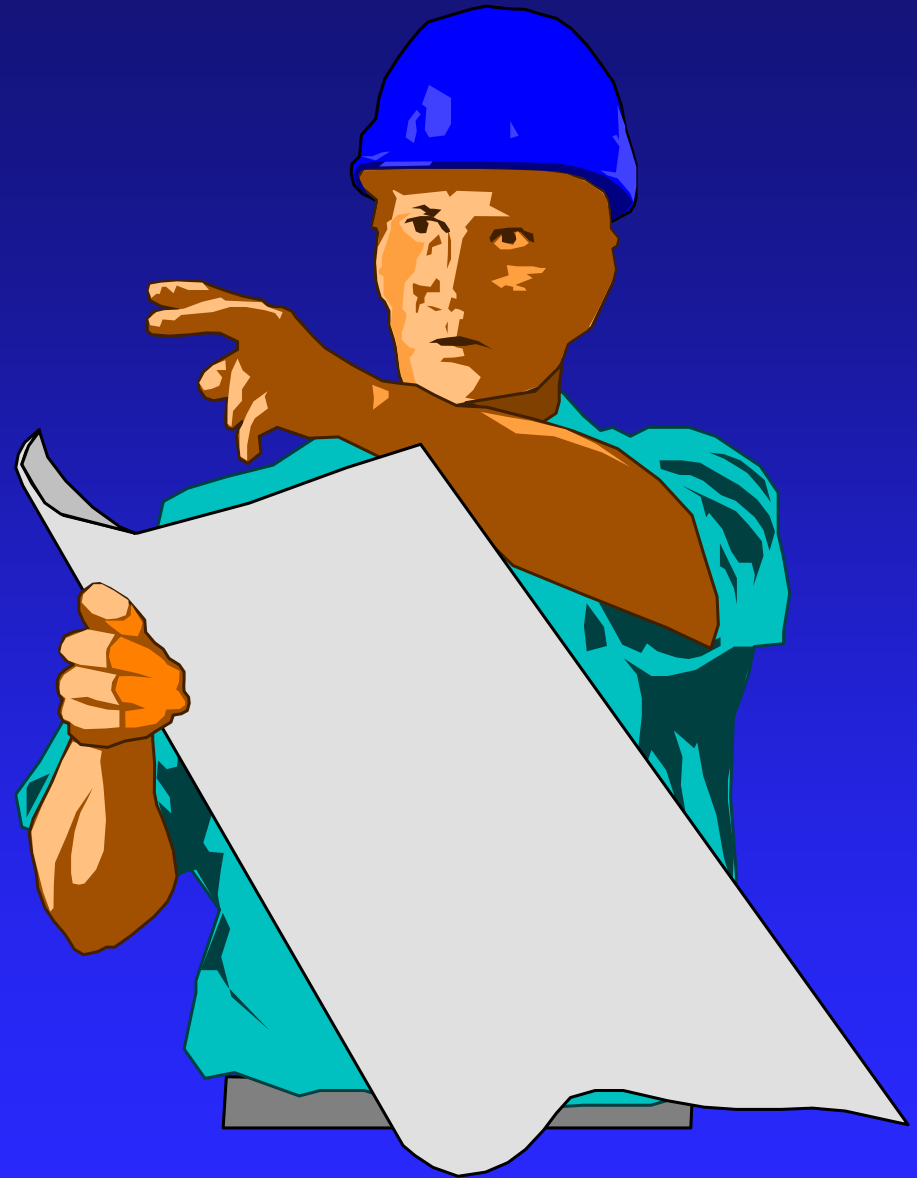
A GUIDE TO SELECTING THE RIGHT CONCRETE RELEASE SYSTEM



Direct Chemicals

Premier Distributor of Release Systems

FORMWORK
SURFACE
TREATMENTS



Formwork Surface Treatments

- ❖ Formwork surface treatments are now many and varied, from applied coatings to form liner systems.
- ❖ The face contact materials each have individual texture and absorbency characteristics which require differing treatments to ensure the best possible results.

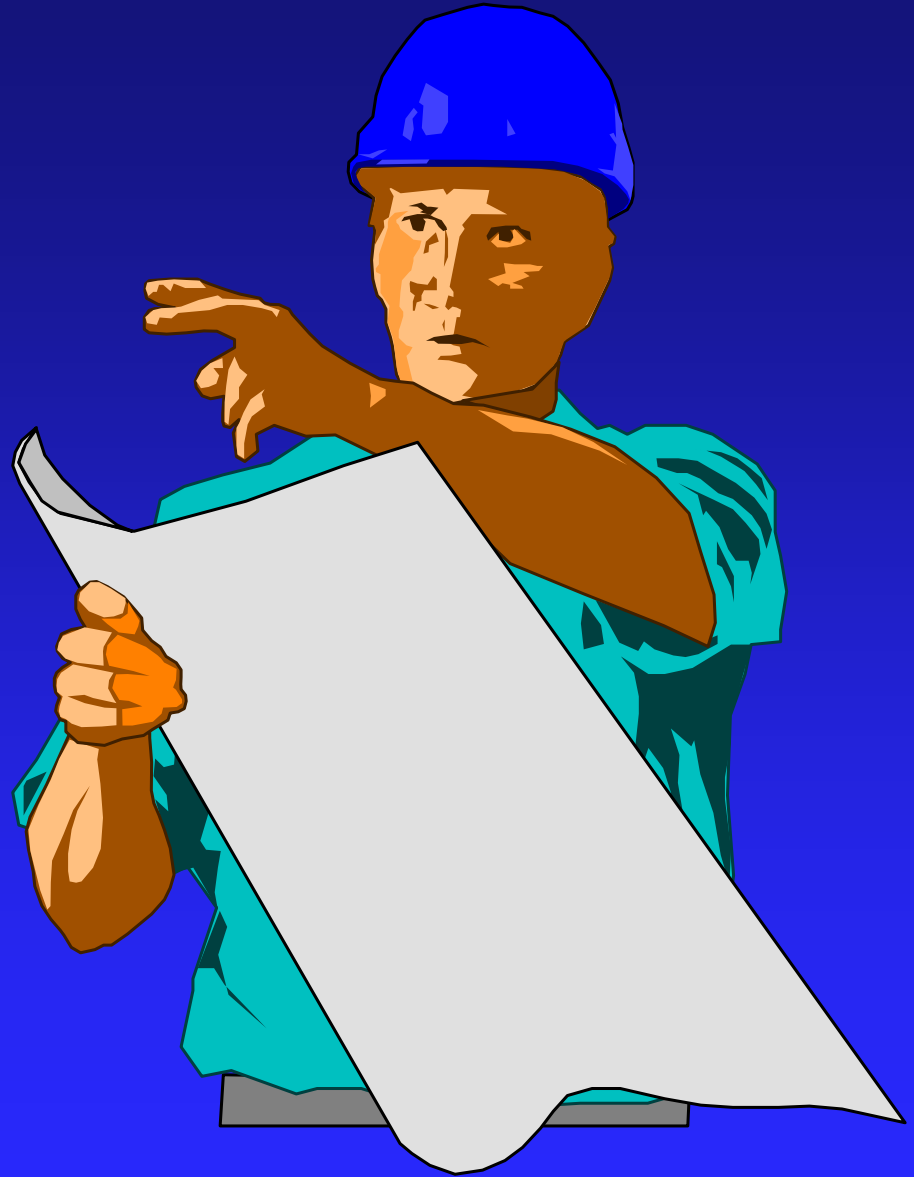
Formwork Surface Treatments

- ❖ It is therefore imperative upon the selection of the form material, the correct choice of release mechanism is employed. This should be carried out confirming the compatibility of the release agent with the face contact material, i.e. steel, timber, phenolic / overlaid plywood, plastics, rubbers, glassfibre and concrete.

Formwork Surface Treatments

- ❖ The cost of a release agent and its application are a minor proportion of the total cost of the formwork and therefore its omission is a totally false economy.
- ❖ Surface damage, poor / inconsistent surface finish and shorter life expectancy of the face contact material are all more likely upon omission of this vital area.

Choice of Release Agent



Choice of Release Agent

British Cement Association Recommendation

❖ **Category 1 - Neat Oils**

- Neat oils are usually mineral oils; they tend to produce blowholes and are not recommended for use for the production of high quality concrete surfaces. They are used in the storage of formwork and for concrete which will be hidden below ground.

❖ **Category 2- Neat Oils With Surfactant**

- Neat oils with the addition of a small amount of surface activating or wetting agent minimise blowholes and have good form penetration and resistance to climatic conditions

Choice of Release Agent

❖ **Category 3 - Mould Cream Emulsions**

- Emulsions of water in oil tend to be removed by rain, but minimise blowholes and are good general purpose release agents, except they are not very suitable on steel formwork.

