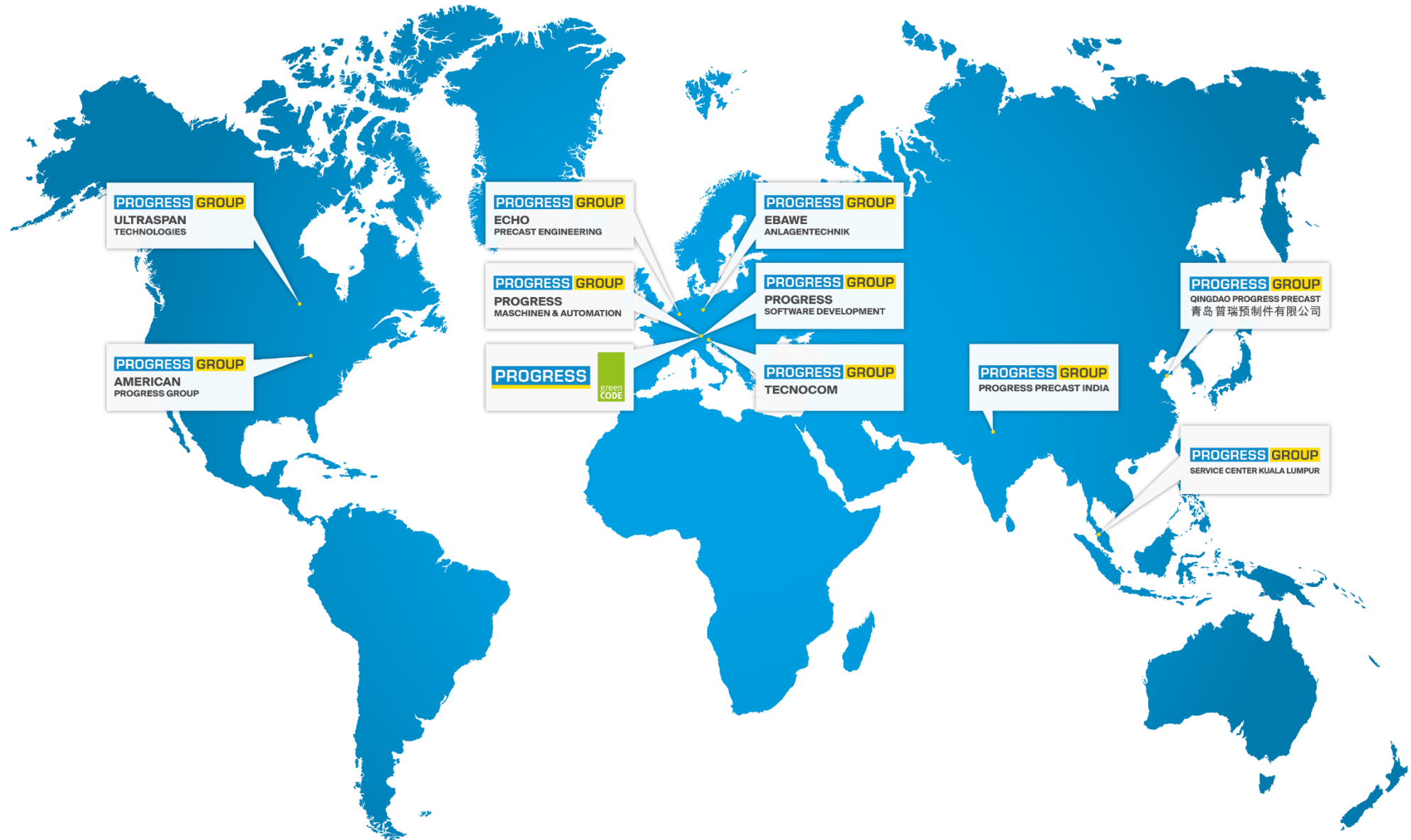


PROGRESS **GROUP**

PROGRESS SOFTWARE DEVELOPMENT

PROGRESS GROUP





270 Mio. €

Turnover 2021



700 employees
in the group

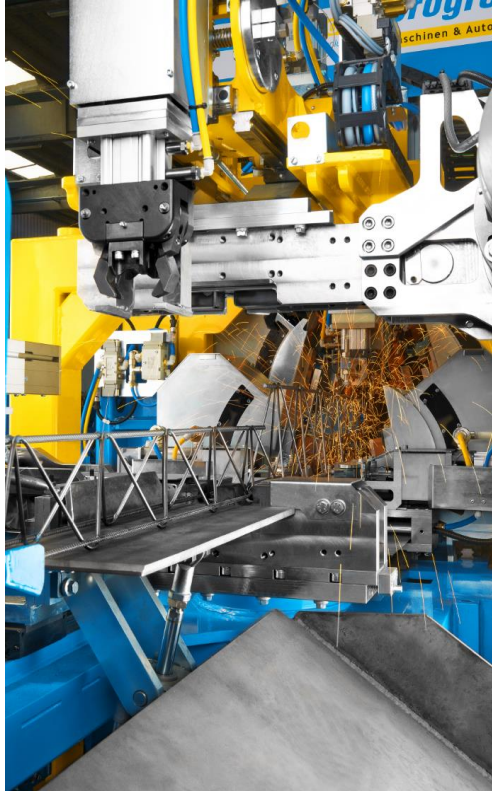


80 countries
with customer relations



1 Partner
for precast concrete plants

————— COMPLETE —————
PRECAST TECHNOLOGY
————— WORLDWIDE —————



Mechanical engineering

Technology supplier for the precast concrete & rebar industry



