

# Load bearing Precast Walls and Slabs produced with Recycled Concrete

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Beton-Betz



# Why is it a real challenge to use recycled aggregates for load bearing precast?



- Just in time delivery
- High speed production up to 2.000 m<sup>2</sup> /day
- Market leading technique in NWE



# Automated production

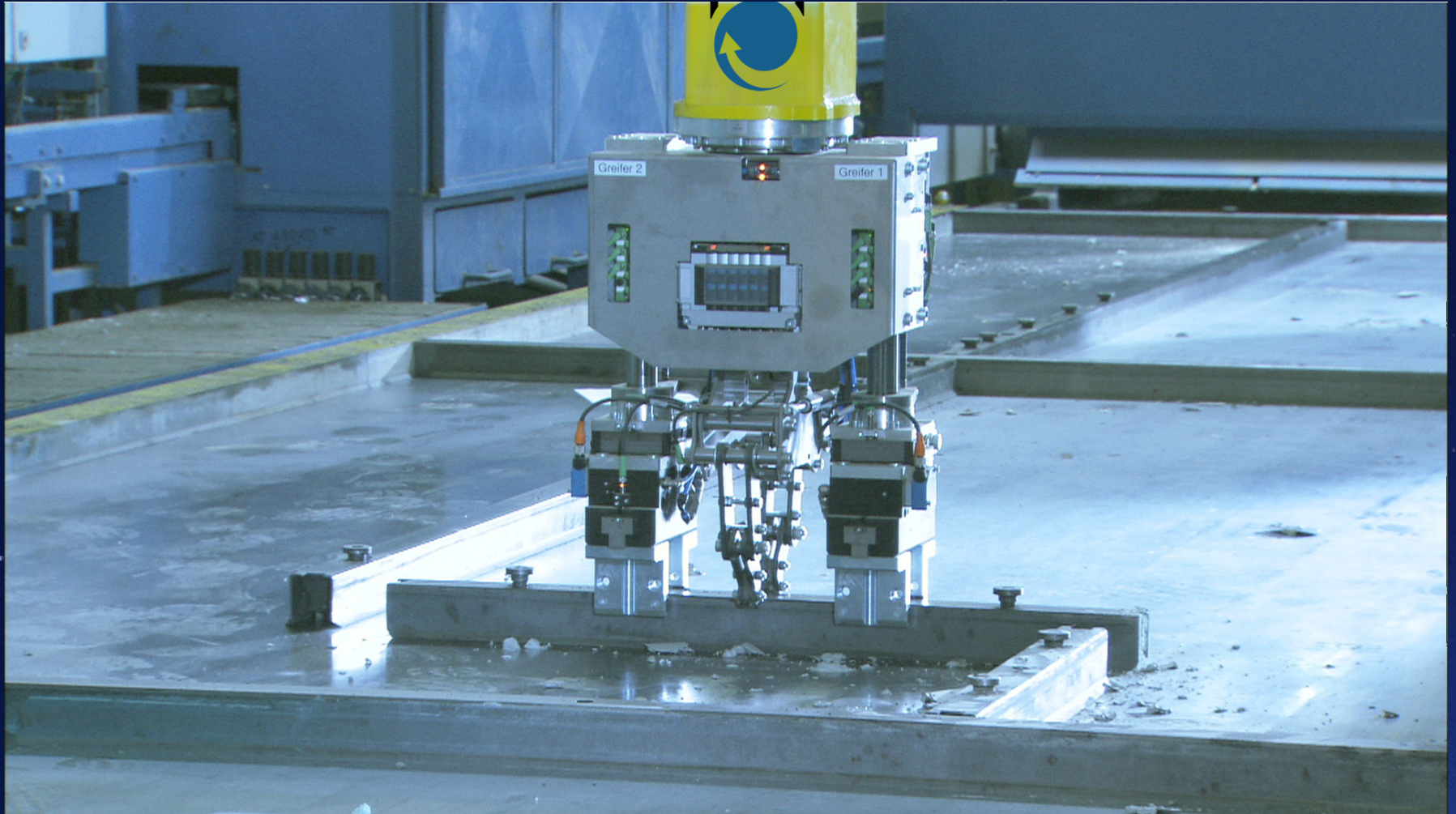


**Form tables on pallets (carousel) with many robotic features.**

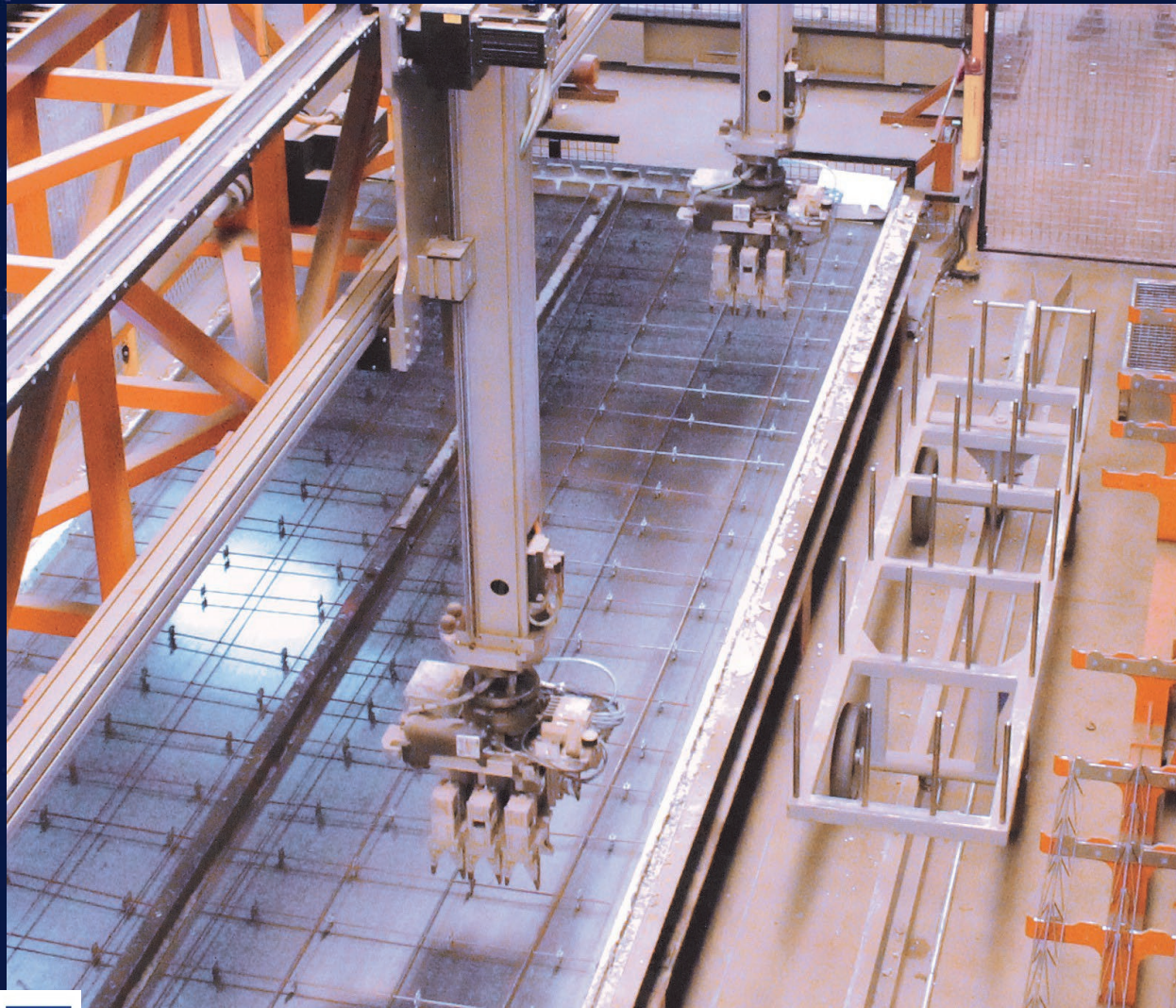
**10 building units per day, 2.000 sqm.**