❖ **Category 4 - Water-Soluble Emulsions**

- Emulsions of oil in water produce a dark porous skin on the concrete which is not durable. They are not recommended for good class work and are seldom used.

Choice of Release Agent

- ❖ **Category 5 - Chemical Release Agents**
 - These are small amounts of chemical suspended in a low viscosity oil distillate. The chemical reacts with cement to produce a form of soap at the interface. Recommended for all high quality work, they should be applied lightly by spray to avoid retardation. Increased cost is compensated for by better coverage compared with the oil-based materials. They generally have good weathering resistance. Certain of the proprietary chemical agents are of the 'drying type' and so are particularly suited to use in dusty, dry climates, on soffit formwork, and in pre-stressed concrete applications.

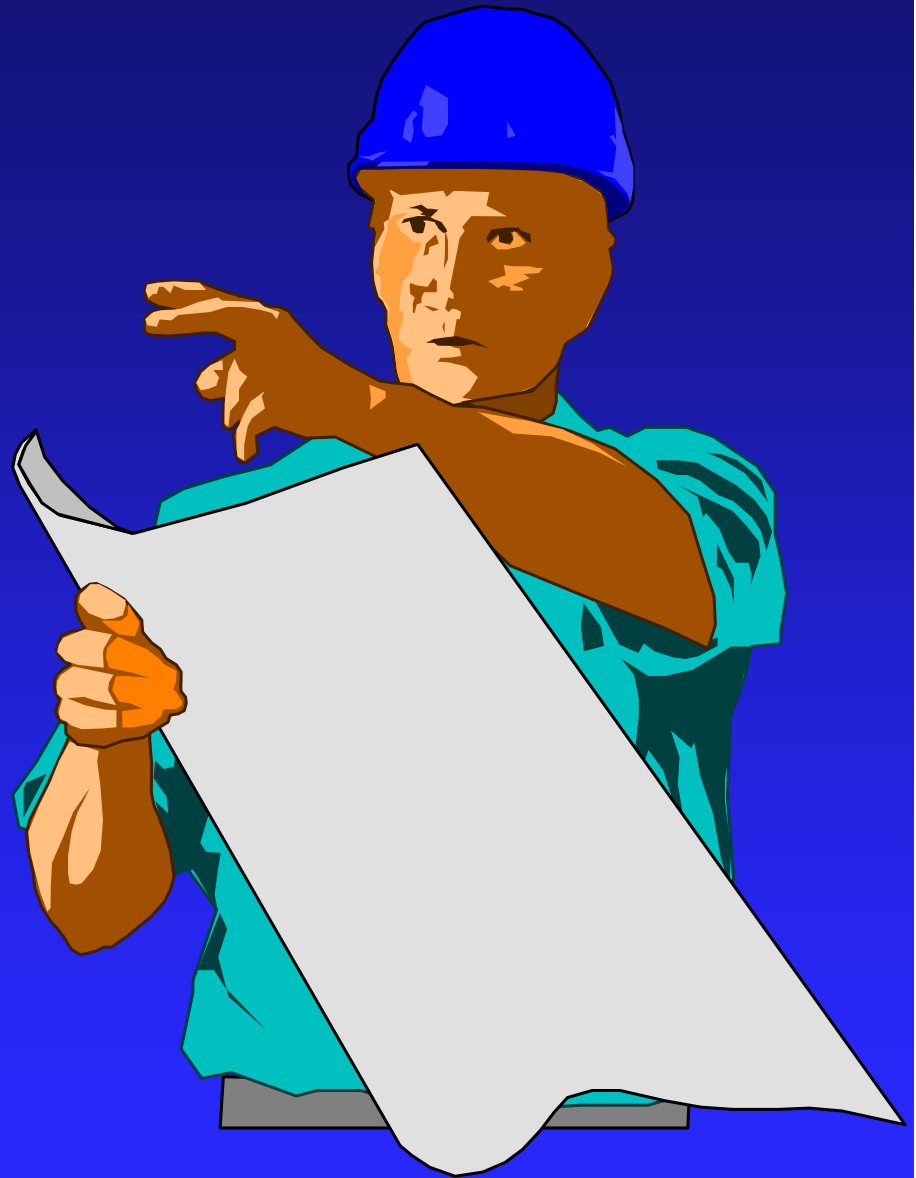
Choice of Release Agent

- ❖ **Category 6 - Paints, Lacquers, Waxes and Other Surface Coatings**
 - These are not strictly release agents but are sealers which prevent release agents being absorbed into the form face. Wax treatments also come into this category. They are all particularly useful where it is necessary to avoid uneven porosity with consequent colour variations in the concrete surface and to give increased usage of the formwork.

Choice of Release Agent

- ❖ **Category 7 - Other Specialised Release Agents**
 - These are various types of release agents not listed in Categories 1 - 6. They include chemical systems, silicones and vegetable oils for such applications as concrete forms, special heated formwork systems, spun pipe systems, etc..

**Face Contact
Materials/
Release Agents**



Face Contact Materials/Release Agents

❖ Absorbent Surfaces

– With many untreated timbers or plywoods, particularly softwood species, the release agent is absorbed according to the density of the material, giving a grain patterned finish. This is most marked on the spring and summer growth rings found in softwood plywood. This problem can be overcome by giving one of the following pre-treatments before use:-

- ◆ One or more full coats of the normal release agent.
- ◆ A suitable barrier paint or varnish (on a dry surface, preferably factory applied).
- ◆ A suitable proprietary formwork wax.

Face Contact Materials/Release Agents

❖ Absorbent Surfaces (Continued)

- Before concreting for the first time, and for all subsequent pours, a normal application of the chosen release agent should be given.
- Patches of barrier paint or varnish may wear off with use and generally cannot be renewed because of the absorption of release agent into the form face. This will result in a blotchy appearance to the concrete surface.

Face Contact Materials/Release Agents

❖ Non-Absorbent Surfaces

- If the surface to which it is applied is virtually impervious, the release agent may tend to migrate and dry up; this will occur where an emulsion is used. This frequently happens, for instance, on bridge decks, where the time between application and concrete placing may be prolonged. The condition is also aggravated by drying winds, strong sunlight and rain. Chemical release agents are recommended in these circumstances, or possible neat oils with surfactant (Categories 5 and 2 respectively).

Face Contact Materials/Release Agents

❖ Non-Absorbent Surfaces (Continued)

- One coat of release agent should be applied as near as possible to the time of the first pour and prior to each subsequent pour. Very smooth flat surfaces may require initial 'ageing' to roughen the surface to assist retention of the release agent. The use of a pre-treatment wax (Category 6) will also improve the finish from the initial cast of the form.

Face Contact Materials/Release Agents

❖ Steel

- It is recommended that a chemical release agent (Category 5) be used on steel, although for lower quality work, a neat oil with surfactant (Category 2) can be used. When used in conjunction with accelerated curing and heating systems, the addition of de-watering and rust inhibitors to these products will make them more suitable. New steel moulds may cause spalling for several uses until 'worn-in' and the use of a formwork wax or oil (Category 6 or 2) initially will help.

Face Contact Materials/Release Agents

- ❖ **Particle Board (Wood Chipboard)**

- Generally the material should be treated in the same way as pre-coated plywood using categories 2, 3 or 5 or formwork release agents.

Face Contact Materials/Release Agents

❖ **Wood-based Sheet Materials**

❖ The choice of release agent depends on the pre-treatment and surface condition of the sheet. Sheets are generally available in the following four conditions:-

- ◆ Sanded but otherwise untreated (the user may subsequently apply sealants to the face and edge surface).
- ◆ Sanded and treated with a release agent.
- ◆ Face and edge sealed (e.g.. 1 or 2 coats polyurethane).
- ◆ Surface overlaid with phenolic or melamine resin films, factory bonded and edge sealed.

Face Contact Materials/Release Agents

❖ **Wood-based Sheet Materials (Cont'd)**

- The edges of cut sheets should be re-sealed with a suitable coating (Category 6).
- It is recommended that pre-treatments are applied in factory conditions as normal 'on-site' applications are rarely successful.

Face Contact Materials/Release Agents

❖ **Fibre Building Boards**

- Generally Category 5 is recommended by board suppliers. Some boards are available pre-coated with release agent.

❖ **Plastics (Particularly Trough and Waffle Moulds)**

- It is recommended that a good quality chemical release agent (Category 5) be used. It should be applied by absorbent cloth or sponge and particular attention should be paid to removal of any excess present on the base of the mould which has run down the sides.

Face Contact Materials/Release Agents

❖ Aluminium

- Chemical release agents (Category 5) have been successfully used in conjunction with aluminium but these are generally special versions and details should be obtained from manufacturers. Pre-etching of panels is essential to give uniformity of concrete colour. There is increased adhesion between the aluminium and cement due to the affinity of aluminium oxides and oxides formed in the cement paste. Thus careful selection and use of release agent is of particular importance.

