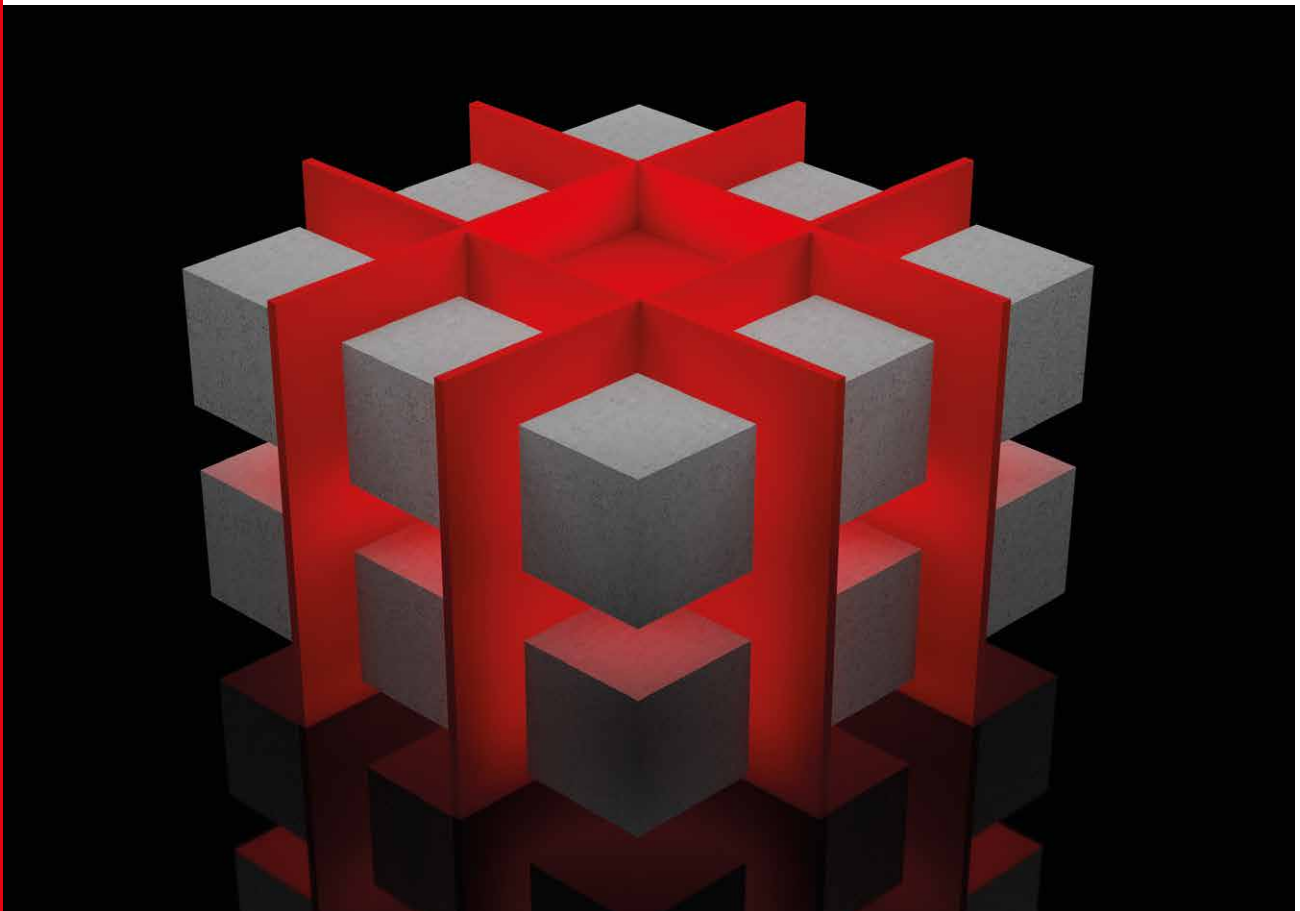


**SATISFACTION  
GUARANTEED!**

**KRAFT RACKS®**



**WITH INTEGRATED CURING SYSTEM  
FOR THE PERFECT CURING ENVIRONMENT**

# WHY **KRAFT** NOW **BUILDS RACKS**

## **No improvement for decades**

There have been innovations and improvements in all areas of concrete production. Yet, racks are still today what they were 50 years ago – storage on which concrete products dry out, and simply no longer up-to-date.

## **Drying is not curing**

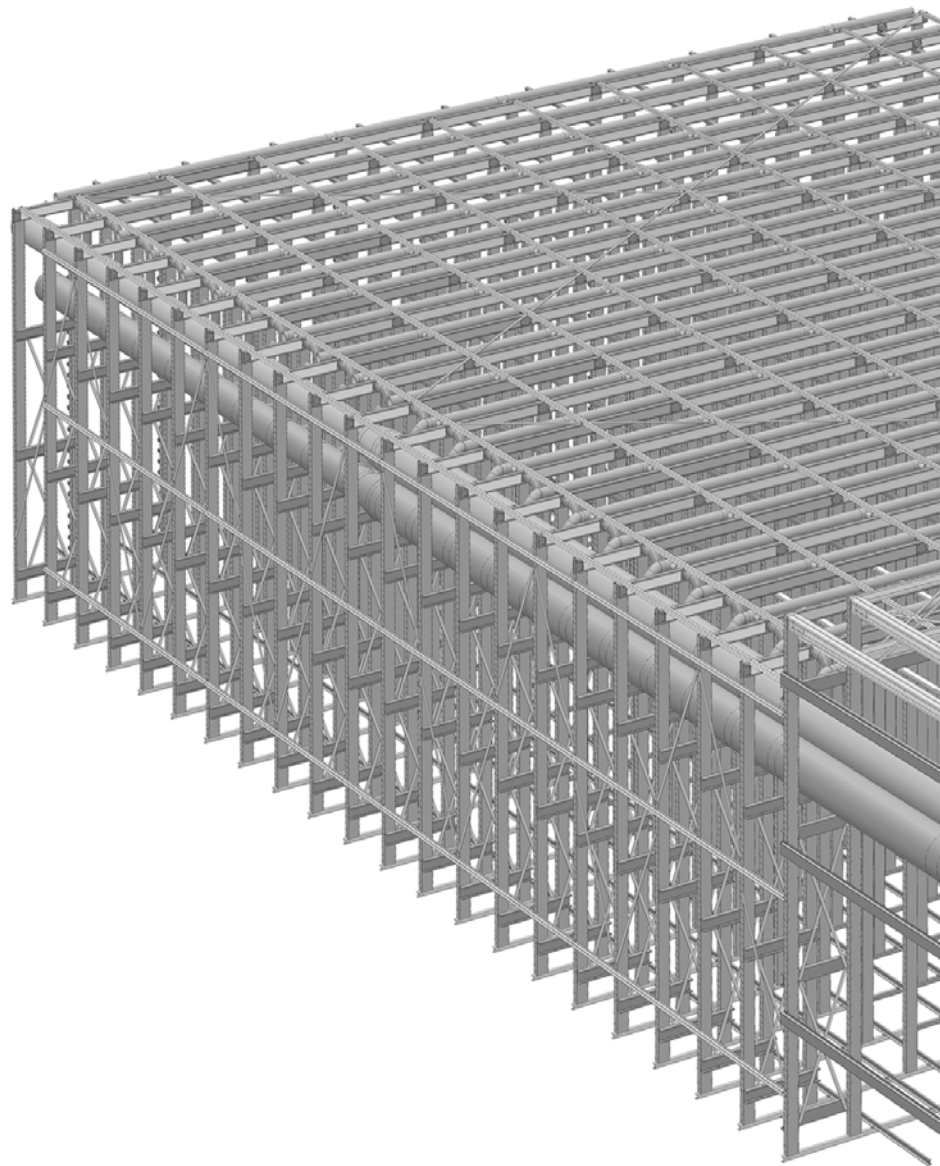
Only in controlled curing conditions can the hydration process – combining cement with water to develop a concrete-forming adhesive – take place completely.

