OPTIPAVE®VRS

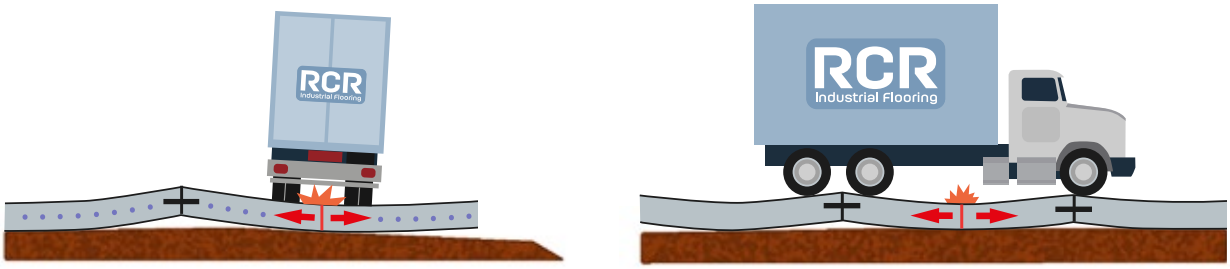
OPTIMIZED SYSTEM FOR EXTERNAL PAVEMENTS AND HEAVY TRAFFIC

RCR
Flooring Applications

OPTIPAVE®VRS – Optimized system for external industrial concrete pavements

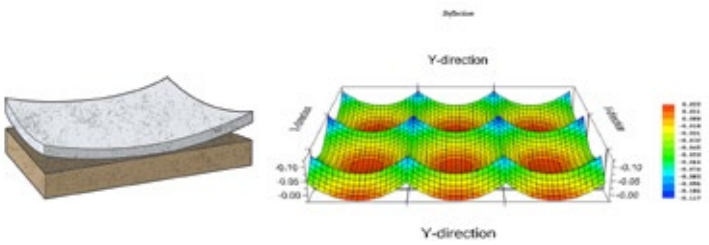
Innovation with the combination of volumetric retraction stability additive, Link EVR®; TCPavemement®'s short slab technology and fiber reinforced concrete.
The conception and design of concrete pavements under intense truck traffic result in great durability and reduced investment.

OPTIPAVE®VRS allows optimized design with thinner concrete slabs thanks to new concept of load distribution coupled to the use of and additive of ultimate generation (LINK EVR®) with addition of fibres.



The position of sawn joints dividing the concrete slab in small panels is defined such as only one set of wheels can load one individual panel at any time. This results in a drastic reduction of stresses and tensions in the concrete.

The volumetric stability of concrete is playing an important role and influencing the design as the curling effect already reduced by the size of panels is eliminated by the reduction of shrinkage.



A necessary evolution for logistics and truck transport

The adaptation of the slab conception with the dimensión of trucks and real requirements of logistic sector allows to eliminate most common problems of external slabs (fatigue cracks, deformation and pumping of adjacent panels…). These recuring pathologies induce high costs of repair and/or altered conditions of transit for vehicles.

A cutting edge innovation

Recurring problems in conventional external concrete pavements led us to look for more durable systems, more competitive and technically sound. **OPTIPAVE®VRS** system create a technological leap with its optimized distribution of loads and the use of latest technologies in concrete (SCC, FRC). The final result is a revolutionary system, with fast execution and optimized cost which solves problems due to fatigue, designs unfit to integrate intense traffic and execution mistakes.

OPTIPAVE®VRS – A Combination of Technologies:

OPTIPAVE®VRS involves an innovative "Volumetric Retraction Stability" additive LINK EVR® combined with glass fibres PROROC®GLASS and the use of the TCP design methodology :

LINK EVR®, beyond shrinkage and **curling reduction** is also preventing superficial micro-cracks ("crazing") and seriously reduces concrete porosity, which is good for freeze-thaw behavior, to contain liquid spillage and to increase abrasion resistance

TCPavements®: The TCP method designs the dimension of the slab so that one set of wheels loads each one a any certain time, reducing the flexural stress and changing the failure mode. This results in a **thinner slab** for the same loading.

PROROC®GLASS is a very performant glass fibre acting as an additional reinforcement of concrete in plastic (reduction of microcracks) and hardened phase. The **impact resistance** is increased (x10) and resistance to cyclic load (fatigue). According to design conditions, other types of fibres can be used (steel or macrosynthetic)

Optimal behavior of joints

OPTIPAVE®VRS eliminates induced consequences of warping on the edges and corners of sawcut panels. We cannot observe any pumping under load cycles as the load is distributed on the whole surface. This increases drastically durability the resistance to fatigue effects and therefore the durability.

Due to short distance between sawn joints and reduction of shrinkage, the joint opening is very limited. The aggregate interlock is is **increasing the load transfer .** The incidence of the increase of sawcut joints will be unsignificant as the tyre won't generate impact.