Face Contact Materials/Release Agents

❖ **Liners (Plastic or Rubber)**

- When a proprietary liner is supplied, the manufacturer may recommend a suitable release agent. If this is not documented, refer to the manufacturer of release agent and conduct a trial on the material, checking for swelling.

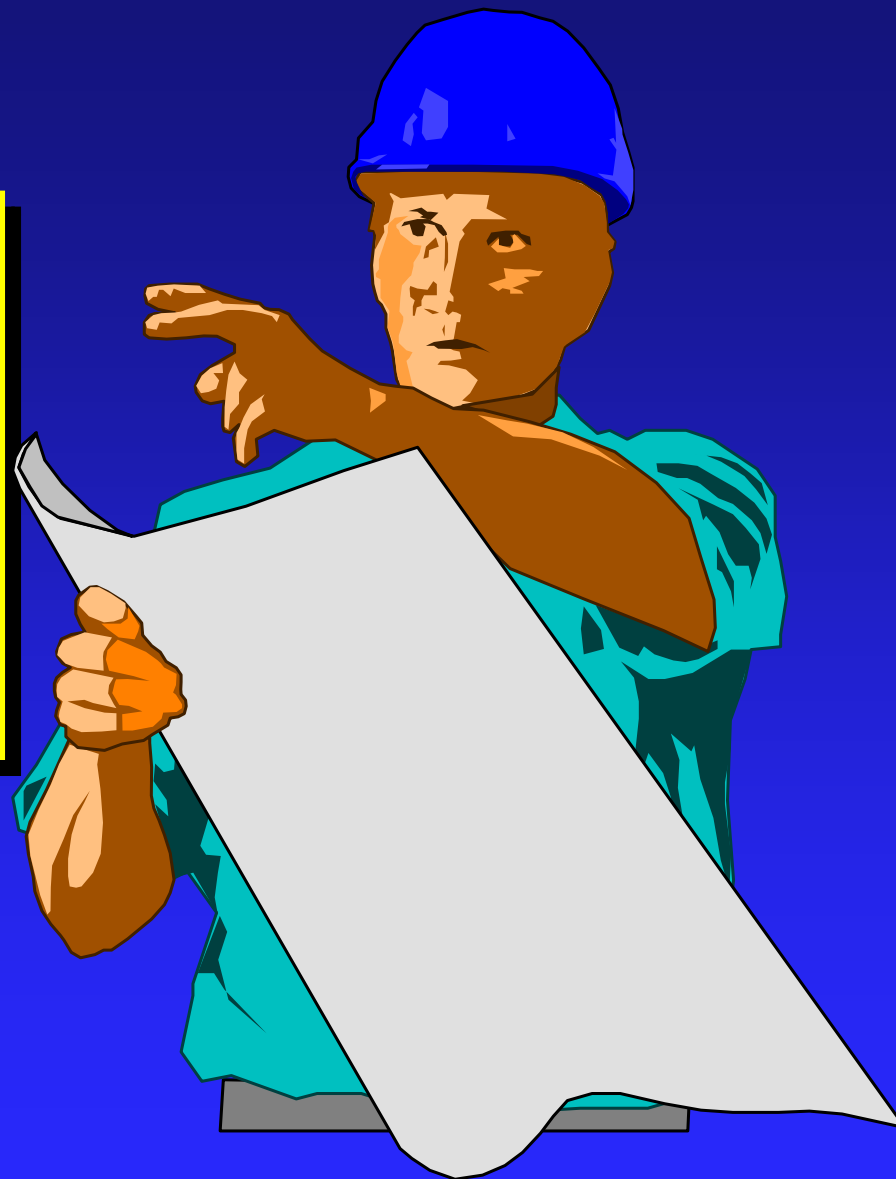
❖ **Concrete Moulds**

- The master moulds should be free of all surface blowholes and blemishes, and when fully cured, sealed either by a coating or form wax treatment. They should then have a compatible release agent applied for each cast.

Release Agent Category

Face Contact	Plain Surface Finish		Special Surface Finish	
	Pretreatment	Subsequent Applications	Pretreatment	Subsequent Applications
Timber, Sawn and Planed	2, 3, 5, 6	2, 3, 5	6, 2, 5	2 or 5, 2, 5
Plywood				
Unsealed	2, 3, 5, , 6	2, 3, 5	6, 2, 5	2 or 5, 2, 5
Sealed	None	2, 5	None	2, 5
Particle Board				
Unsealed	2, 3, 5, 6	2, 3, 5	2, 3, 5, 6	2, 3, 5
Sealed	None	2, 3, 5	None	2, 3, 5
Fibre Building Board	5	5	5	5
Steel	None	2, 5, 6 (wax)	6, (5 can be used to prevent rust)	2
Plastics, GRP, EPS Polypropylene (plain or textured) Rubber & special linings	None	5, 7	None	5, 7
Aluminium	Some specially pretreated	5, 7	Some specially pretreated	5, 7
Concrete	6 (wax) 6 (wax)	2, 5, 6 (wax)		