## **Curing has to be added**

A conventional rack is obviously not the same as a curing rack, it is just – a rack. Air circulation ducts, humidification, dehumidification and other heating and ventilation components must be added, compromising what could be the best solution.

## **A different approach**

As a developer of curing systems, KRAFT has a completely different view of the rack. KRAFT sees it as a component in the ideal hardening process and improved it in many aspects to meet that requirement.



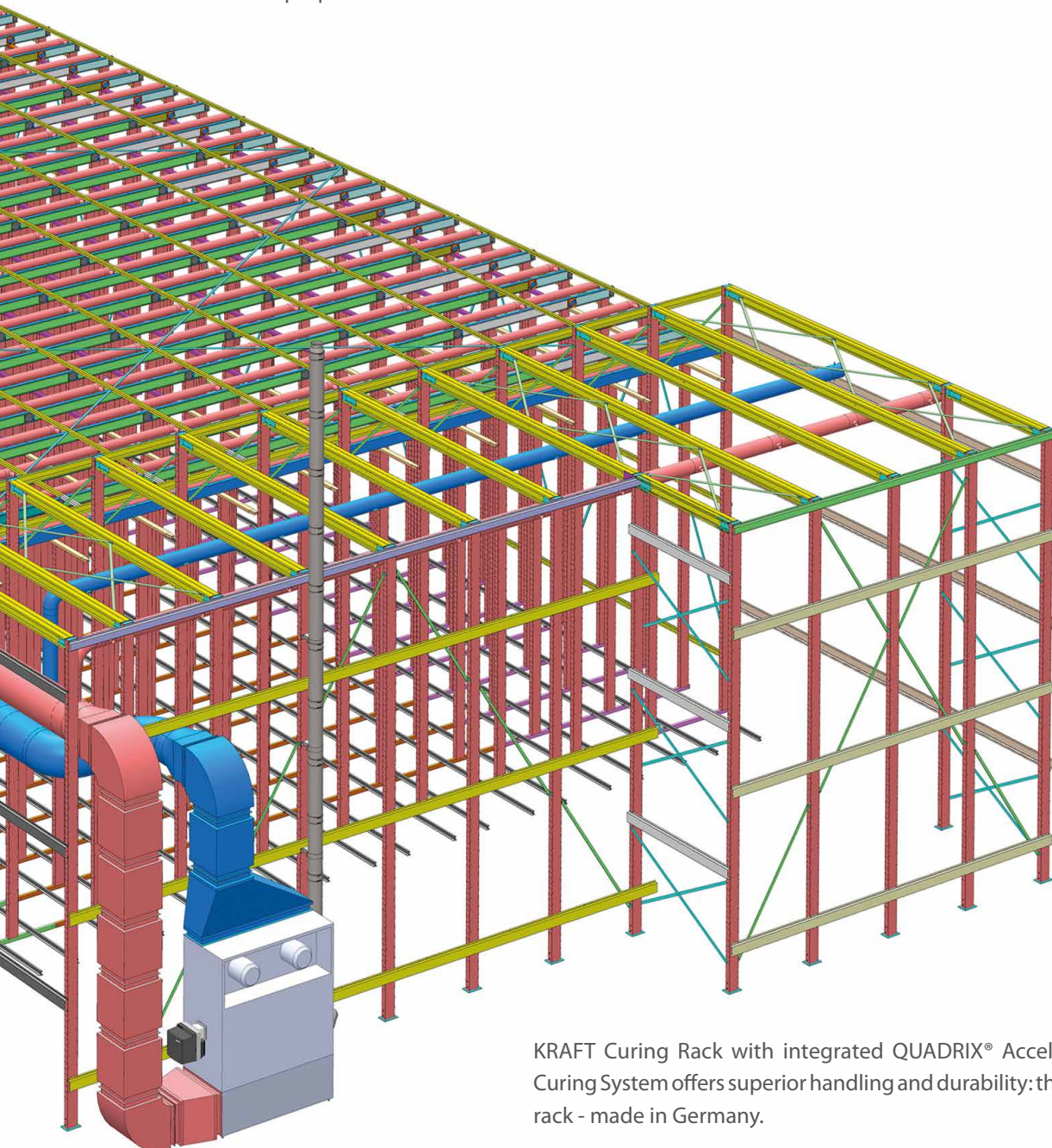
# THE **RACK** FOR THE **TWENTY-FIRST CENTURY**

## **The first true curing rack**

With the air distribution system incorporated in the load-bearing structure, KRAFT's concrete curing systems are designed directly into the rack, making for a precise, uniform distribution of the targeted curing parameters, independent of the chamber's size. This makes the new KRAFT Rack the first CURING RACK in the true sense of the meaning, focussing on the core benefit and purpose of a rack: CURING.

## **Patented Design**

The new KRAFT Rack system points the way to the future in controlled concrete curing. That is why our design is patented. The rack meets the highest specifications in terms of precision, durability, flexibility and functionality, while remaining an affordable curing solution.



KRAFT Curing Rack with integrated QUADRIX® Accelerated Concrete Curing System offers superior handling and durability: the first true curing rack - made in Germany.



# THE **PROBLEM**

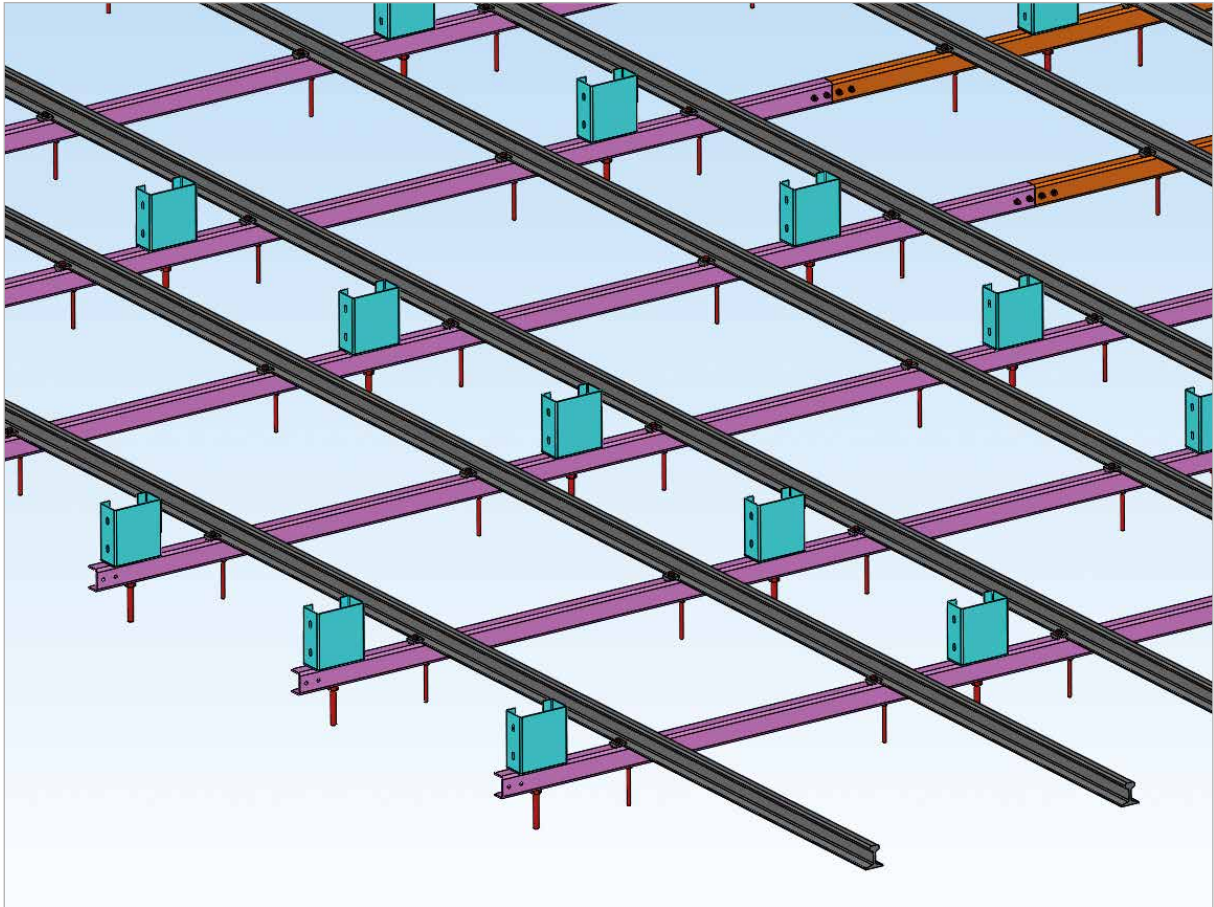
## Poor Solution for Accurate Levelling of Rack and Transport Rails