Construction joints will preferably be reinforced by steel dowels. This will not be needed for contraction joints. **Joint sealing** will be **eliminated**, as there will be no deterioration of the edges under truck traffic. This is creating great savings on maintenance.

OPTIPAVE®VRS

Main advantages

Reduction of stresses in the slab - long term design based on real traffic - elimination of the negative effects of curling & pumping - minimal joint opening

Results:

Thinner slabs - no joint sealant – reliable - economical solution – optimisation of the investement

OPTIPAVE®VRS and Environment

RCR **OPTIPAVE®VRS** system is respecting the environnement. It allows an important optimization of the quantity of raw material used for the slabs (low CO2 footprint). **OPTIPAVE®VRS floors can also absorb CO2 (around 500 g /m²).**

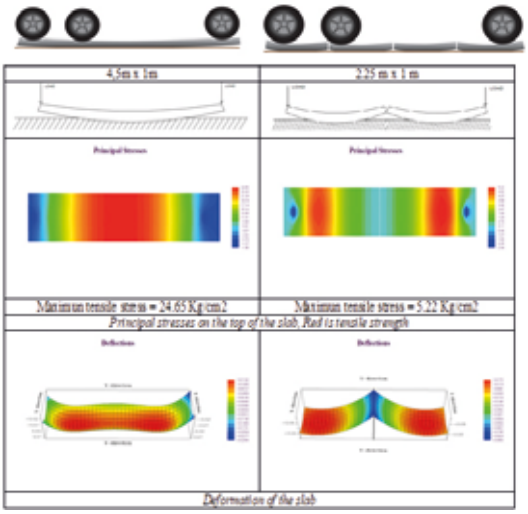
OPTIPAVE®VRS is recommended for projects with high environmental concerns **(LEED, BREEAM, HQE…).**

OPTIPAVE®VRS – Optimized design of external concrete pavements

Favorable load distribution in smaller panels generates less tensile stresses than usually considered in conventional pavements.

Slab thickness will depend on the environment of the project, quality of subbase, weather conditions, type of vehicles and estimated traffic at mid and long term.

In order to take into account all those parameters, a mechanistical dseign software has been developped **OptiPave2** based on theory (FEM) and an extensive experimental study at Illinois Center of Transportation (USA).



Trust and experience

American Concrete Institute

The calculation method of system **OptiPave2** is aknowledged by **ACI (American Concrete Institute)** as a reliable approach to optimize concrete roads for intense traffic or transit areas for truck transit (ACI 330-2R-17).

The system has been already widely and successfully used with more than 1**0 000 000 m²** realized **over ten years.**

Optipave®VRS: an exclusive system

TCPavements® short slab concept is patented and **protected in 80 countries.** Patents N° 44820 (Chile) - N°7.571.581 (USA) - PCT NºEP2006/064732 (worldwide), among others. ©TCPavements all rights reserved.

Engineering and technical development of Optipave®VRS

Monofloor industrial flooring consultants are using the dedicated calculation software **OptiPave2**. Required input are traffic analysis through ESALs or load spectra and characterization of support layers (e.g., soil, base, or subbase). The software predicts concrete slab cracking.

By fatigue damage per the equations of NCHRP Project 1-37 (AASHTO2008), joint faulting, and pavement roughness. Monofloor is also providing recommendations to establish the **concrete mix** for each batching plant. The dosage of LINK EVR® additive and fibres are defined according to the expected shrinkage factor. The slab thickness is optimised for dynamic loads defined through traffic evolution. Monofloor completes its engineering services with joints drawings, constructive details, and definition of **execution process.**

Excellence in execution

Equipment RCR Flooring Applications

- Application companies in more than 20 countries
- Highly qualified teams with international experience
- Controled processes and quality finish
- Advanced machinery for concrete screeding (Laserscreed®), polishing and mechanised application of dryshakes with Topping Spreader
- Respect of commitments and schedules thanks to great productivity without compromising final result

Specialized solutions RCR Flooring Products

- Volumetric control stability additive **LINK EVR®**
- Armoured joints and sealants **PERMABAN**
- Surface hardeners and fibres **ROCLAND**
- Curing products and plasticizersd **RINOL**

Technical support & control RCR Flooring Services

- **MONOFLOOR** Industrial Flooring Consultants
  Conception & design of concrete floors
  Supervisión, QC and surveys on site
- **PERMANEO** Renovation
  Maintenance, repair and renovation of industrial floors

Which applications ?

Intense logistics with high truck traffic
Transit roads

Parkings for heavy or light vehicles
(external or internal)

External pavements exposed to freeze-thaw

External storage areas with high environmental or durability requirements

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RCR Flooring Applications

Leaders of the flat world