Software solutions

Development & implementation of software solutions for the precast concrete & rebar industry



Building systems

Planning & production of precast concrete

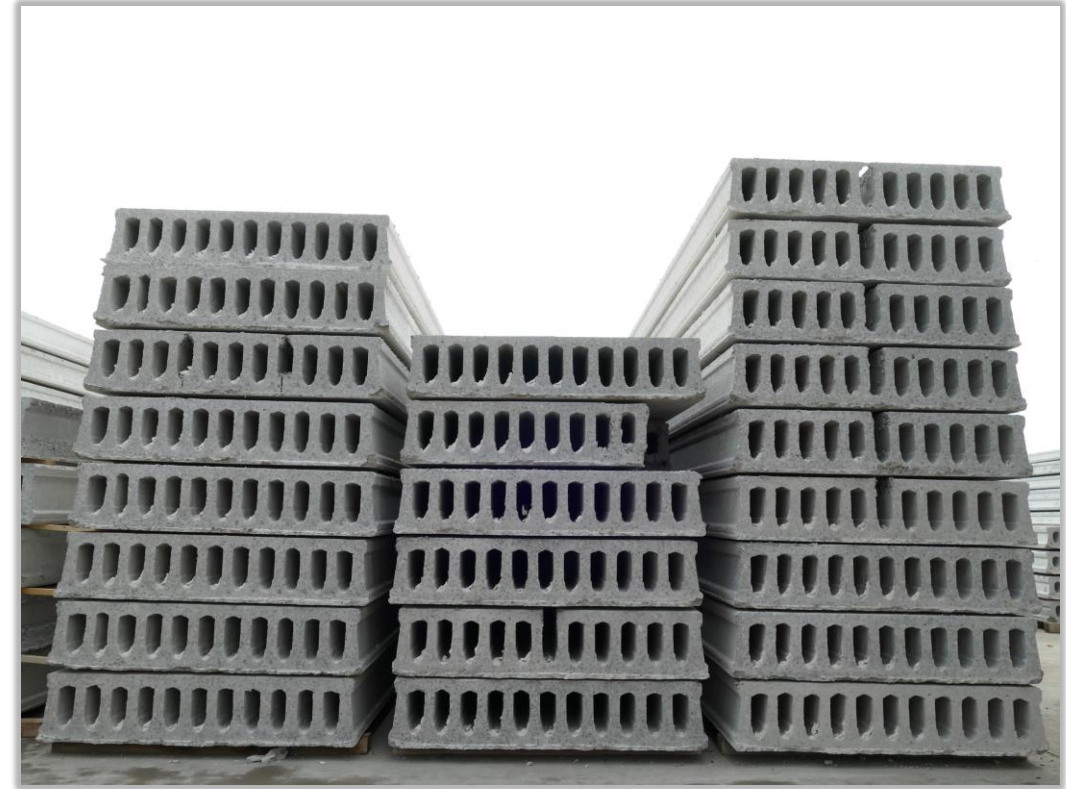
“Develop an algorithm, that assigns a set of elements (rectangles) to a minimal number of beds”



Precast concrete elements are produced on beds. For cost efficiency every single bed should be filled as much as possible.