In traditional systems, the rack and rails have to be levelled separately and each column must be levelled individually – a difficult and time consuming task. In addition, the rack and rails also have to be level to one another, a procedure that is imprecise and facilitates misalignment.

# THE SOLUTION

## Simple and Accurate Synchronous Levelling of Rack Columns and Rails



All components of KRAFT Rack are automatically level to one another because they are levelled together on a steel grid with column "shoes."

## THE KRAFT ADVANTAGE

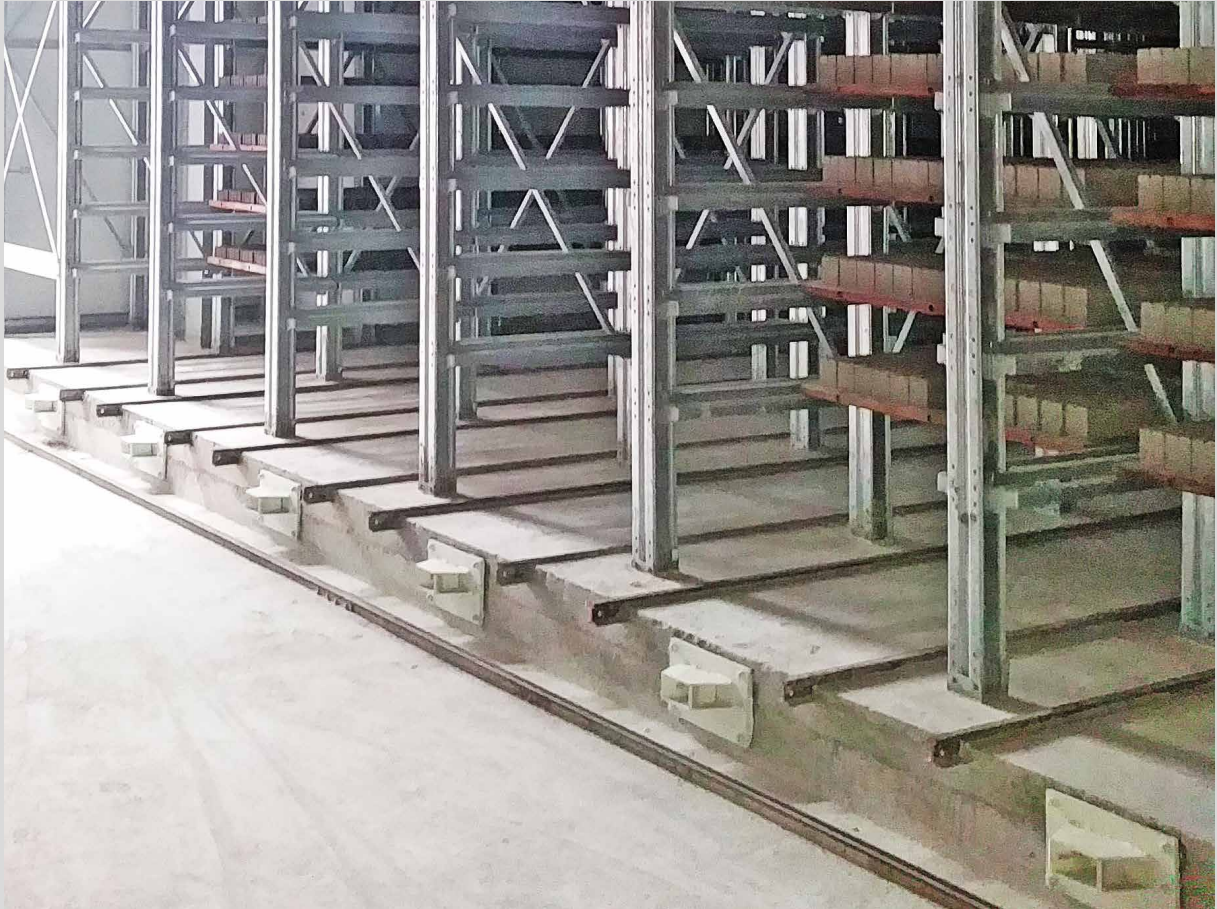
The KRAFT Rack is levelled via a modular steel grid which is levelled as one complete base. This base incorporates pre-assembled column insertion elements ("shoes") and transport rail fitting points.

Once the base is levelled, columns and rails are automatically level and level to one another – reducing the time for levelling each column individually and avoiding the imprecision of this procedure, preventing misaligned or unlevel rack components.



# THE **PROBLEM**

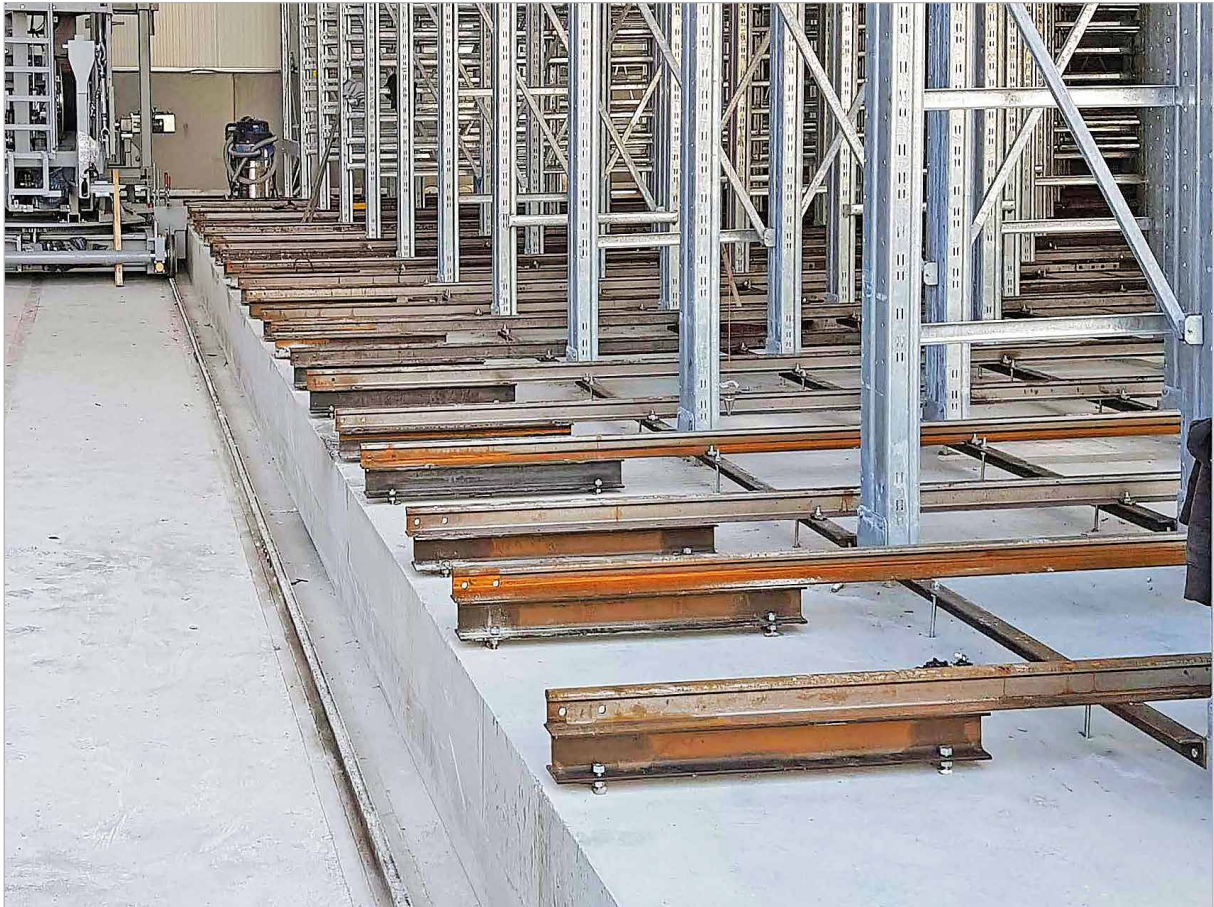
## Poor Support for Transport Rails in Rack