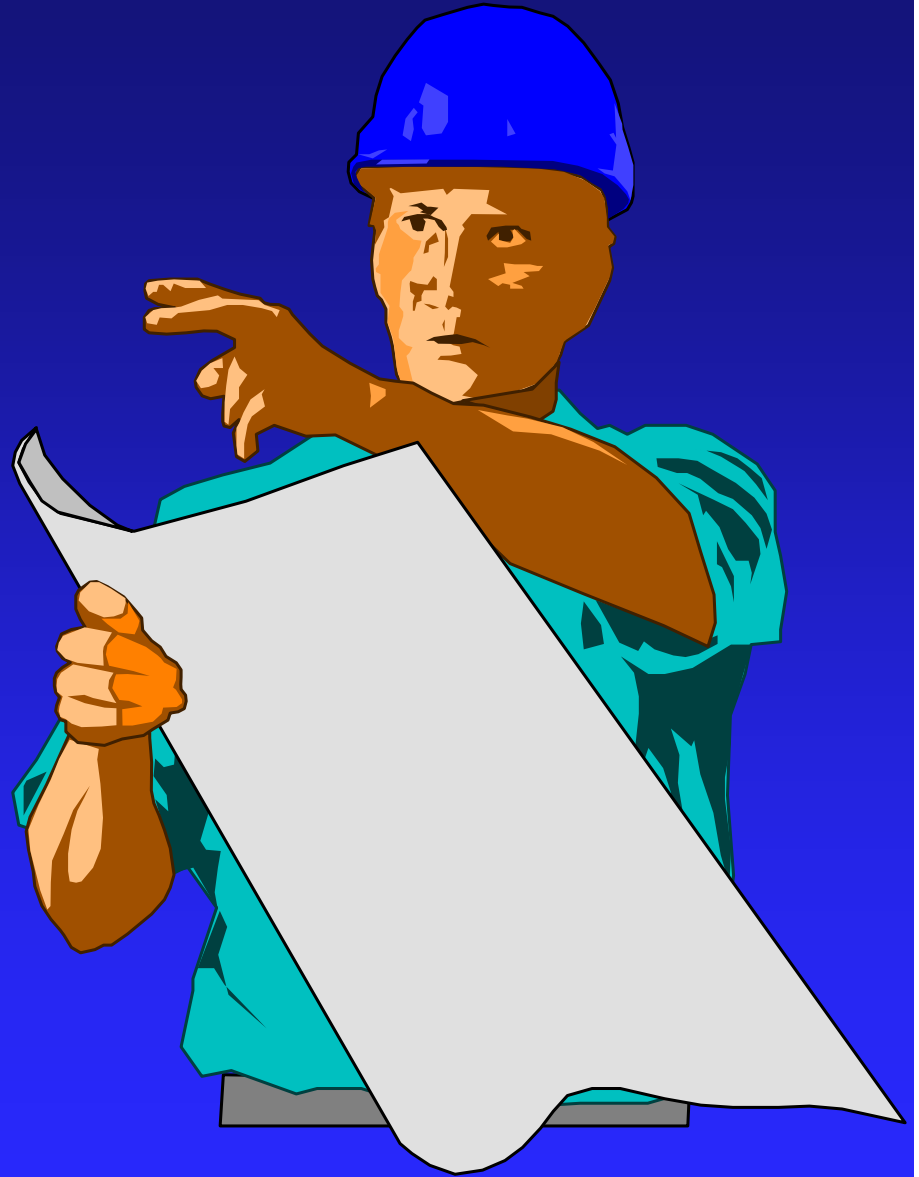
**Release
Agent
Selection**



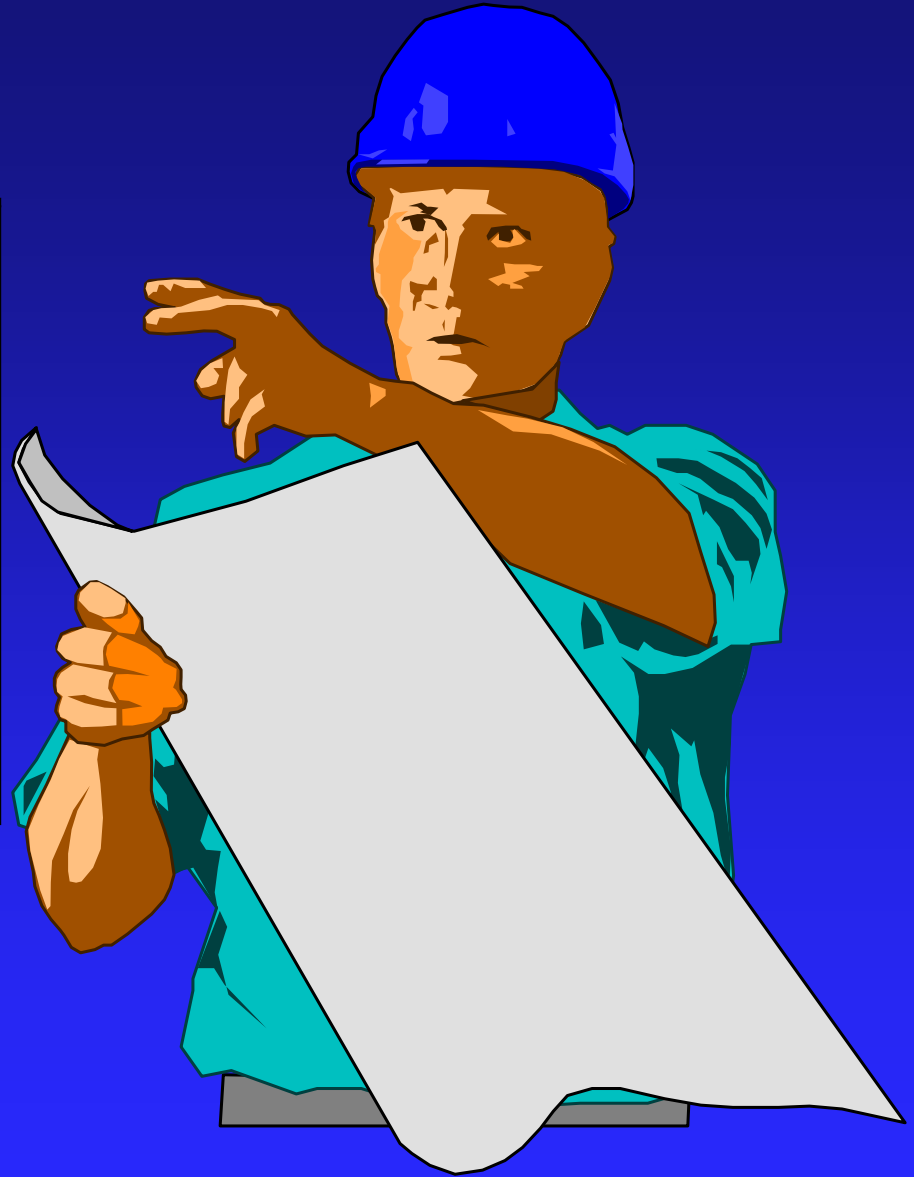
A Good Release Agent Should ...

- ✓ Provide a clean and easy release or 'strike' without damage to either the concrete face or the form.
- ✓ Contribute to the production of a blemish-free concrete surface.
- ✓ Have no adverse effect upon either the form or the concrete surface.
- ✓ Assist in obtaining maximum re-use of forms.
- ✓ Be supplied ready for use from the container without site mixing.
- ✓ Be easy to apply evenly at the recommended coverage, providing good economy.
- ✓ Not inhibit adhesion / penetration of any subsequent treatment applied to the formed concrete surface.
- ✓ During application be inoffensive to the operative with regard to odour, skin staining and be virtually free from the risk of dermatitis and allergic reactions.
- ✓ Be suitable for use in the anticipated weather conditions.

Application of Release Systems



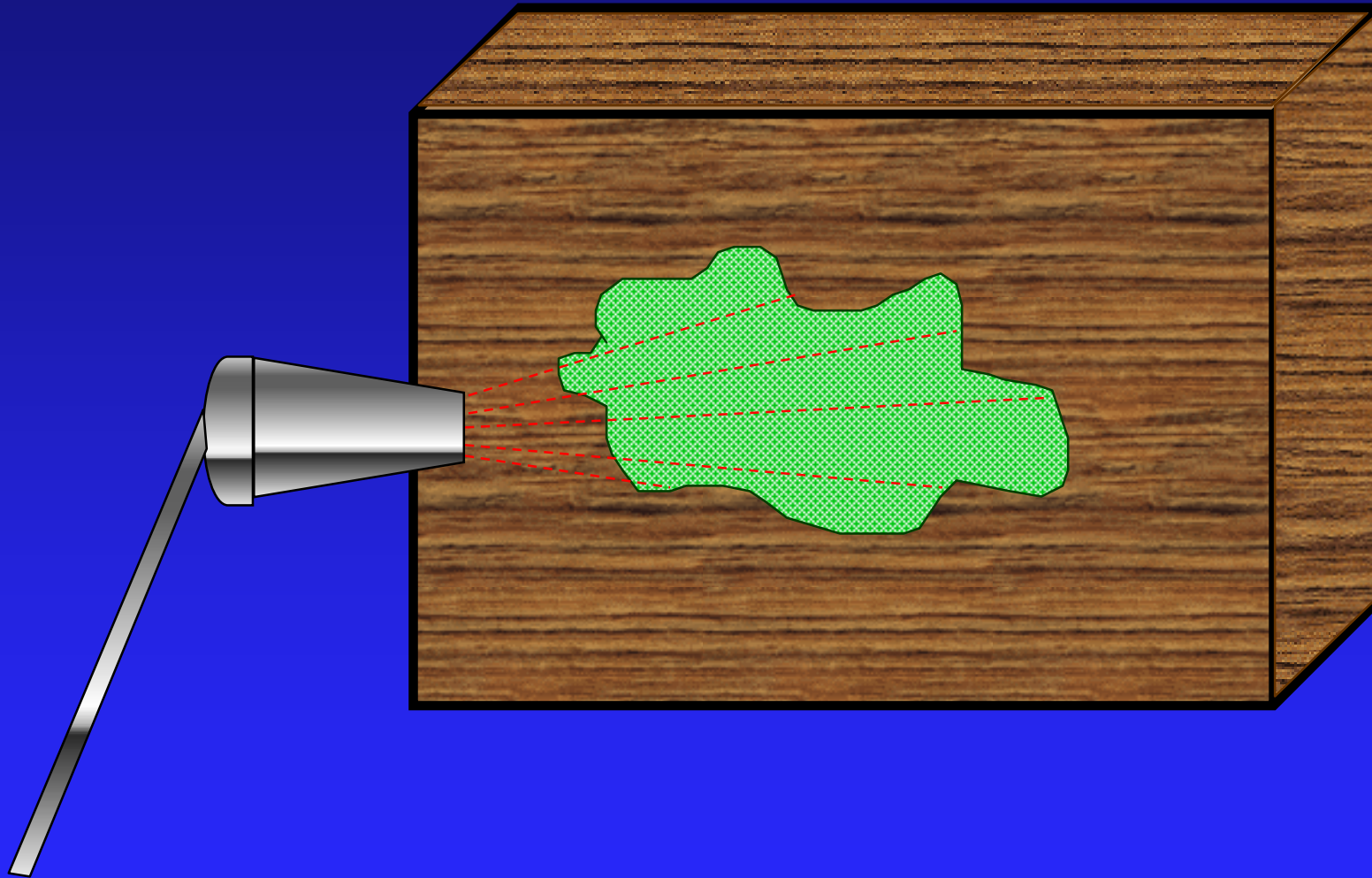
**Chemical
Release
Agent**



Chemical Release Agent

- ❖ Materials should always be applied to **cleaned** formwork. Products should be applied as thinly and evenly as possible for optimum performance. Application by fine mist spray shall provide the best and most economical performance.
- ❖ Any excess material should be mopped up.
- ❖ Care should be taken not to over apply.