**6- 8 hours per shift requires concrete with  
very rapid hardening.**

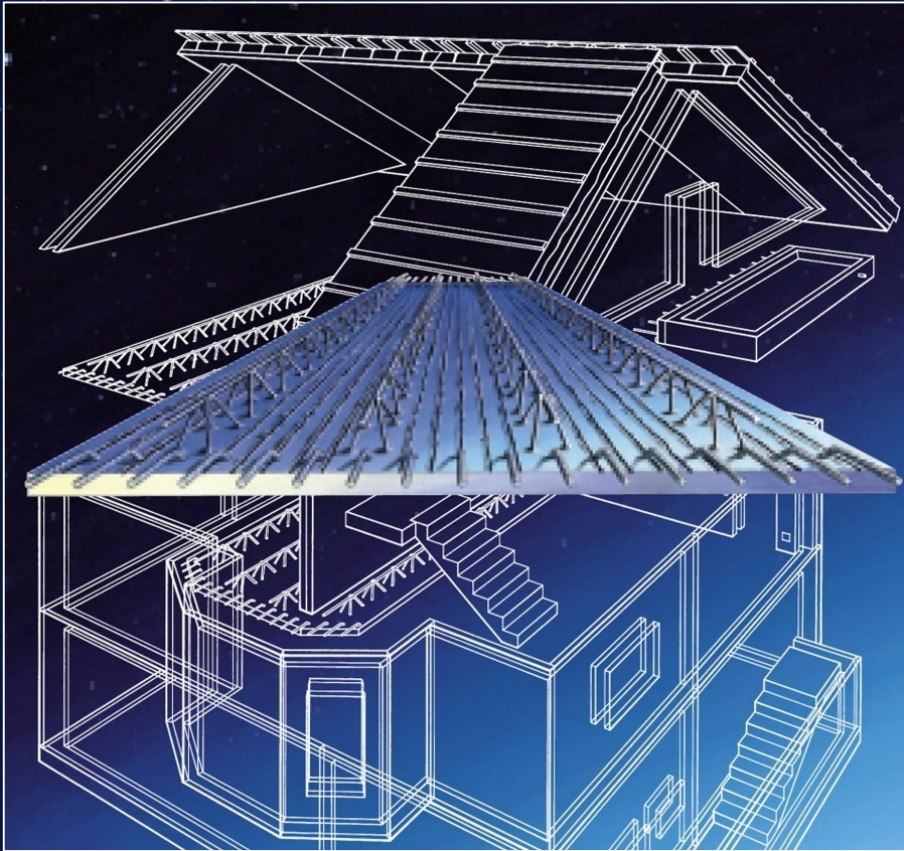
# Automated production



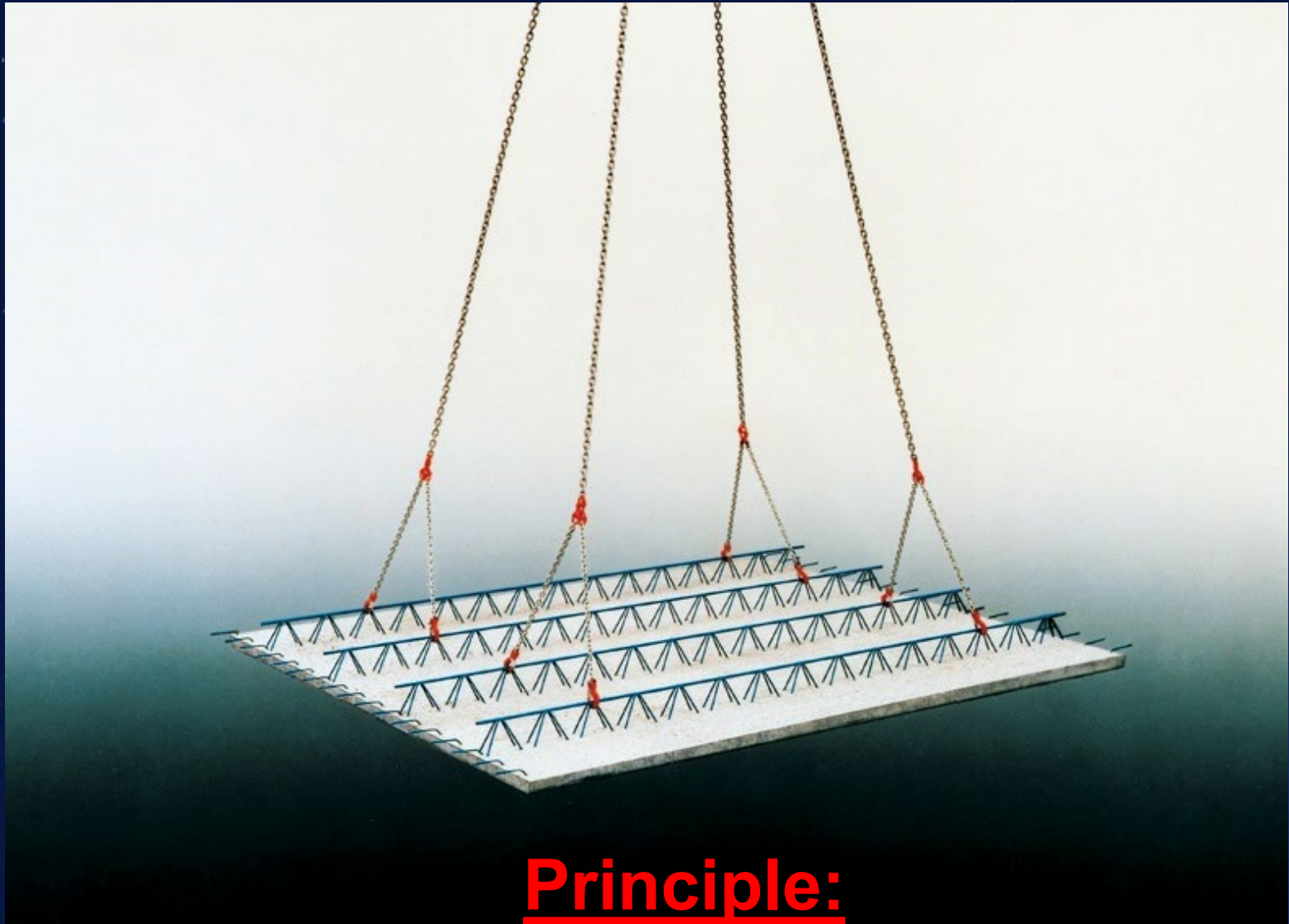