In existing rack systems, transport rails at the entrance of a rack passage tend to wear out as a result of constant stress. In addition, replacing the front portion requires excavating a portion of the concrete slab.

# THE SOLUTION

## Improved Support for Transport Rails



KRAFT transport rails leading into the rack come with an improved support that protects against wear-and-tear and provides for easier replacement.

## THE KRAFT ADVANTAGE

KRAFT Racks come with a support base at the front of the transport rail - the portion which is prone to wear-and-tear. This construction is capable of

absorbing the constant stress of production. In the case of wear-and-tear, this section of rail is easily exchanged.



# THE **PROBLEM**

## Poor Solution for Support and Replacement of Rails in the Transfer Car Area



In existing rail systems, the rails are supported, connected and leveled with flimsy sleepers and concreted into place. During concrete works the sleepers and rails are easily displaced causing misaligned and unlevel rails.



The traditional method of fixing rails in concrete in the transfer car area is seen in the photos above. Replacing the rails requires excavating the concrete around the worn rails, replacing the rails and pouring new concrete. Production is not possible during this time.



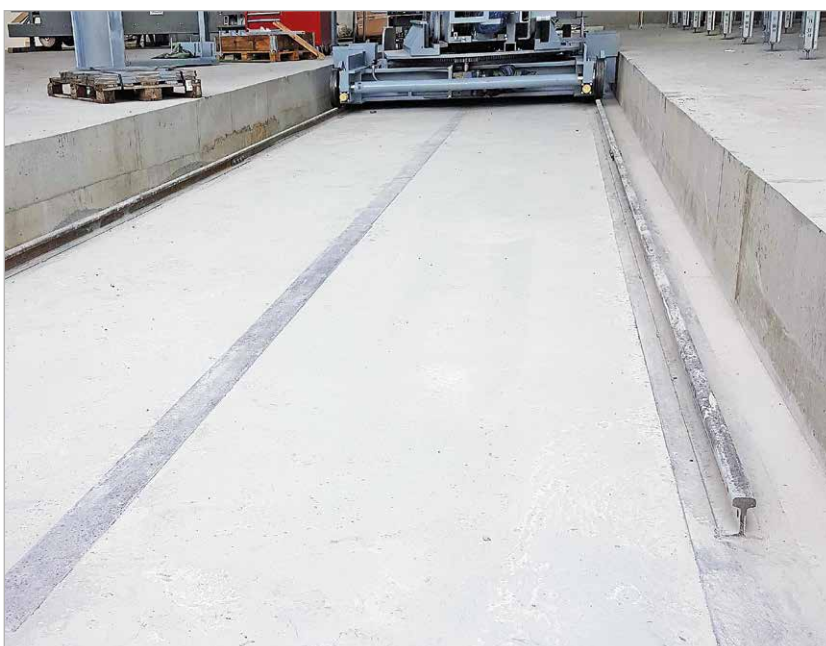
# THE SOLUTION

Improved Rail Support Structure for greater Accuracy, increased Durability and simpler Replacement



## THE KRAFT ADVANTAGE

HEA beams are anchored to the concrete foundation and leveled prior to concrete works. Concrete is poured only to the top flange of the beam.



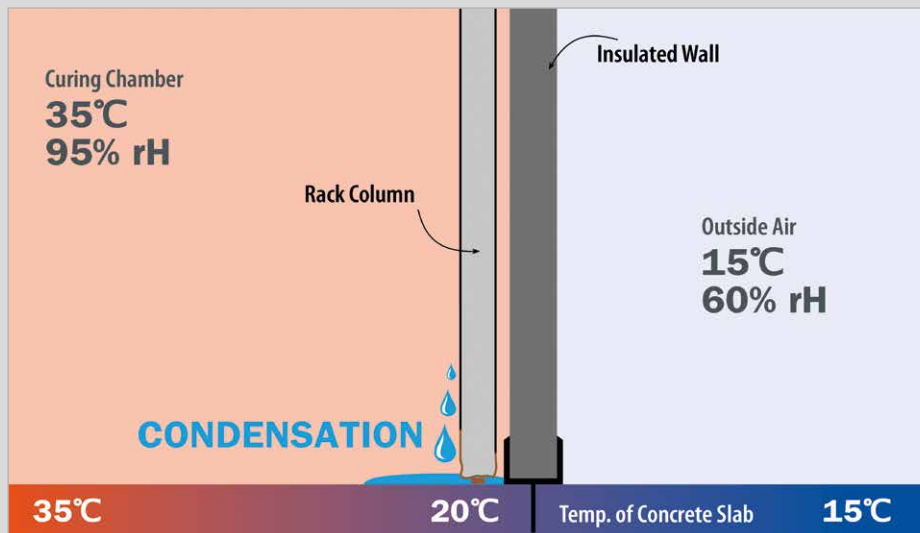
Only after concrete works are the rails installed either by welding or with clips. Rails are easily removed without concrete demolition and time loss.

# THE PROBLEM

## Corrosion is due to Condensation

In existing racks, the concrete slab acts as a thermal bridge – transferring cold from outside through the concrete

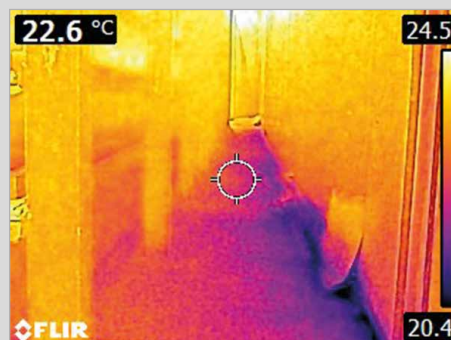
slab under the insulated chamber wall and cooling the perimeter columns that are installed on the concrete slab.



The moisture that is contained in the warm humid air of the curing chamber condenses into drops of water when it comes in contact with the colder rack columns, causing puddles and corrosion of the columns.



Due to condensation, columns close to the chamber wall are affected by corrosion while columns inside the chamber are not [picture on left]. Eventually, corrosion leads to complete failure of the column [picture on right]. The complete load-bearing structure needs to be replaced.



The thermal image [right] clearly shows a difference of 4° C between the floor near the wall [dark blue] and the floor inside the chamber [orange]. The floor is a thermal bridge.