Apply Release Agent by Spray Equipment



Chemical Release Agents

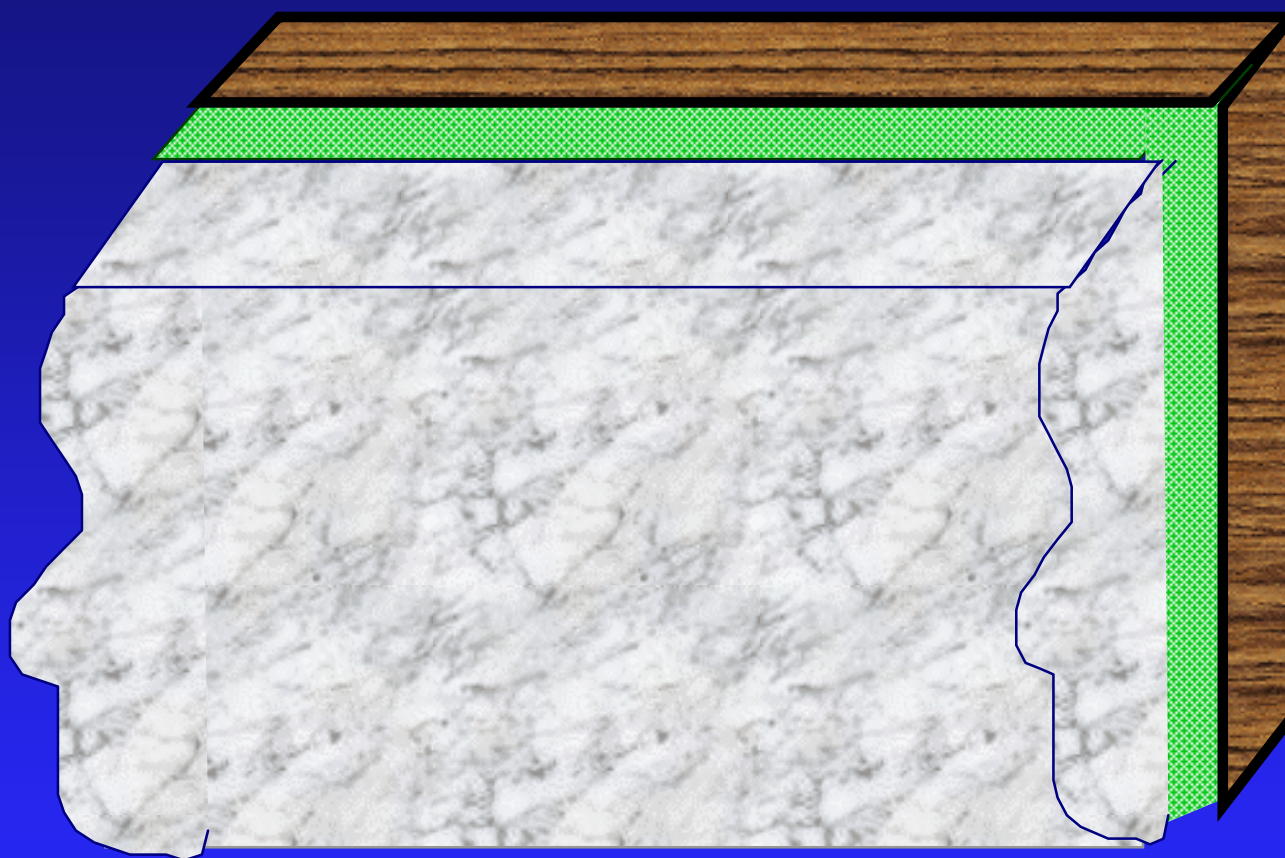
- ❖ The chemical release action enables very high quality finishes to be produced with a uniformly matt surface.
- ❖ Incidences of blow holes, surface blemishes and surface crazing are greatly reduced.
- ❖ This **positive** chemical release greatly reduces stripping times, minimising cleaning and subsequent damage to formwork.

Ensure 'uniform coverage

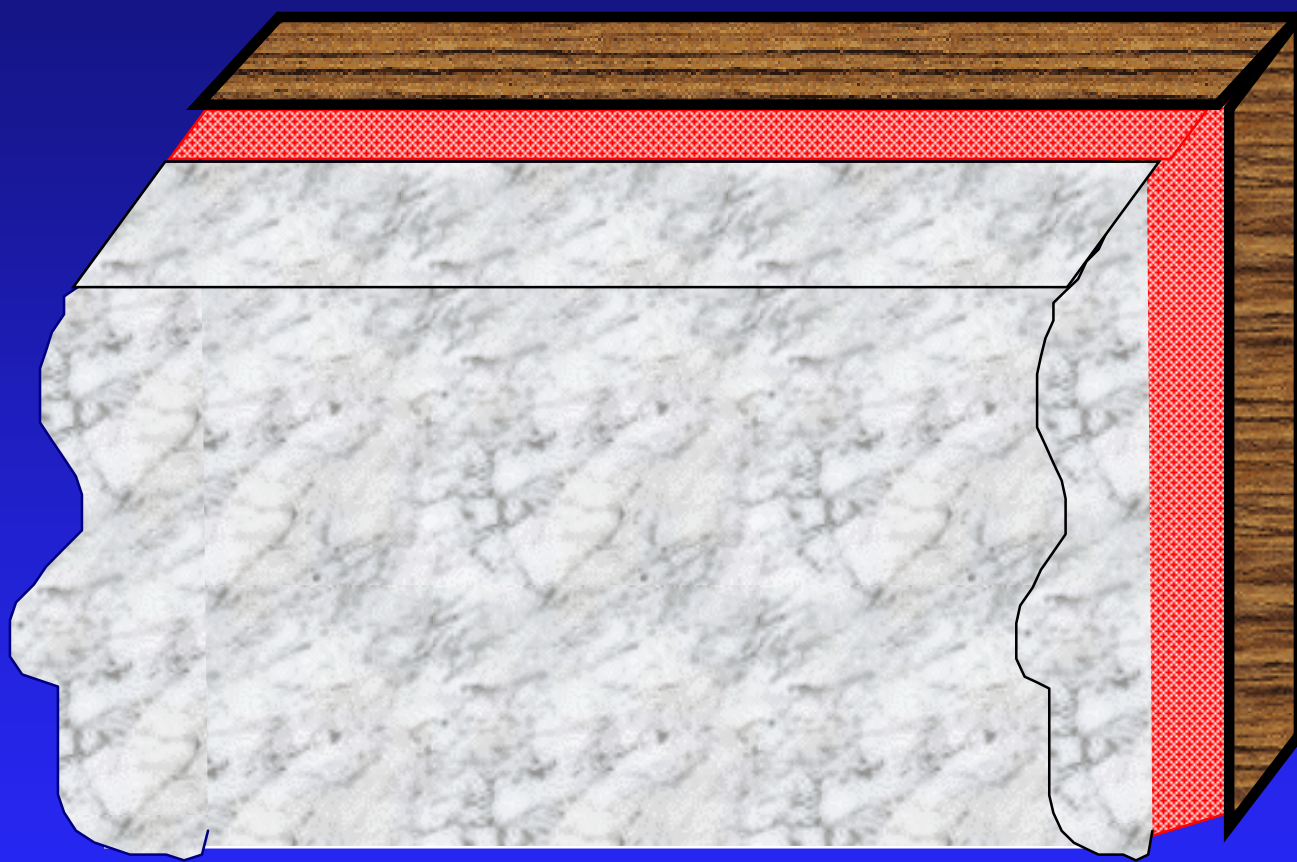


- ❖ The release mechanism is effected by the chemical formation of complex soaps at the concrete interface, being a reaction between the product's acidic materials and alkalis produced by the hydration of the concrete.
- ❖ The soaps then dry to form a stearate dust of a size which enables a positive dis-bonding between concrete and form upon striking.
- ❖ N.B. - The 'dust' is usually so insignificant as to be considered non-residual.