# Automated production



# Main series products



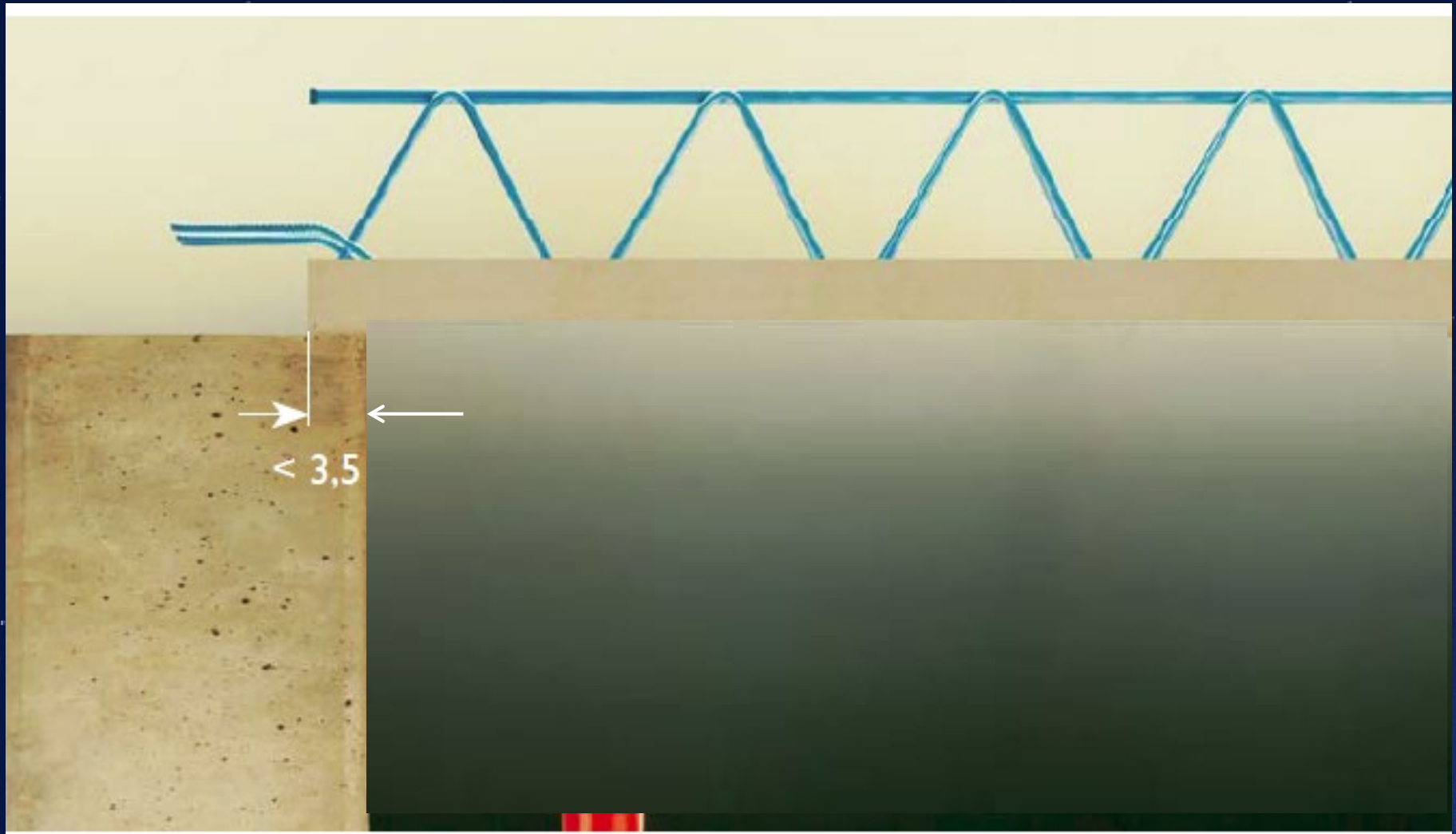
up to 3,50 m wide + 12 m long, a. 4 – 8 cm thick