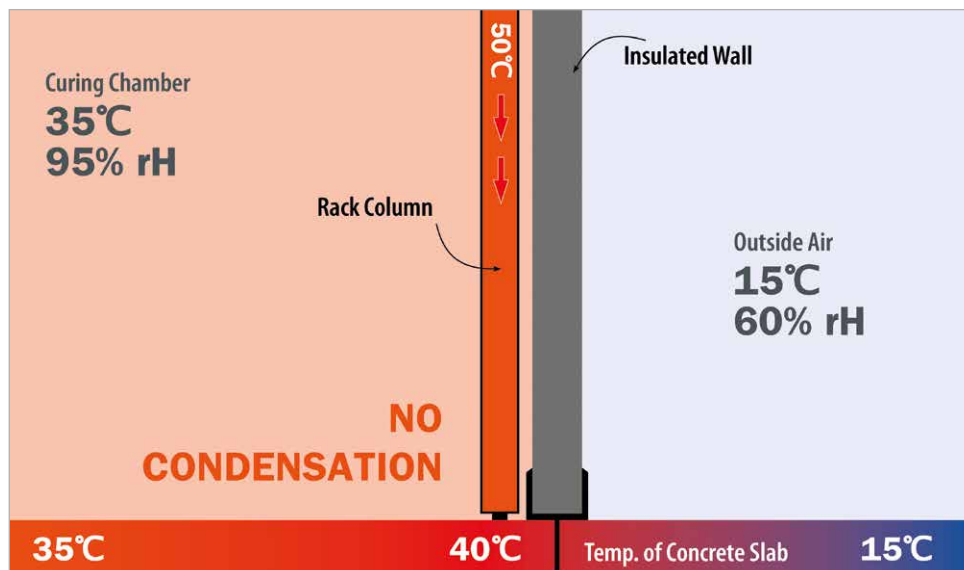


# THE SOLUTION

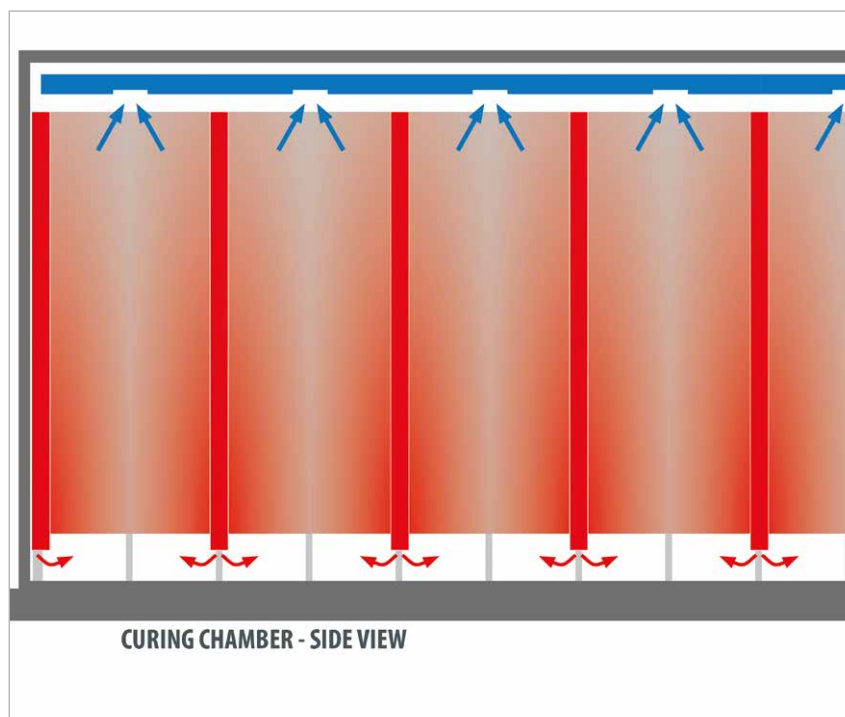
## Prevent Condensation and Eliminate Corrosion

The KRAFT Rack is designed so that the air distribution system for the curing chamber is incorporated in the load-bearing structure. Kraft's QUADRIX® Accelerated Concrete Curing Systems and NAUTILUS™ Air

Circulation Systems are connected directly to the rack structure without the need for air supply or return ducts.



All rack perimeter columns duct warm air on to the concrete slab, thereby heating the concrete slab and moving the thermal bridge from the inside to outside of the curing chamber.



## THE KRAFT ADVANTAGE

The columns of the KRAFT Rack distribute air, humidity and heat consistently throughout the curing chamber. As a result, the column is warmer than the environment.

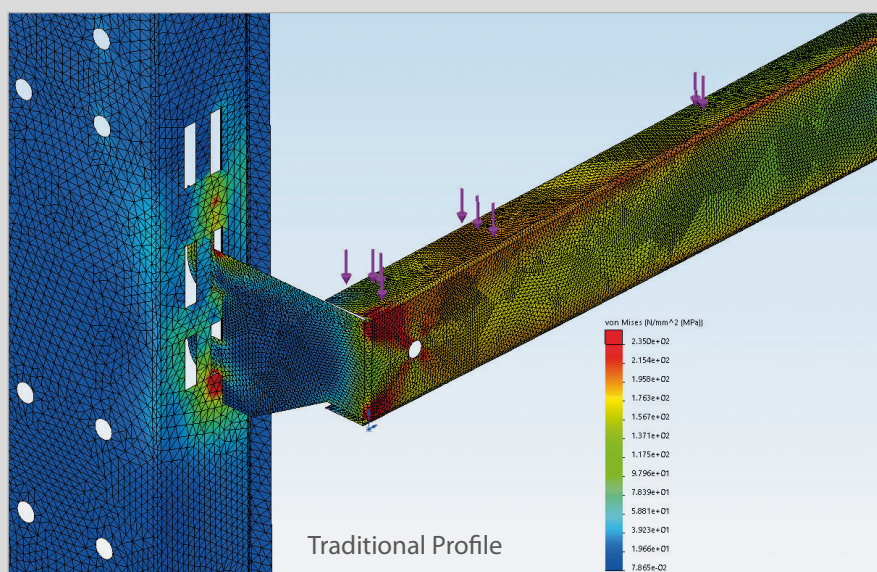
The concrete slab can not act as a thermal bridge and the load-bearing structure remains consistently dry despite optimum moisture for the curing. The structure is protected from corrosion.

# THE PROBLEM

## Weak and unreliable Shelf Connection



A weak connection between column and pallet shelf causes failure. The pancaking effect increases the damage: falling boards also destroy lower ones. Because of the torn tab connection the column itself is destroyed, the complete load-bearing structure must be replaced.

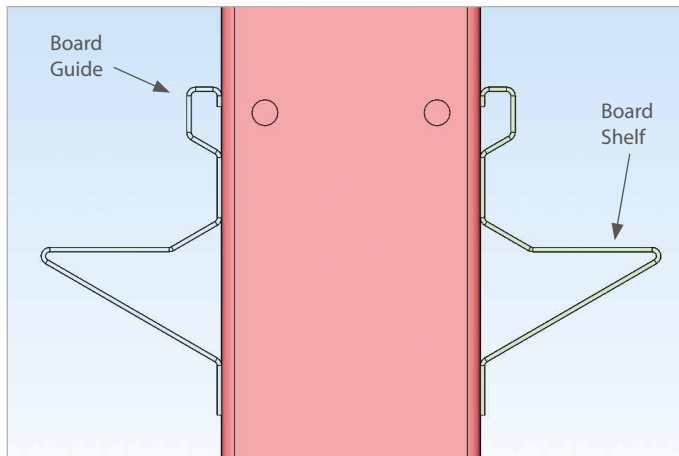


Computer analysis (Finite Elements Analysis - stress comparison) shows weak points of traditional structures. Zones colored in red indicate material failure.