1. Beds have a rectangle shape with the same predefined dimension
2. Beds are numbered 0, 1, 2, 3, ... and will be produced in this order
3. Elements have a rectangle shape and can have different sizes
4. Elements are always smaller than the bed
5. Elements can be freely placed on the bed (x/y dimension) and can be rotated by 90°
6. The elements placed on a bed must not overlap or exceed the dimensions of the bed
7. Elements have a concrete quality; on a bed only elements with the same concrete quality can be placed

TAKE CARE ABOUT STACKS...



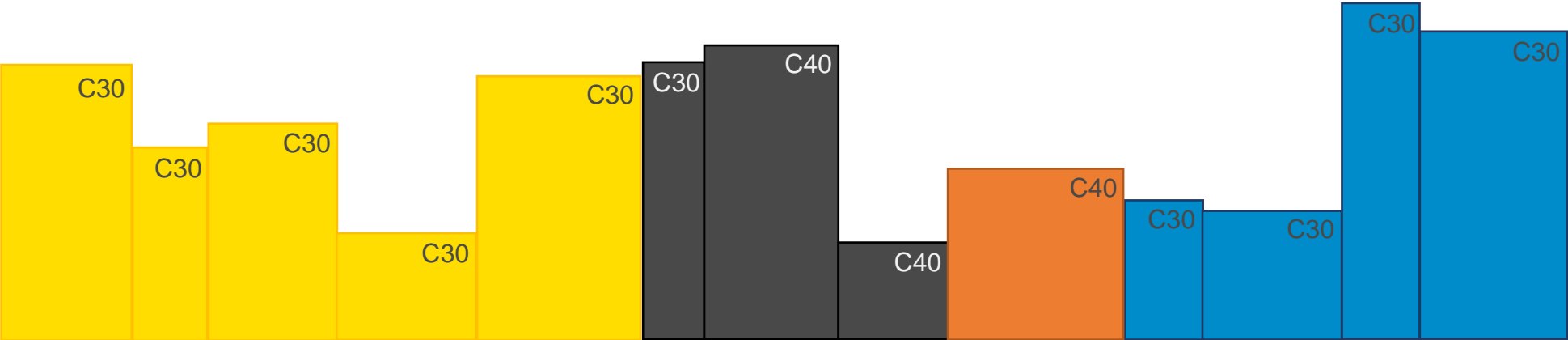
8. Elements are grouped to “stacks”. A stack is a numerical identifier 0, 1, 2, ...



9. At the same time only a predefined number of stacks can be “open”. A stack is opened by producing the first element and gets closed with the last one.

