ShutterStrip

Concrete Solutions

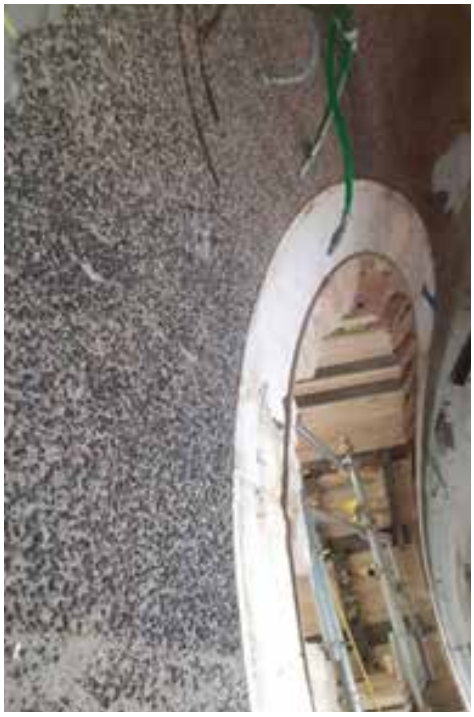
CONSTRUCTION JOINT RETARDER FILM

ShutterStrip Construction Joint Retarder Film is a non-toxic water-soluble film containing organic retarder for concrete; the film is designed to provide a simple, economical and safe method of exposing aggregates between either 1.5mm to 3mm and 3mm to 5mm depending on the aggregate being used in freshly poured concrete structures and slab joints.

The film can be easily attached to any area of a formwork/shutter to de-activate the setting of wet concrete laitance to expose aggregates for creating a keyed construction joint, for exposing starter bars/couplers and for creating aesthetic decorative finishes. ShutterStrip is ideal where the concrete interface is expected to transfer tensile and shear stress forces.

During the process of pouring or pumping concrete into the formwork, as the concrete level rises submerging the film, the film dissolves onto the surface of the concrete as it sets forming a barrier between the surface and formwork/shutter face, de-activating the concrete setting process.

Once the formwork is struck, the film will have evenly distributed the retarder, leaving a visible area of de-activated laitance that is easily removed by jet-washing or simply with the use of a hard brush and water. The laitance can be removed and the aggregate exposed over a longer period of time. For example on a typical pour the shutter is usually struck 24hrs after concreting, using ShutterStrip on a typical pour the aggregate can be exposed up to 72hrs after concreting with the shutter removed after 24hrs. For larger complex pours that can't be struck until the concrete has reached the required compressive strength the laitance can still be removed up to 7 days after concreting, if kept in the Shutter, meaning ShutterStrip is offering far greater flexibility to operatives and contractors.



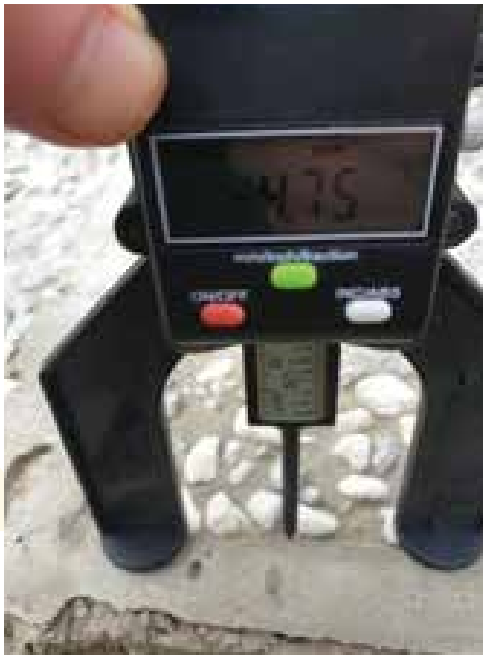
The film has a protective layer on top and has an adhesive layer on the back covered by a back liner, that can be easily attached to any desired area of a formwork requiring an exposed aggregate, it can be applied to wood, metal, polystyrene and plastic moulds.

The prime function of construction joint film is to deactivate the setting of concrete laitance on the surface that is placed against a formwork. An exposed aggregate finish is obtained by removing the deactivated surface.

So why use ShutterStrip?

Removing the laitance and getting a good construction joint is no easy task. As a result, there are often conflicting views between the client and members of the project team over whether a completed construction joint is good enough or roughened enough!

So, what is rough enough and how much of the lattice should be removed? How much of the aggregate should be exposed?



This is a grey area on every job and is often left to the engineers' discretion of what's rough enough, with the decision being driven by costs involved, timeframes and the safety of the operatives.

With research carried out by looking at academic papers and publications, it turns out the best-exposed depth of aggregate is 1/3 of the lateral dimension of the aggregate being used, most commonly in concrete is 20mm stone. So, the answer to the grey area question is between 3mm to 6mm and 4.75mm depth of exposed aggregate is best for bonding structures together.

On applications where the concrete interface is expected to transfer tensile forces to the full capacity of the substrate design strength, for example, industrial flooring, at least 30% of the interface will need to be clean, strong exposed large aggregate. In less demanding applications, at least 10% of exposed aggregate is necessary to ensure transfer loads can aid in creating a monolithic watertight joint. The tests used were the sheer slant and pull off.