**Principle:**

**Precast layer substitutes shuttering**





**Assembly stage without shuttering**

**After assembly on site:**

**only top reinforcements to be added**



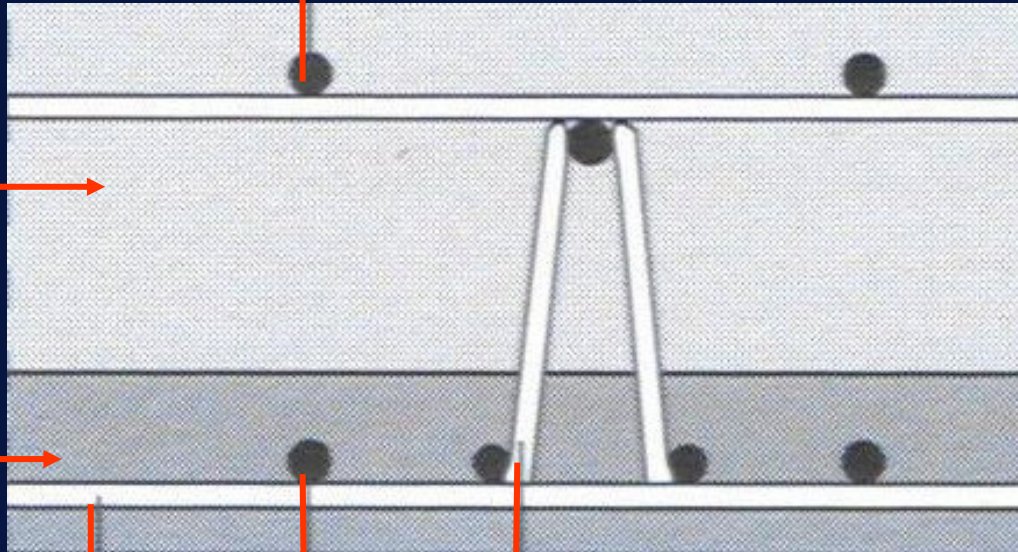


**Easy completion:  
top bars & concrete topping**

# Composite slab construction

In Situ  
concrete  
topping  
C20/25

Top-bars

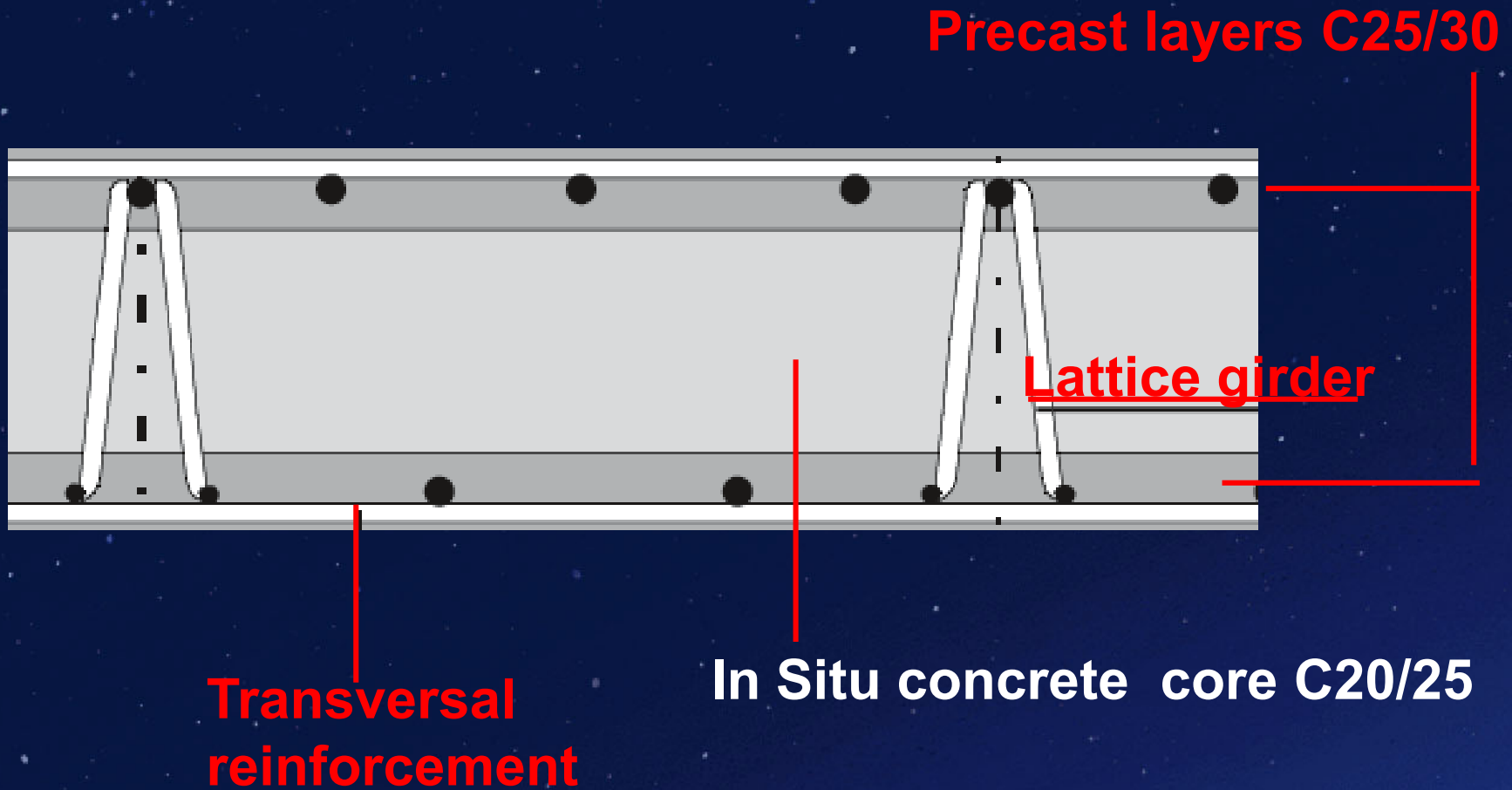


Precast  
layer  
C25/30

Reinforce-  
ments

After curing of in-situ:  
monolithical cross section

# Extending the production method

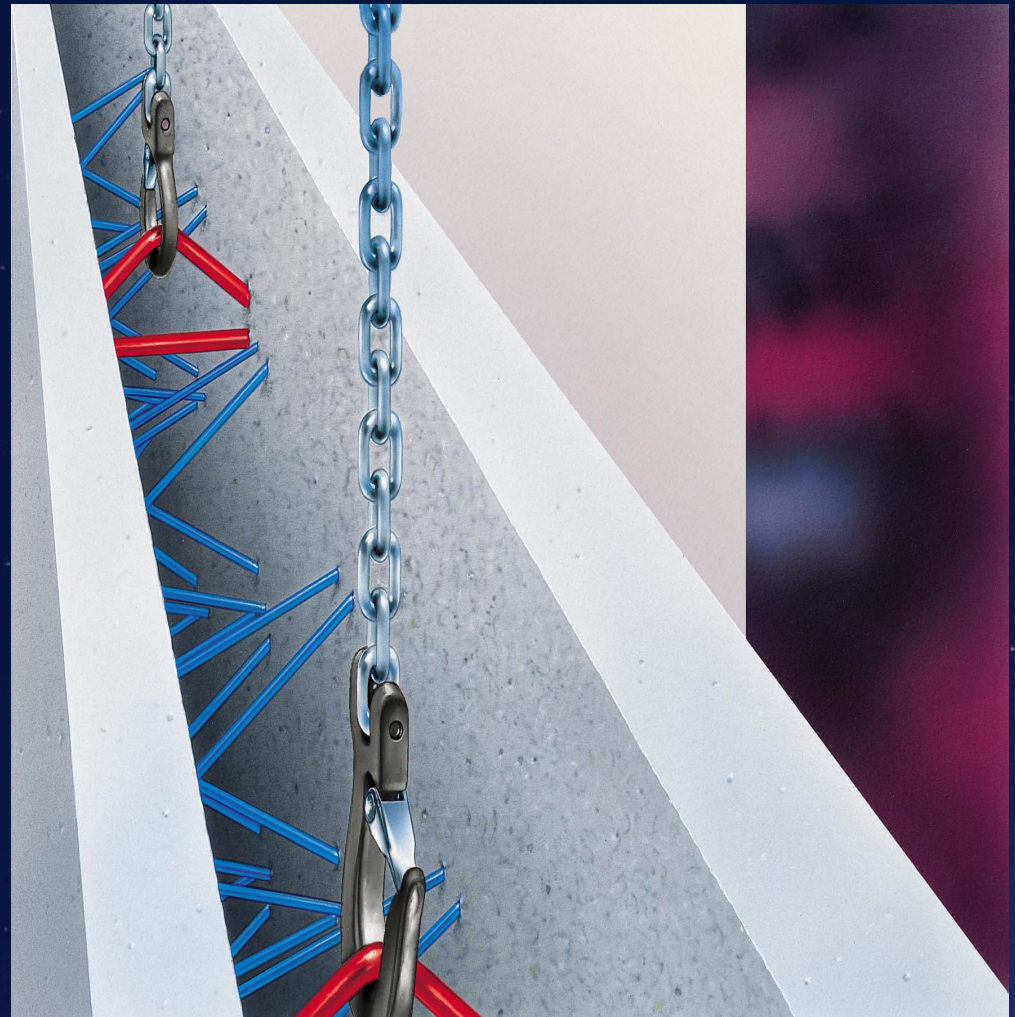