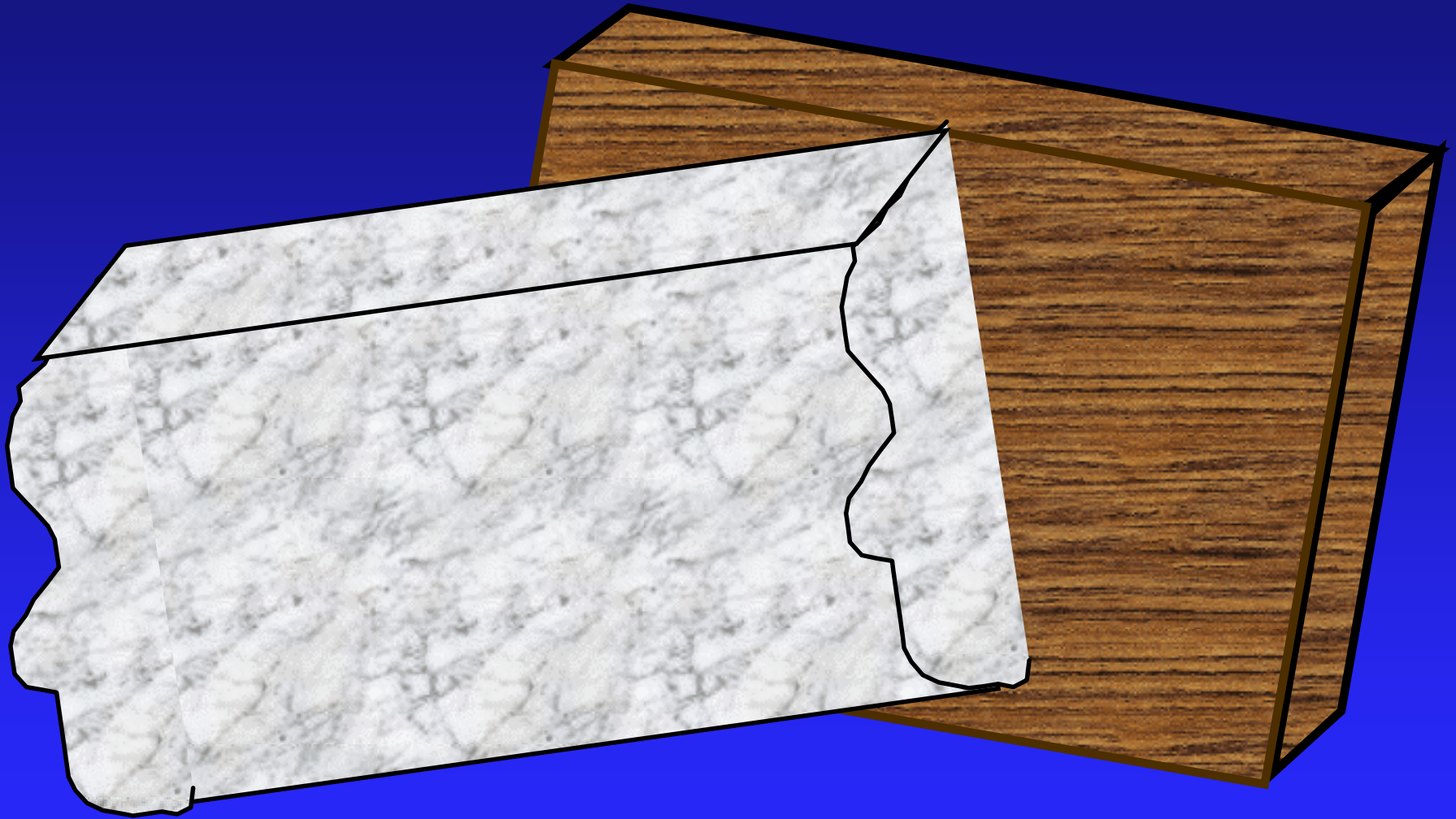
Concrete may now be poured



Chemical 'Reaction' takes place



Forms may now be struck



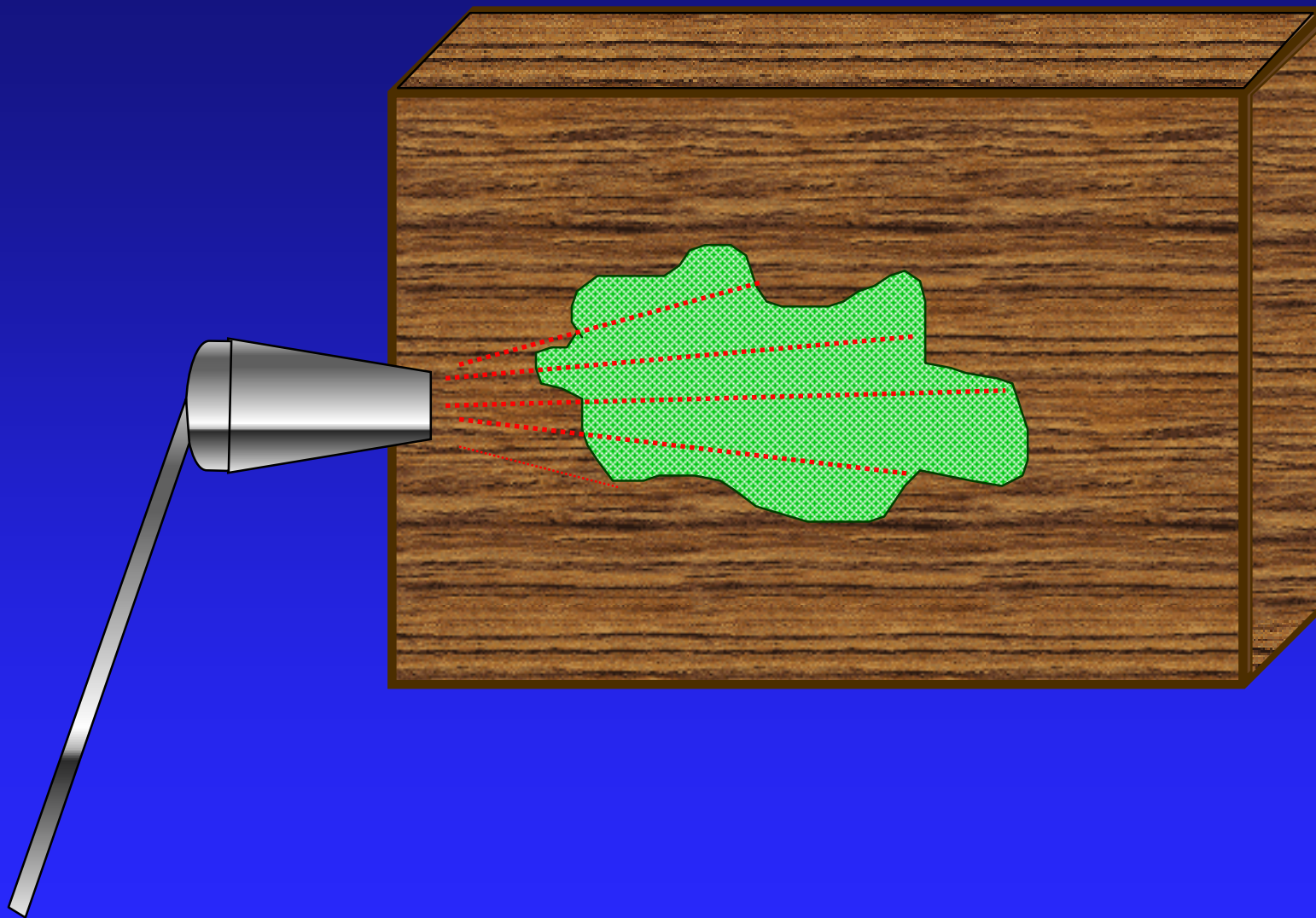
Mould Oils



Mould Oils

- ❖ Materials should always be applied to cleaned formwork. For optimum results, application by spray equipment is necessary.
- ❖ A fine mist spray, evenly applied will provide consistent good quality and economical use.
- ❖ Excess material should not be allowed to puddle and should be mopped to ensure an even coat.
- ❖ Care should be taken not to over apply.

Application by mist spray



Mould Oils

- ❖ The highly active surfactant assists in reducing surface tension at the interface between the concrete and formwork, reducing the incidence of blowholes, surface blemishes and staining, ensuring optimum release and surface quality.

