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iNFORMER

YOUR QUARTERLY FRC NEWS &
TECHNICAL UPDATE FROM iNFORCE

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NEW TEAM MEMBER

We are pleased to welcome Crawford Fisher to our Project Management team.

Crawford joined the team in September bringing with him project management experience from the Hospitality sector where he was working with developers, designers, and architects to deliver new and refurbished motels and hotels.

With a very entrepreneurial mindset, he brings much valued passion and enthusiasm which fits right into the core values of the Inforce team.



CASE STUDY GIBBONS

Nearly two years ago, Inforce got together with Gibbons and Coresteel buildings to design a floor slab that would best suit a workshop and warehouse facility in the Nelson Region that would be subject to a range of load cases.

Warehouse Slabs: 5500kg racking leg loads with 8200kg forklift.
Workshop Slabs: NZTA standard axle loads, lifting jacks and general workshop equipment.

The design arrived at was a steel fibre reinforced slab with no sawn joints or steel mesh reinforcing. A jointless slab fully utilises the benefits of fibre reinforcing by creating large floor panels, with no saw cuts in them. The panels are unrestrained from the building structure and are interconnected with steel armoured joints to protect the slab edges.

This design provided more than sufficient load bearing capacity while giving the asset owner confidence that the slab is designed for long term durability with reduced maintenance issues compared to a conventional slab design.

The difficulty with saw cuts is that not only do they create a weak point in the slab but over time a saw cut will deteriorate leading to an unsightly joint that is chipped which leads to being unserviceable and difficult to maintain.

The Inforce team provided full design support to the relevant parties and once construction started provided on site support to ensure the slab was constructed as per our design and to assist in any issues that might arise. We worked in with Allied Concrete technical team to ensure the concrete mix was designed to accommodate the high fibre dose rate.



GIBBONS CONTINUED

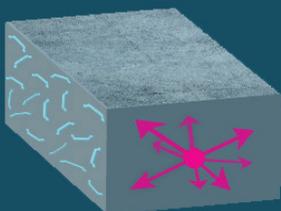
It was a privilege to be working with a company like Gibbons who have such a strong history of successful construction projects and developments that embrace innovation to provide better outcomes for their clients. Simon Dobson, Development Project Manager for Gibbons, summed it up best with his comment:

“As an experienced property development company, Gibbons is always looking for ways to bring innovative ideas and solutions into our investments which benefit not just the building but provide low maintenance solutions for our tenants. Using Inforce Fibre as an alternative to conventional reinforced concrete was a great solution on this project, as was the support we received from the team.”

It was a privilege to be working with Simon and the Gibbon’s team to deliver a project we all can be proud of. We believe in order to achieve a positive and desirable outcome, there needs to be clear communication, expectations backed up with support that exceeds our client’s expectations.



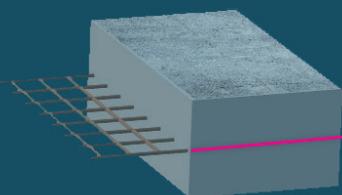
FIBRE REINFORCEMENT



TOP TO BOTTOM REINFORCEMENT

VS

STEEL MESH REINFORCEMENT



SINGLE LAYER OF REINFORCEMENT

REDUCING ABRASIVE WEAR IN CONCRETE

Abrasion resistant concrete is critical for the serviceability, maintenance, and longevity of a concrete slab in high traffic and heavy wear areas. Scraping and wear on a surface that does not hold sufficient tensile strength and ductile properties will cause cracking and deterioration of the concrete and eventually lead to the exposure and corrosion of steel reinforcing over time.

The corrosion of steel reinforcement will cause expansion and bursting of the concrete, which results in unserviceable and unworkable areas that takes considerable time, effort and money to replace or repair.

That is why we look to using fibre reinforcing to reduce abrasive wear. Introducing fibre into the concrete mix provides a significant increase in tensile strength, ductility and permeability which reduces the crack, impact and fatigue deterioration possibilities of the concrete.

Fibre creates a matrix of reinforcing– the diagram on the left gives a visual example of the **top to bottom** reinforcement provided through the introduction of fibre.



DESIGNING MORE COST-EFFECTIVE YARD SLABS

One of the main drivers in the design phase for our team at Inforce is to look at what is the most fit for purpose yet cost-effective slab design we can achieve. We ask: How can we optimise it?

That is why we design with a range of various fibre types and strengths in order to, on a case by case basis, select the right fibre type that will provide sufficient load capacity while being cost effective so we are not choosing an expensive fibre to do a job that a lower cost fibre can do.

‘Optimised’ should in no way insinuate lower quality or lower price, but rather utilising our design experience and tools we have in order to design a slab that is fit for purpose, serviceable and cost effective without being over designed.