## The Double Wall

## Dimensions

Typical  
length/width:  
12 m x 3 m resp.  
3 m x 12 m

12 - 50 cm  
thickness



The double wall properties are as produced monolithically.



## Example for double walls and precast slabs at underground storeys



# High-rise buildings





**Residential homes,  
commercial  
buildings, hotels**



**Perforated  
Facades**

.. and smooth surfaces on both sides:  
no plastering outside and .....





..... high end surface finish at  
inside of walls and slabs as well.....



..... high quality  
architectural  
concrete surfaces...



The challenge is to introduce recycled aggregates and crushed sand for a load bearing purpose into the automated precast process with focus on high speed hardening and architectural finish



**SeRaMCo: Start in 2017**



Crushing of own  
concrete waste: 2.000 Tons.

Crushed material after  
processing with 3 screens:

- 0/2 mm
- 2/16 mm
- 16/50 mm



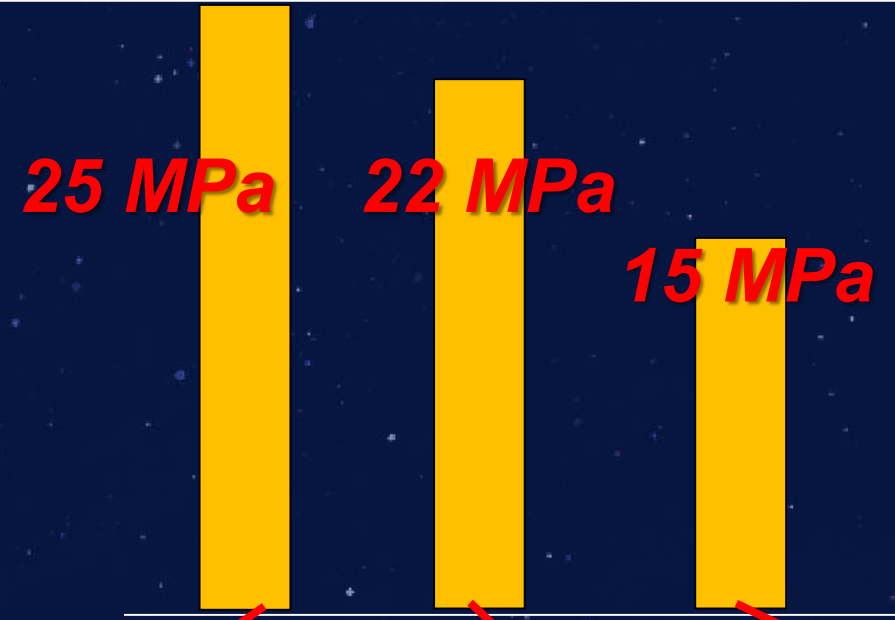
**Knowhow from verification of various concrete mix designs developed in our factory.**