EXAMPLE – t₀

Elements

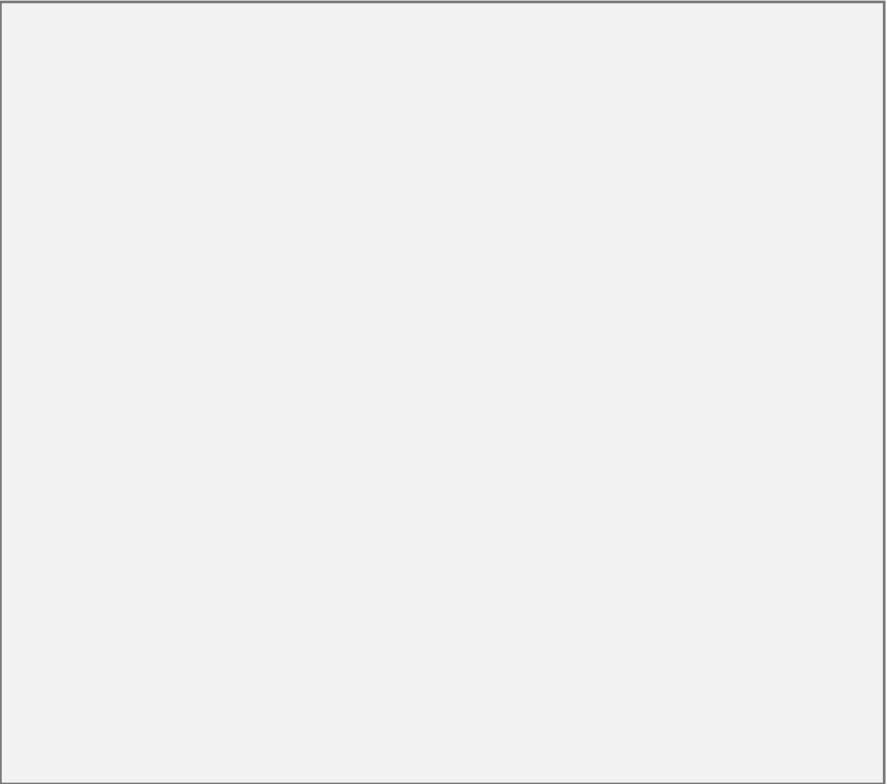


Legend:
Cxx → Concrete quality
Color → Stacks

Beds

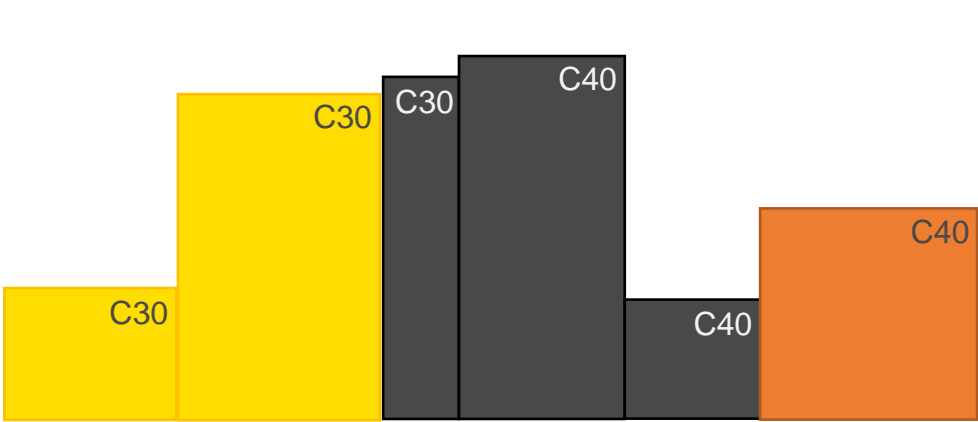


Open stacks (max. 2)