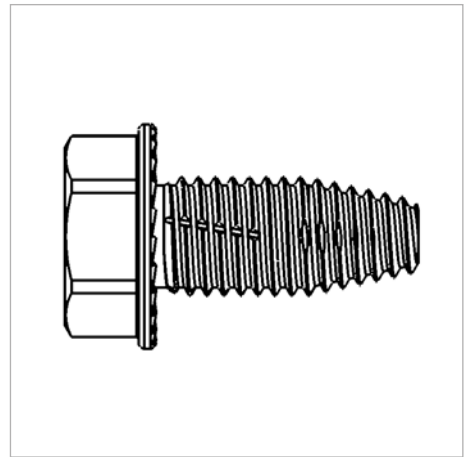


# THE SOLUTION

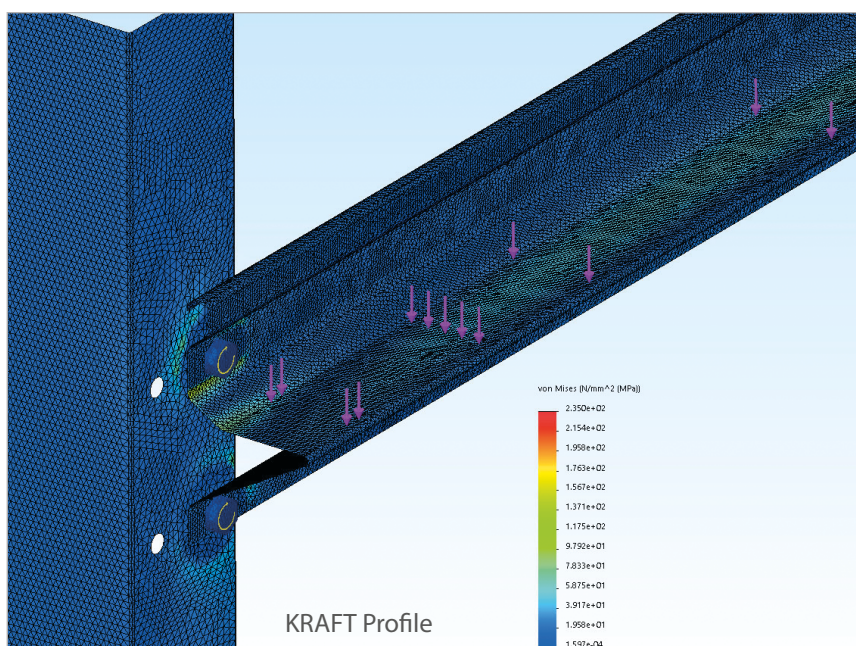
## Reliable Shelf Connection



Computer optimized (FEA Method) high torque profiles are attached with special fasteners. The integrated board guide rails over each passage's entire length prevent the production boards from shifting out of line – something that can otherwise cause heavy damage to the rack columns.



Shelves are attached with fasteners with high load capacity, specially designed for the requirements of heavy duty storage racks. Self-forming thread guarantees highest strength without damaging the galvanization.

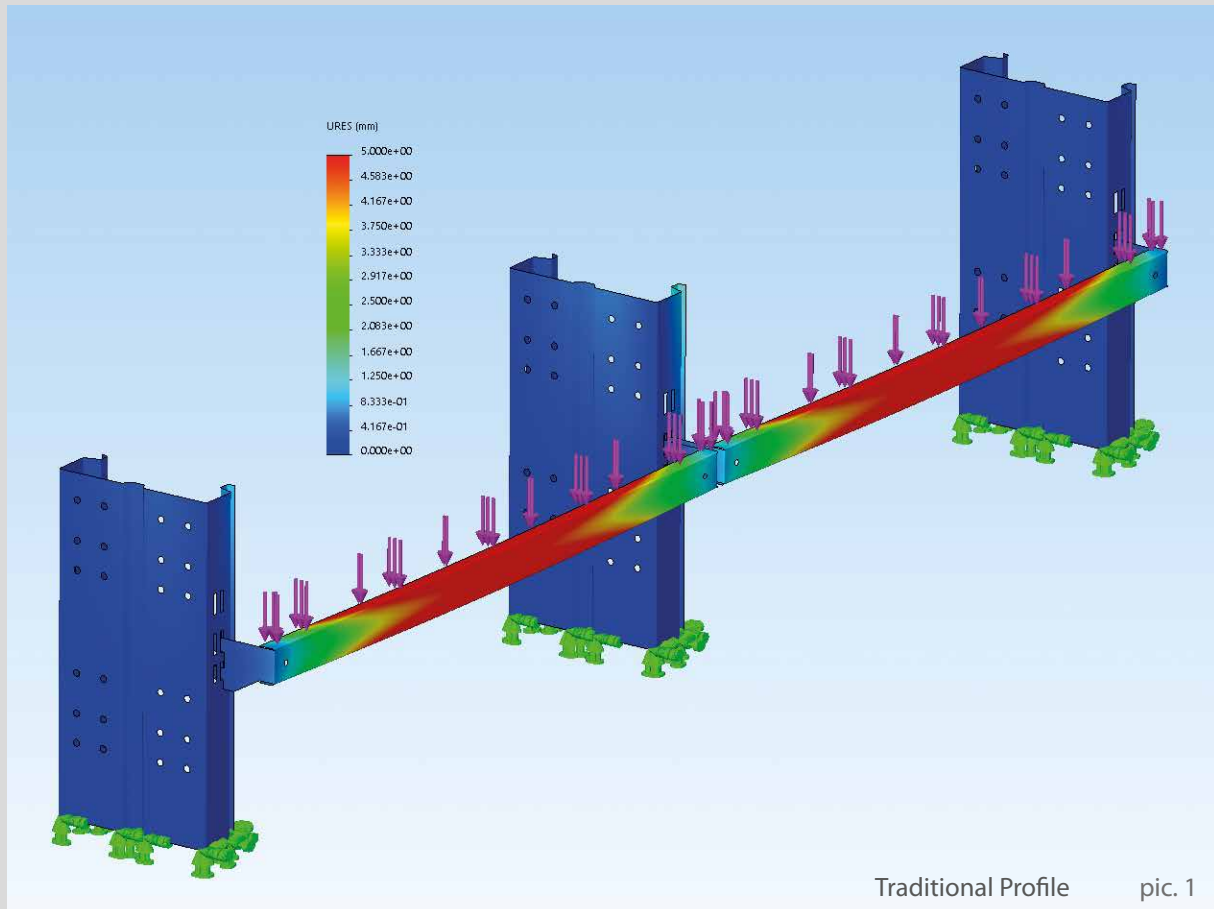


## THE KRAFT ADVANTAGE

Computer analysis (Finite Elements Analysis - stress comparison) shows that the KRAFT Racks shelf profile is capable of absorbing much higher loads than traditional structures. (Computation executed with same load applied as in picture on left page).