**Essential:**

**Daily quality control of fresh concrete properties due to crushed sand and its too high influence from soaking.**



# Compr. strength after 1 day



Basic mix:  $w/c = 0,60$   
290 kg cement

0%  
substitution

40 % substitution:  
Sand / coarse =  
10% / 30%

**100%**  
**Substitution:**  
Sand / coarse =  
30% / 70%



# Creep tests at Beton-Betz with large scale units



# Long term tests with large scale specimen on shrinkage and cracking

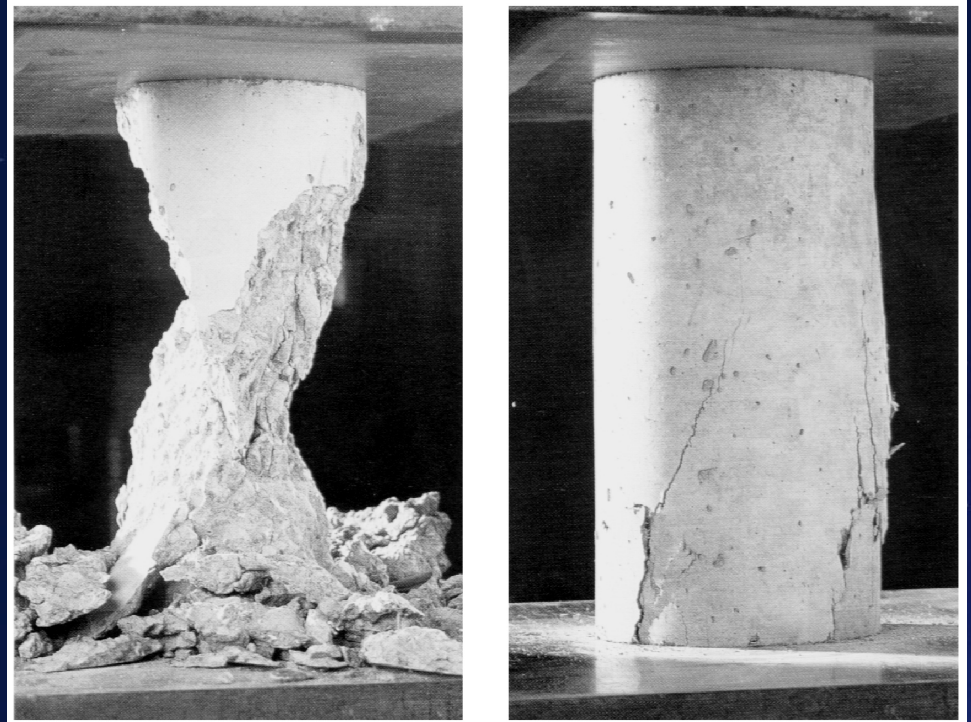


# Test results were introduced into the application for a German Building Permit:

a) Quality control procedure based on DAfStb directive had to be established

b) Vast amount of further tests to be performed:

- Coarse acc. to DIN
- Sand acc to SIA



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20.08.2020

# Pirmasens pilot

Mein Aktenzeichen  
5131-0002#2020/0011-0401 4529

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Vorhabenbezogene Bauartgenehmigung Nr. VBG FM RLP 34/2020  
gemäß § 17a der Landesbauordnung Rheinland-Pfalz (LBauO)<sup>1</sup>

**BV:** Errichtung eines freistehenden, eingeschossigen Pavillons, Marie-Curie-Straße 12, 66959 Pirmasens  
Verwendung eines R-Betons mit einer, von der Verwaltungsvorschrift Technische Baubestimmungen abweichenden Beton- und Zementmischung

Sehr geehrte Damen und Herren,

für die Errichtung eines Pavillons ist die Verwendung von Beton mit rezyklierten Gesteinskörnungen (R-Beton) vorgesehen. Die einzelnen Konstruktionselemente werden





# Assembly of Pirmasens pilot on 2020, Dec.