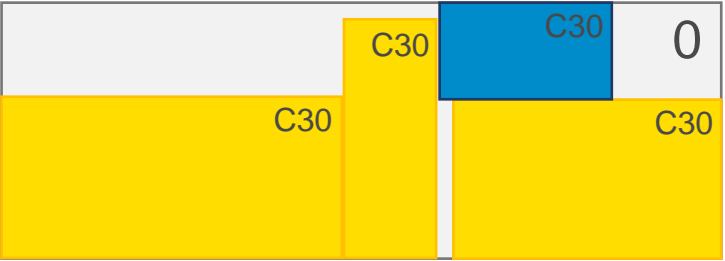


EXAMPLE – t₁

Elements

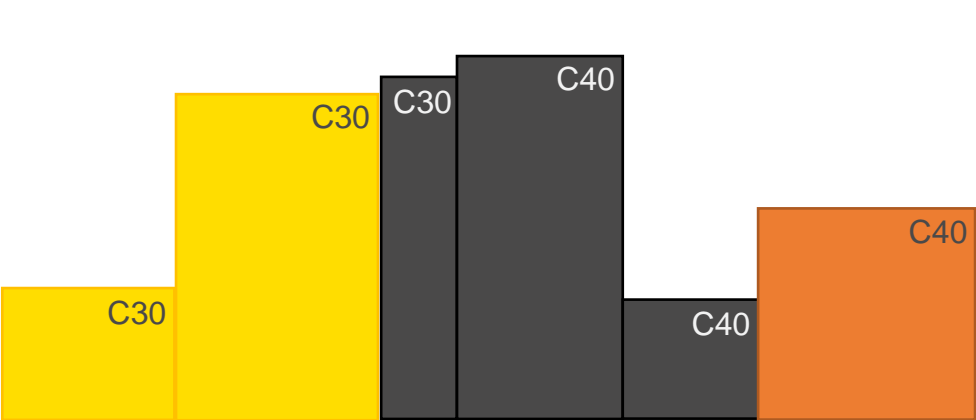


Beds



EXAMPLE – t₂

Elements

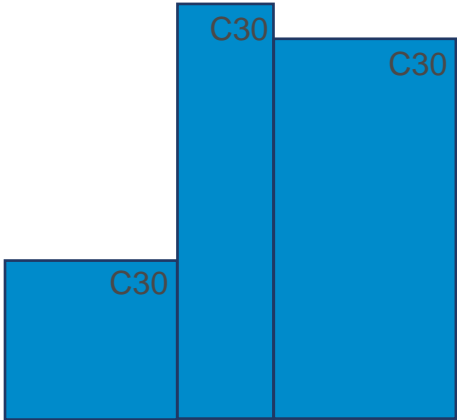


Beds