Unsure of what type of fibre to specify in standard yard slabs or hardstands? Talk with our design team today to discuss the project and we can help you determine the best fibre to suit the project.

REDUCING ABRASIVE WEAR CONTINUED

As shown in the diagram, a fibre reinforced slab helps spread the distribution of stresses more evenly and further apart than that of mesh reinforcing which provides (often) a single layer of reinforcement. This is one of the largest benefits with the Fibre Reinforcing in providing superior crack and impact resistance.

Fibre Reinforced concrete improves tensile strength & ductility.

Concrete slabs under a compressive load will result in tension at the bottom of the slab. When the tension becomes too great, fractures begin to form, resulting in surface cracks.

The further the tension load is spread, the less likely a crack will form. In the case a fracture does form – the fibre in the concrete will help prevent the fracture from becoming a significant crack. Another added benefit of fibre reinforcing is the assistance of evenly spread aggregate throughout the depth of the concrete. During the vibration process of placing the concrete, larger aggregates tend to shuffle/sink lower into the concrete slab with “fines and cream” rising nearer to the surface. When fibre is included in the concrete mix, it helps maintain a more even spread of aggregate throughout the concrete due to the fibre shape and matrix style positioning. This helps reduce shrinkage and shrinkage cracking which is a contributor to abrasive wear.

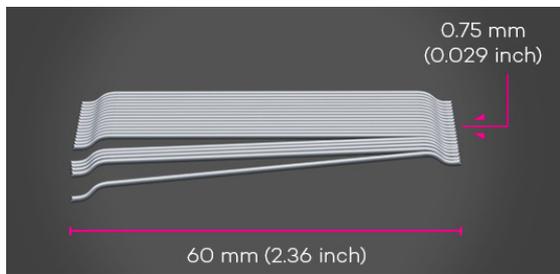


PUMPING FIBRE

A very common misunderstanding in relation to Fibre reinforced concrete is that it cannot be pumped.

That is not accurate.

Fibre can be pumped the same as any other concrete design, however, as with all other concrete mixes – you will need to ensure a suitable mix is specified so the concrete holds the workability properties to move through the pump smoothly, particularly with higher dose rates of fibre. Our team are able to assist the batching plants to ensure the right mix design is utilised to reflect the fibre dose rate.



USING FRC TO REDUCE RISK OF CURLING IN SLABS

Curling in concrete is a significant problem, especially in pavements. NRMCA define curling as the distortion of a slab into a curved shape, upward or downward bending of the edges. If the curling is significant enough the slab can crack and likely end in structural failure.

Curling mostly occurs from significant temperature differential in the concrete slab. Higher temperatures cause concrete to expand causing tension, while drying of concrete causes concrete to shrink causing compression. Fibres serve as mini reinforcement which can resist tension strain. Fibres help hold the mix together, creating a stronger more durable concrete when used appropriately. In general, for curling to occur with fibres in the concrete mix, more energy is required to overcome the resistance because of the higher quality concrete and reinforcement effect.

Fibres also help to keep the water appropriately dispersed throughout the mix, greatly reducing the aggressive gradient of moisture from the bottom of the slab to the top of the slab. If the moisture is able to stay consistent, or have a minimal gradient, this helps to remove the variable of moisture from the cause of curling, or at least significantly decrease the effect. Fibres create a stronger, more durable mix; help carry tension forces; help maintain consistent moisture distribution; and help resist and reduce cracking. All of these advantages help resist and reduce curling.



GIVING TO GOOD COAST GUARD

As part of our promise to donate 20% of our profits to charities, Coastguard is another very worthy cause we give to. On the West Coast, surrounded by so much coastline, this service is critical to saving the lives of those who find themselves in trouble while in the water. **Thank you for what you do Coastguard!**

INFORCE
SIMPLIFY WITH CONFIDENCE.

PRODUCT FOCUS: PROFORCE®80

Proforce80 is a steel fibre with a high tensile strength of 1100Mpa which is over twice the strength of standard mesh reinforcing. Due to its high aspect ratio, these fibres come collated together to ensure an even distribution of fibres within the concrete mix.

Proforce80 is most commonly used in heavy-duty slabs, industrial floors and residential TC2 slabs. With high strength and re3 values, this fibre helps to increase the load bearing capacity and impact resistance of the concrete, with a higher post crack hold than most other types of fibre.

As with all our structural fibre types, Proforce80 can replace all secondary reinforcement or be used in conjunction with steel mesh reinforcing in a Hybrid slab design.

Proforce® 80 fibres are certified to CE mark in accordance to European Standard and manufactured under ISO 9001 and ISO14001 certification.