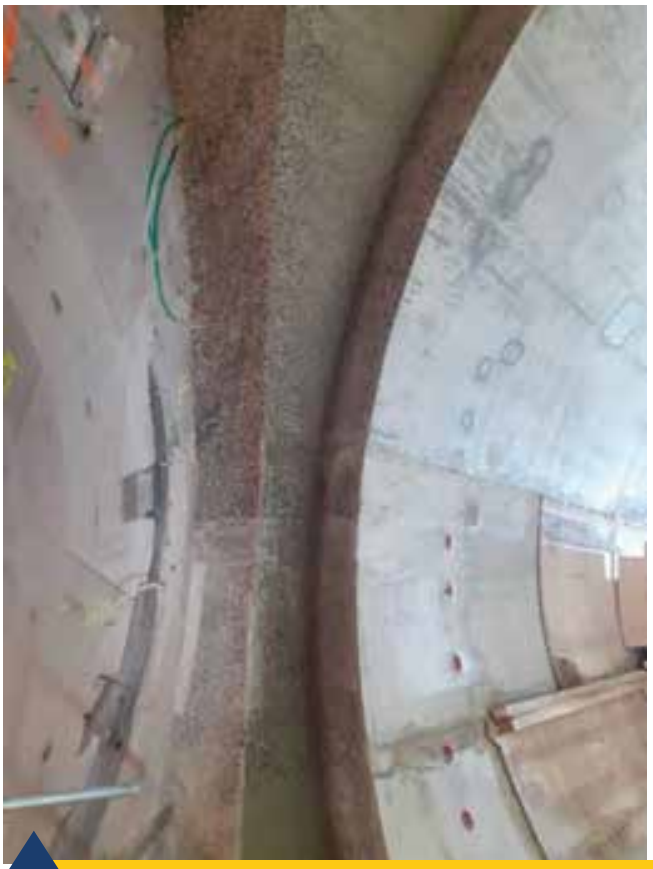
Engineers rarely enforce this as it near impossible to achieve the required finish on a vertical surface using conventional techniques. The mechanical procedures can't do it because they would only dislodge and shatter the aggregate, being counterproductive weakening the joint.

Practices and methods used today include:

- **AIR AND WATER JETTING -** a wet and messy procedure with dangerous particles of flying aggregate and has to be timed perfectly.
- **ABRASIVE BLASTING -** requires specialist equipment and training with high safety precautions in place.
- **MECHANICAL SCABBLING -** time-consuming and one of the most laborious and harming jobs a concrete operative has to undertake and limited to HAVS monitoring.
- **EXPANDED METAL MESH -** only gives 75% of strength, so not suitable for high strength and can be time-consuming to put in place.
- **SURFACE RETARDERS –** a limited time frame of use, the application can contaminate steel, uneven finish that still needs to be jet washed.

Each one of the procedures has drawbacks!!!

Most common practice used is Scabbling which is a high vibration activity that is carried out with handheld pneumatic devices that pound the surface with pointed rods. As a result operatives are exposed to the following industrial diseases **Hand-arm Vibration (HAVS)** which leads to white finger and **Respirable Crystalline Silica (RCS)** can be inhaled and can lead to silicosis, a lung disease that causes permanent disablement and early death. As a consequence, the Health and Safety Executive (HSE) categorise scabbling as HIGH RISK. Effective control is necessary, involving assessment, prevention and controls such as on-tool extraction, Respiratory Protective Equipment (RPE) and (HAVS) monitoring.



The only option that might achieve the correct depth is sprayed surface retarder but only effective on a flat horizontal surface, with perfect timing and with control measures (impossible on a vertical formwork). As most retarders only have a realistic working life span of around 12 to 18 hrs so are not suitable for larger pours with restricted striking times. ShutterStrip offers substantial flexibility when compared to today's methods due to its working life. ShutterStrip also increases the number of options when planning and sequencing the programme of works, but perhaps, more importantly, it means that when works don't go according to plan, there is a large window of working time available to be utilised.

In addition to the numerous benefits relating to health, safety and quality; ShutterStrip offers commercial value concerning cost, programme and flexibility of working in comparison to more traditional methods of creating construction joints in concrete.

Commercial Risk Factors OF SCABBILING

- **Joint Failure –** Scabbling/scaling provides an inconsistent finish and leads to fracturing the aggregate which is counter productive as it can weaken the joint.
- **Additional Time –** scabbling is a more time-consuming activity than use of ShutterStrip.
- **Hand-arm Vibration (HAVS) Restrictions –** The daily exposure limit value (ELV) is 5.0 m/s2A(8), in accordance with The Control of Vibration at Work Regulations 2005, the employer has a duty to establish and implement a program of works.

The following mitigation measures can be introduced to reduce the impact however they further increase the direct costs:Increase the number of operatives carrying out the activity.

- Rotate operatives – this, however, can lead to inefficiencies in other activities.
- Use different equipment – technology is continuously improving, and lower vibration tools are being introduced but these tend to be more expensive and less effective.

  HAVS monitoring equipment is expensive.

- **Plant/Equipment –** additional costs for plant and fuel (scabbling/scaling equipment) and increased risk in the event of equipment failure.

Conclusion

Even if the above methods are implemented correctly and effectively, ShutterStrip is a competitive alternative from a commercial perspective. When the health, safety and quality benefits are taken into consideration, ShutterStrip is the preferable option to Clients and Contractors. Combined with the flexibility of working and the risk factor mitigation, **ShutterStrip is a market-leading product.** It has been designed solely to help make the construction industry more productive, reduce costs and carbon footprint, while most importantly, making it safer for all those involved.

ShutterStrip have solved the age-old problem of creating a construction joint. By using ShutterStrip construction joint retarder film you will be creating the perfect uniformed construction/key joint of 1.5mm to 3mm & 3mm to 5mm depending on the aggregate used avoiding the mess, dangers and uncertainty associated with the methods used today.

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