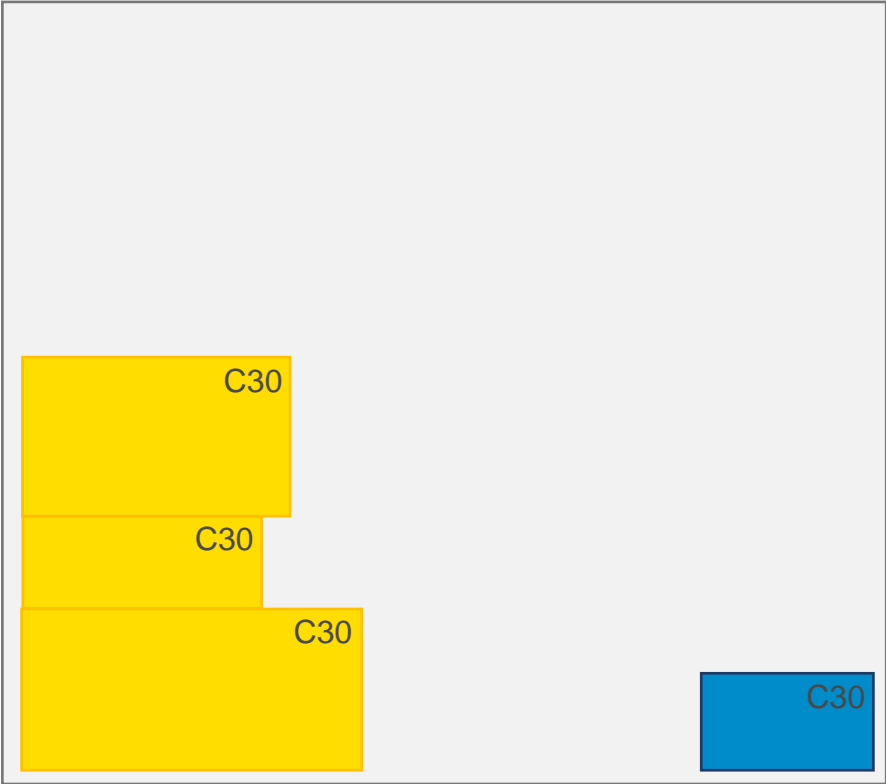


PROGRESS GROUP

Legend:
Cxx → Concrete quality
Color → Stacks

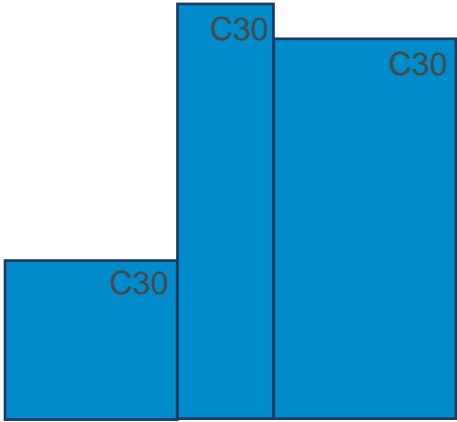
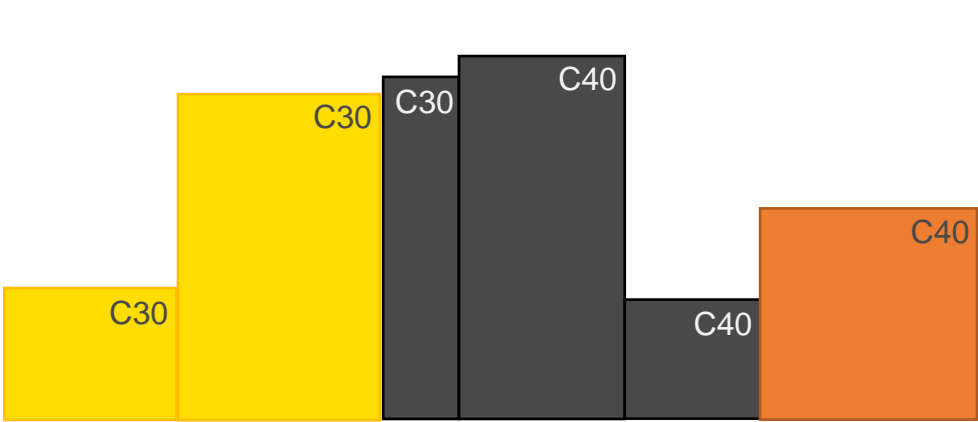


Open stacks (max. 2)