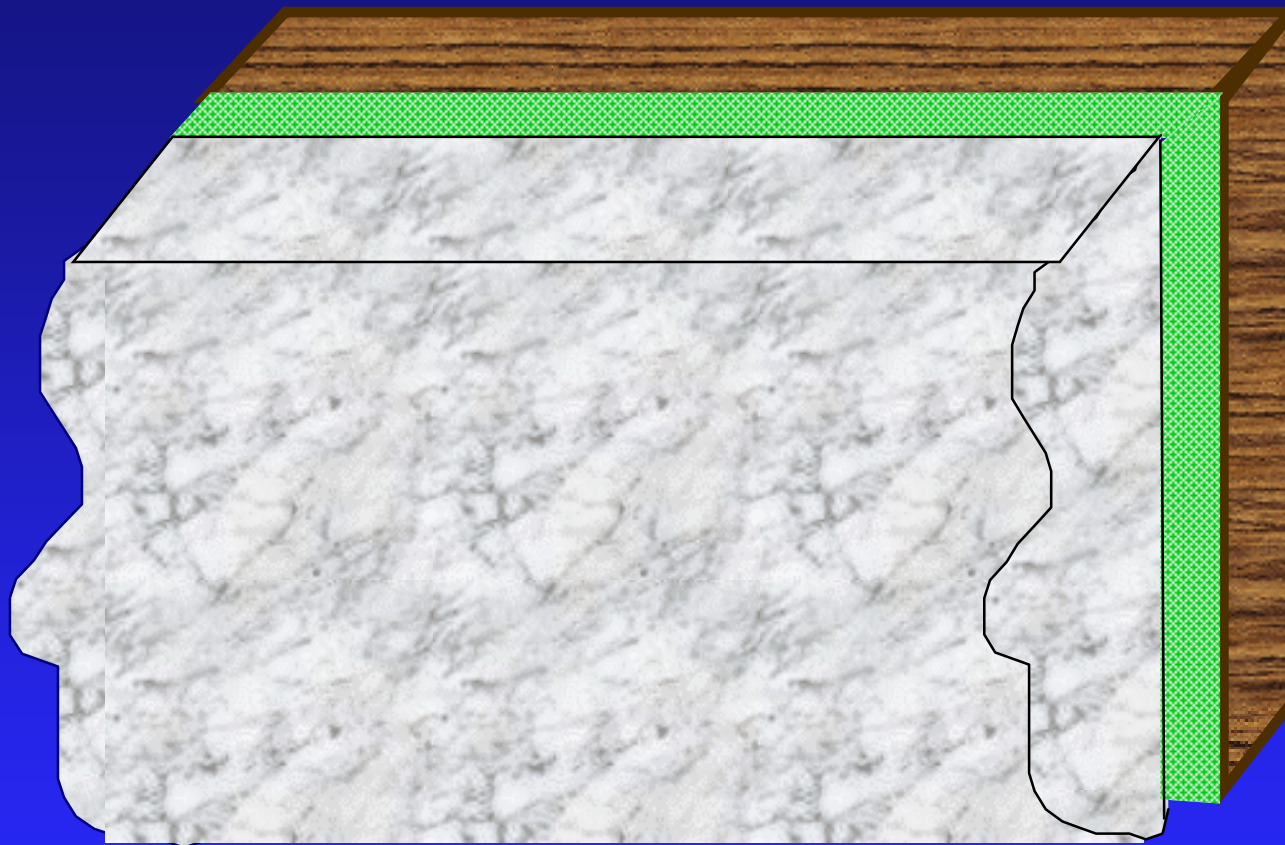
Ensure 'uniform' coverage



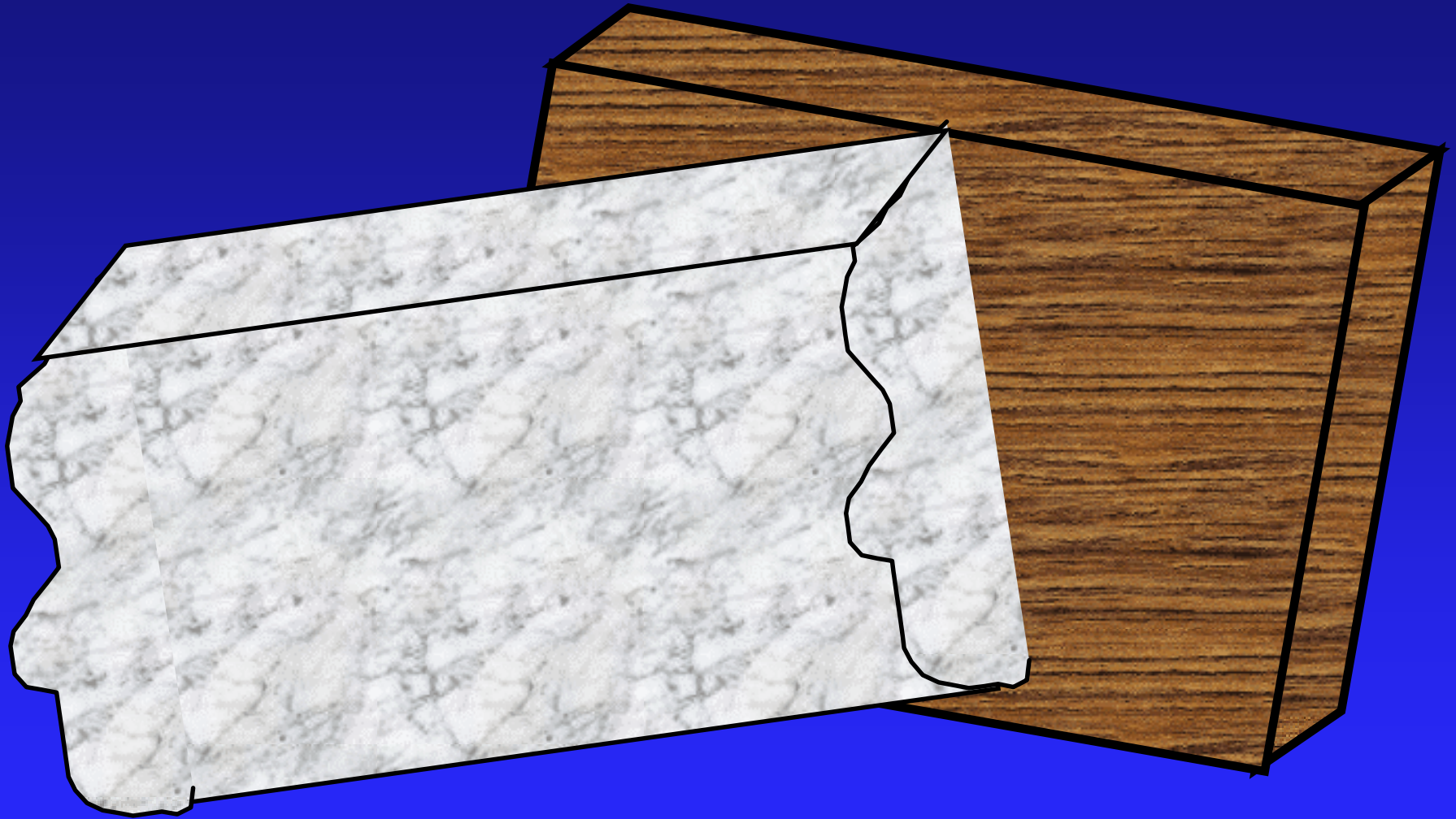
Mould Oils

- ❖ The release mechanism is effected by providing a thin physical film between the materials at the interface which enables the dis-bonding of the concrete and form upon 'striking'.
- ❖ Continued use on timber provides progressively better results.
- ❖ Residues may be found after striking on less porous surfaces, i.e. steel.

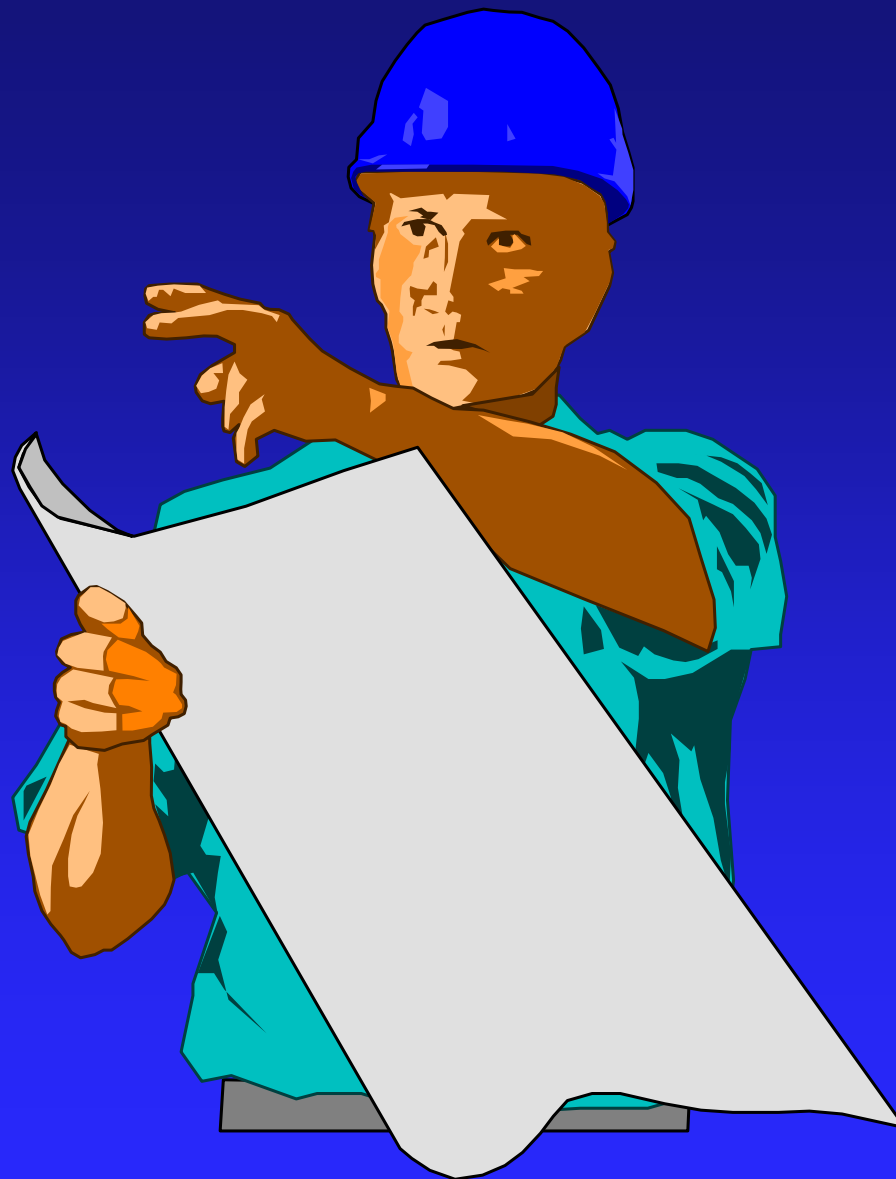
Concrete is now cast against form-face



'Striking' may now commence



Form Wax



Form Wax

- ❖ Wax is usually applied to new untreated timbers and plywoods, particularly softwoods.
- ❖ The wax is specifically developed for the initial sealing of form surfaces. Applied by a clean rag or brush, the wax is worked into the surface in a paste consistency.
- ❖ Absorption then takes place within 1 hour. Areas exhibiting excessive absorption should be treated again, however, excess surface wax should be removed prior to use.