# THE PROBLEM

## Deformation of Profiles due to Higher Load

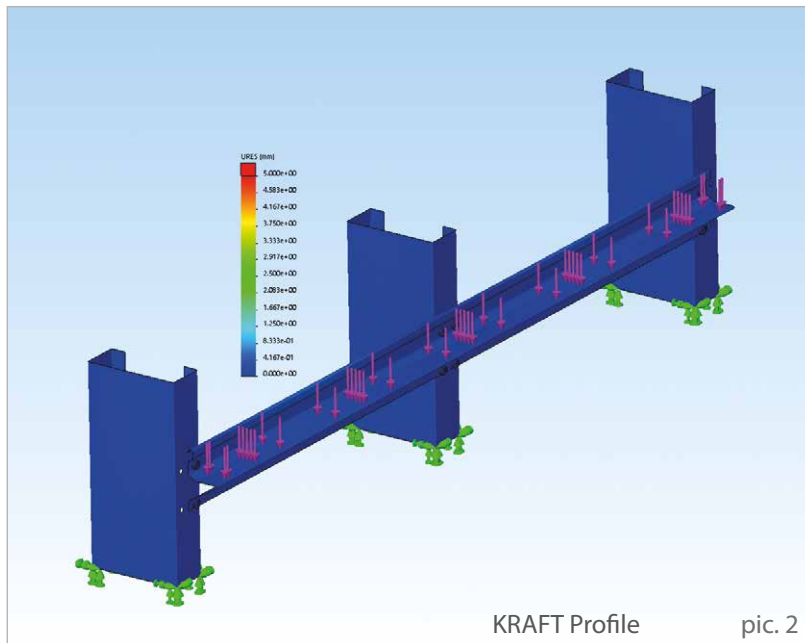


Traditional systems are often designed on a very economical basis. Higher loads can overextend the material and cause irreparable damage to the complete construction. Columns have to be positioned at shorter distance to support shelf profiles [deformation analysis with same load applied as in picture 2].



# THE SOLUTION

Highest Load Capacity and Resistance against Stress and Torque



## THE KRAFT ADVANTAGE

The shelf's appreciably higher load capacity is clearly shown in the FEA analysis [deformation analysis with same load applied as in picture 1], allowing for larger column spacing and more economical and faster construction. The columns are hot dip galvanized, the shelves come with Magnelis® coating. Magnelis coating is a heavy duty coating that performs up to three times better than galvanization.

Magnelis coating provides outstanding corrosion resistance in aggressive environments, self healing on edges and scratches, excellent protection even on deformed parts and long-term protection.

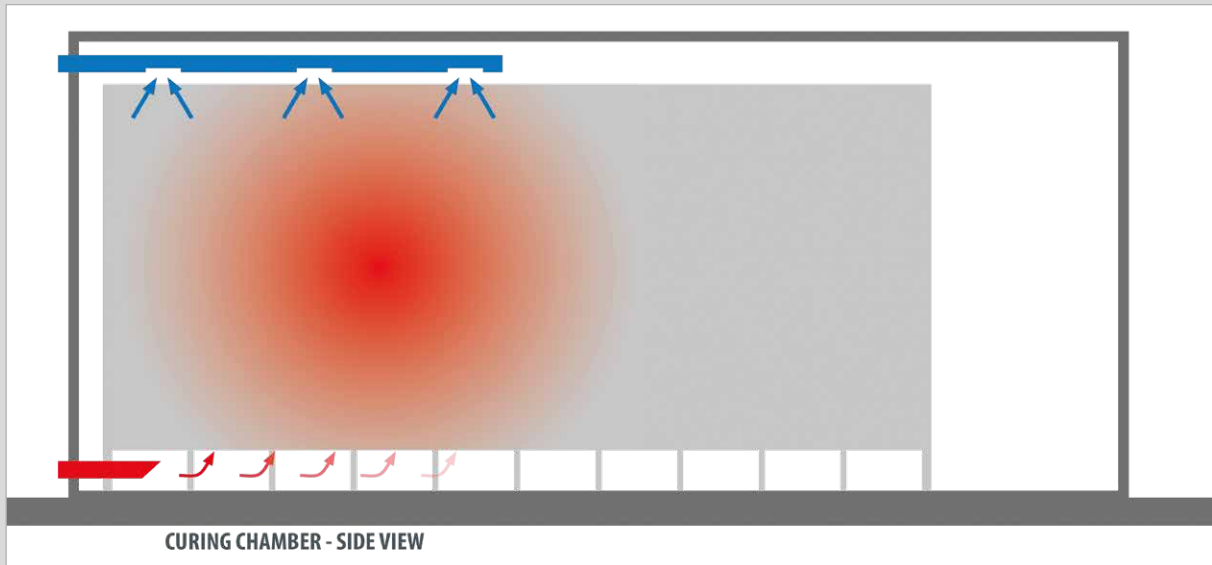


A maximum load/failure test conducted at KRAFT CURING's facilities showed no deflection of the shelf and no fastener failure with a load of more than 2 tons of concrete product per production board [picture 3]. Even combining this extreme load with an extremely uncentered board [picture 4] did not produce a failure of the system.

# THE PROBLEM

Uneven Curing Climate,  
resulting in Inconsistent Concrete Quality

(Picture below: Competitive System)



Competitive curing systems that recirculate the air in the curing chamber from the top to the bottom usually work from the back or the side of the curing chamber. Some, as above, pull the return air via ducts at the top of the chamber and circulate it into the lower rear of the chamber (usually between the floor and the lowest production board).



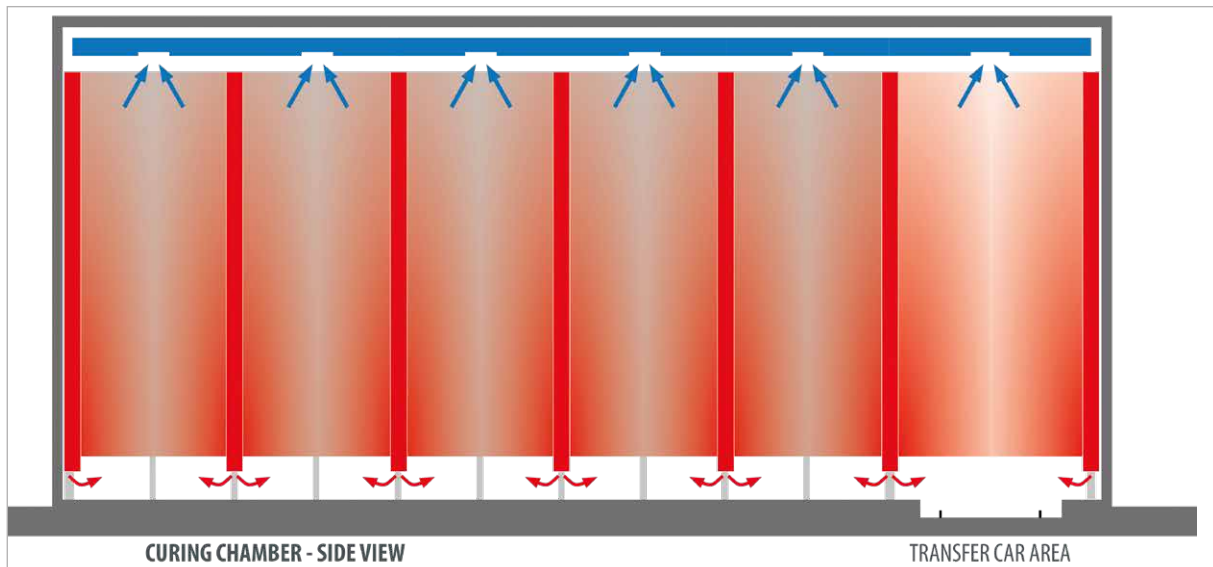
Test with smoke device shows poor air distribution in transfer car area (Competitive System)

They rely on air velocity created by axial ventilators to move the air through small diameter ducts from the rear of the curing rack to the front and into the transfer car area. A test with a smoke device illustrates exactly how little air is flowing into the transfer car area.