EXAMPLE – t₃

Elements

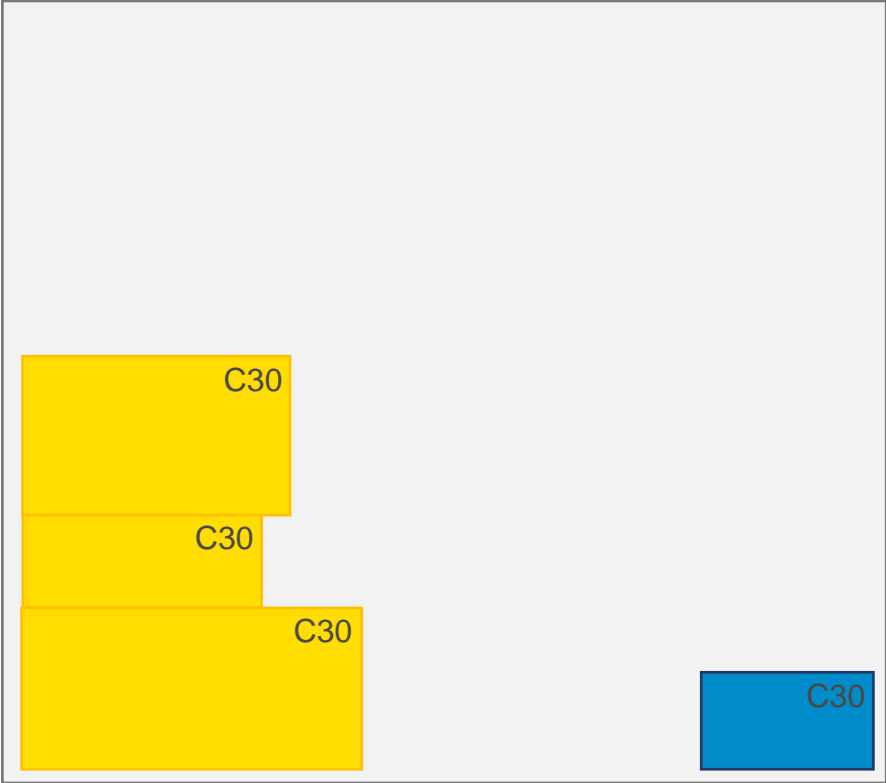


Legend:
Cxx → Concrete quality
Color → Stacks

Beds

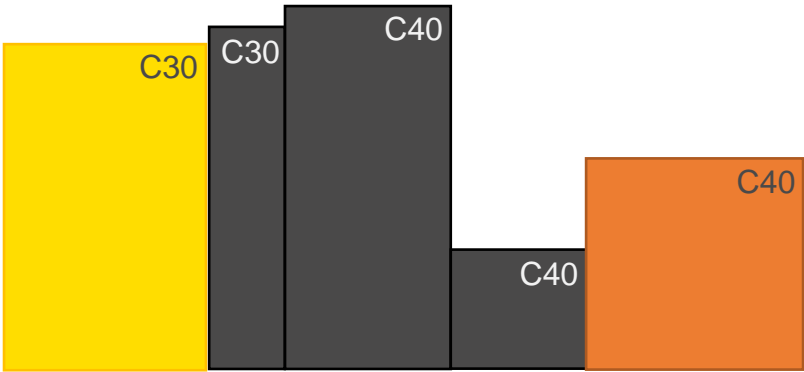


Open stacks (max. 2)



EXAMPLE – t₄

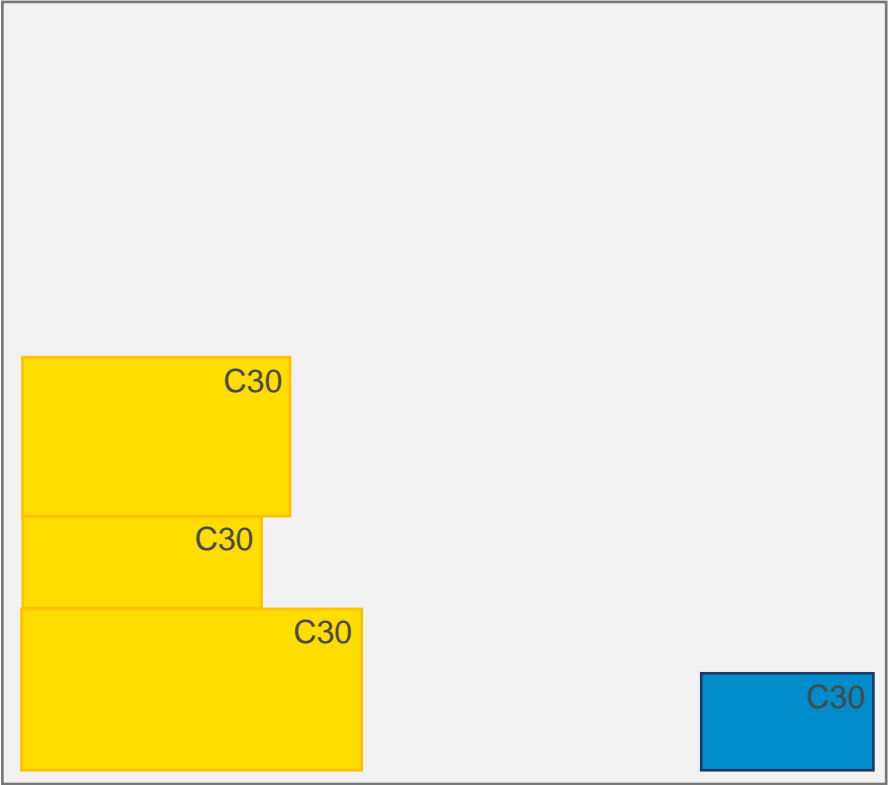
Elements



Beds



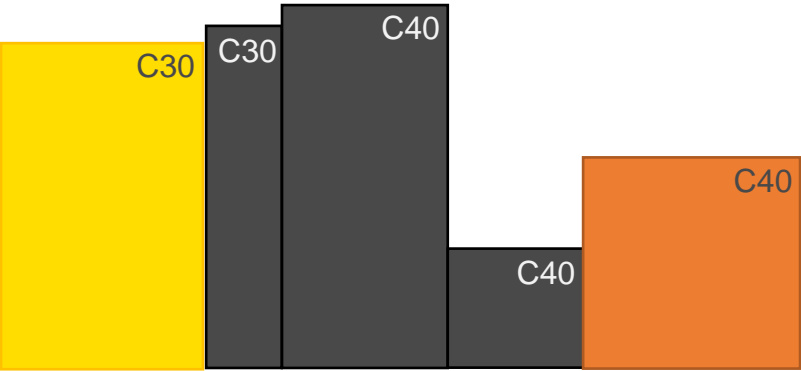
Open stacks (max. 2)