Plain 'unsealed' Plyboard



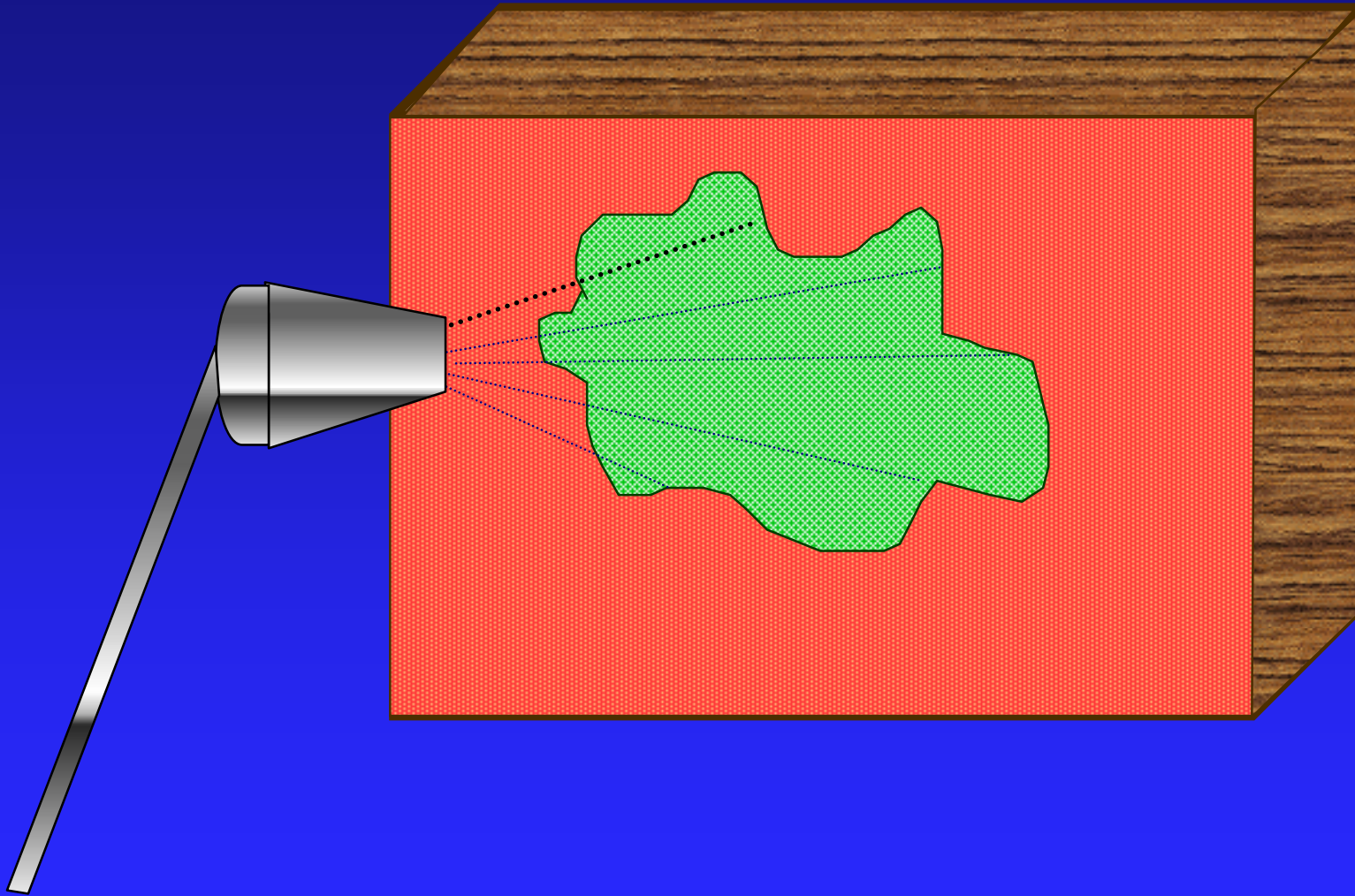
Application of Formwax[®] by cloth or brush



Form Wax

- ❖ Once the treated surface displays a uniform coating, it is then ready to be treated with a chemical release agent. Absorption has now been standardised and a quality surface finish expected.

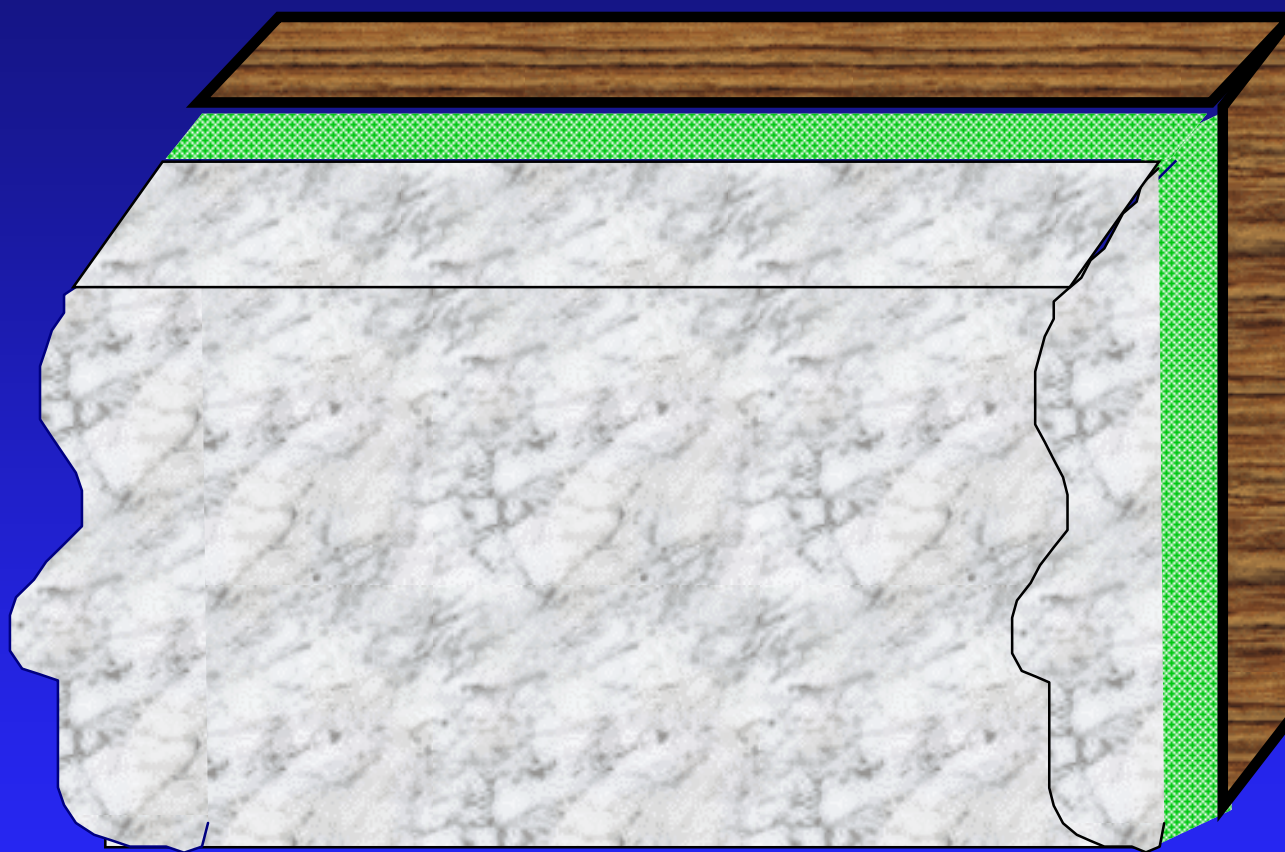
Application of Release Agent to treated surface



Ensure 'uniform coverage with Release Agent



Concrete may now be cast



Chemical **reaction** takes place



Concrete may be 'struck'