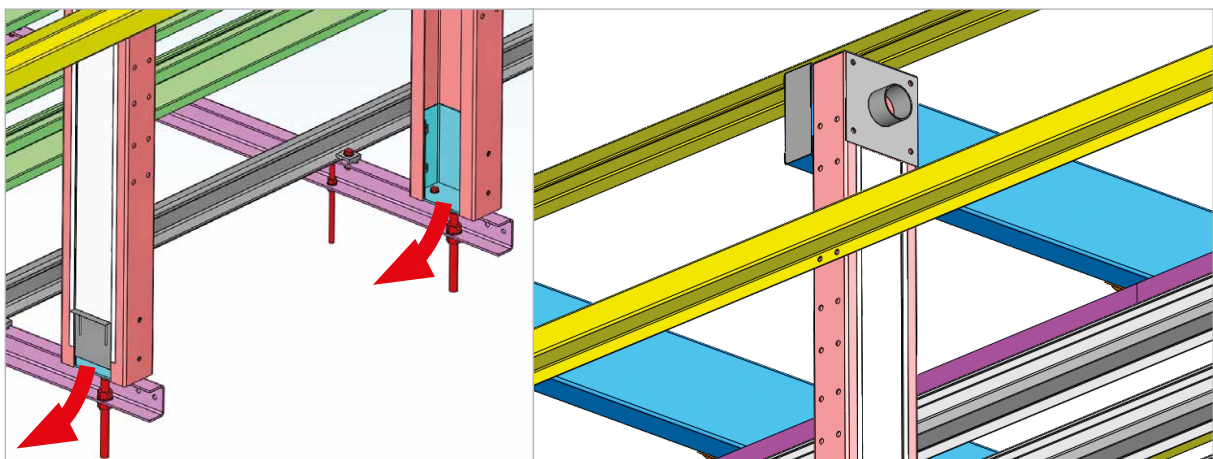
The result of poor air circulation is warm and cold spots resulting in inconsistent concrete strengths and colors, condensation and standing water as well as fog in the transfer car area.

# THE SOLUTION

Incorporating Air Circulation into the Rack Structure results in a Uniform Climate



The KRAFT Rack is designed so that the air distribution system for the curing chamber is incorporated in the load-bearing structure. KRAFT's Concrete Curing Systems are integrated into the rack structure without the need for air supply or return ducts.



## THE KRAFT ADVANTAGE

Warm air is supplied directly at the floor of the rack via adjustable outlets incorporated into the rack columns. The air is returned at the top of the rack through the transverse rack supports. Utilizing each and every column at the perimeter of the rack for the prevention

of condensation at the chamber floor (due to cold transfer through the concrete slab) and every second column inside the rack, there is no more precise air circulation system for consistent temperature and relative humidity.



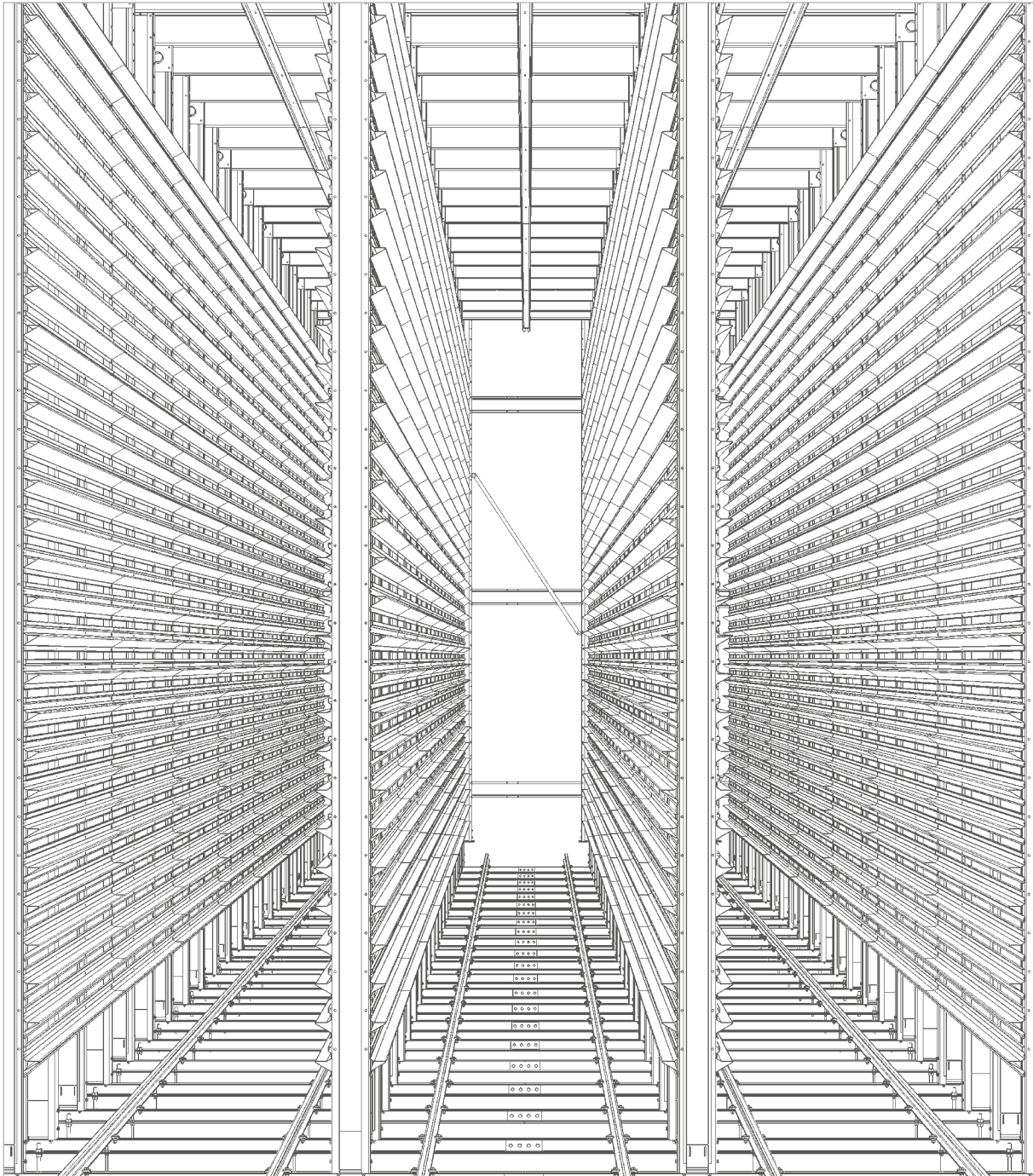
# HOW THE KRAFT RACK COMPARES

See in direct comparison how the new KRAFT Curing Rack stacks up against existing rack systems when it comes to handling, economy or durability.

Feature / Issue	Traditional Racks	KRAFT Rack	Benefits in Detail
Storage for concrete products	✓	✓	Rack provides storage for fresh concrete products on production boards.
Simple levelling of Rails and Rack	✗	✓	KRAFT rack and rails are levelled together. Misalignment is avoided, guidance for finger car is improved.
Corrosion Prevention	✗	✓	Traditionally, columns can corrode as a result of condensation. Integrated curing system prevents corrosion on KRAFT columns.
Uniformity of Curing Climate	✗	✓	Curing system of KRAFT rack is part of construction (every second column supplies or returns air), providing for maximum climate uniformity.
Simple Rail Replacement	✗	✓	Only substructure of KRAFT rails is connected to foundation. Rails can be replaced easily.
Reliable Shelf Connection	✗	✓	KRAFT profiles are attached with special thread-forming fasteners to guarantee highest strength, FEA optimized profile withstands highest loads.
Centering of Boards	✗	✓	KRAFT profile with integrated guide precludes misalignment in full depth of each passage, simple levelling provides for uninterrupted operation.
Speed of Erection	✗	✓	KRAFT profiles are extremely rigid against torsion, make larger column distance possible. Integrated curing system - no additional air ducts needed.
Durability	✗	✓	KRAFT rack comes with 50-year corrosion warranty when incorporating the QUADRIX® curing system. Special fasteners do not damage galvanization.
Integrated Curing System	✗	✓	KRAFT rack provides for the highest uniformity of climate in concrete industry without the need to install a separate curing system.

**"Concrete shouldn't dry -  
concrete should harden!"**

**– Michael Kraft,**  
Managing Director Kraft Curing Systems





CONCRETE CURING SOLUTIONS · MADE IN GERMANY

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