Legend:
Cxx → Concrete quality
Color → Stacks

EXAMPLE – t₅

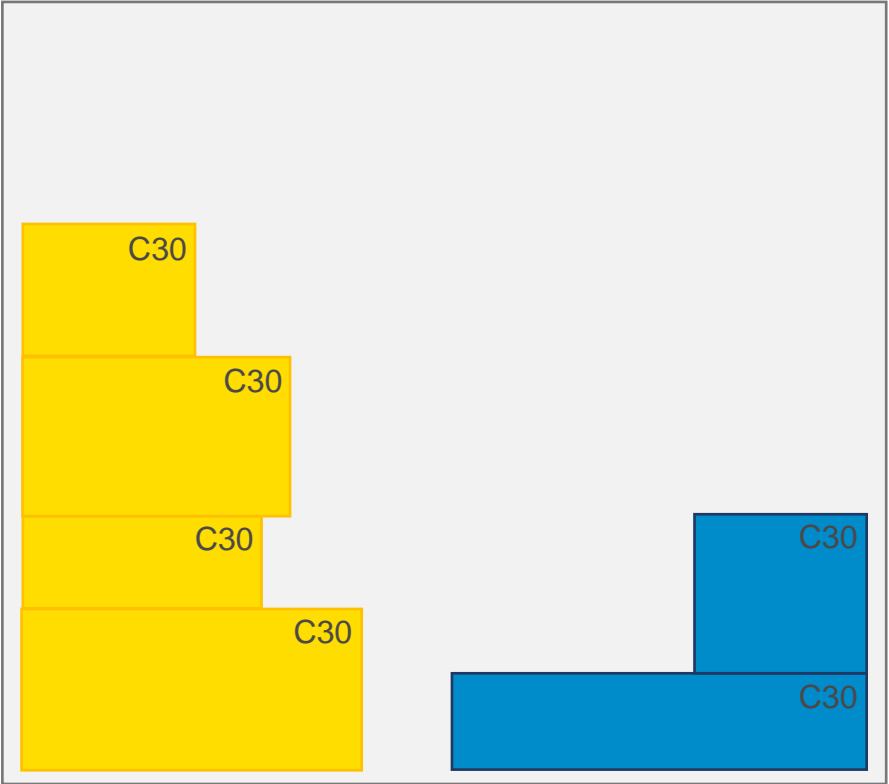
Elements



Beds



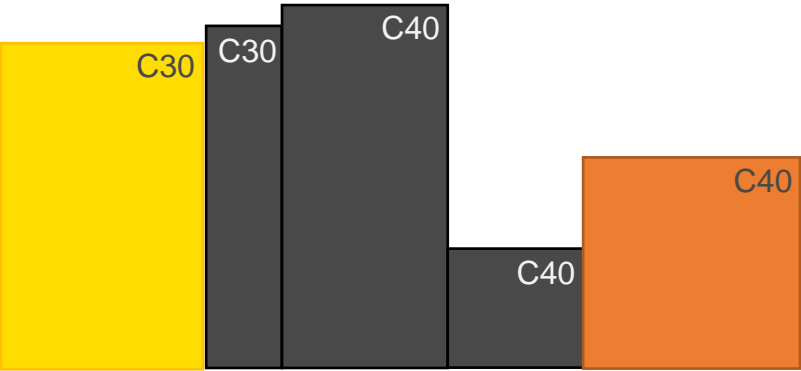
Open stacks (max. 2)



Legend:
Cxx → Concrete quality
Color → Stacks

EXAMPLE – t₆

Elements



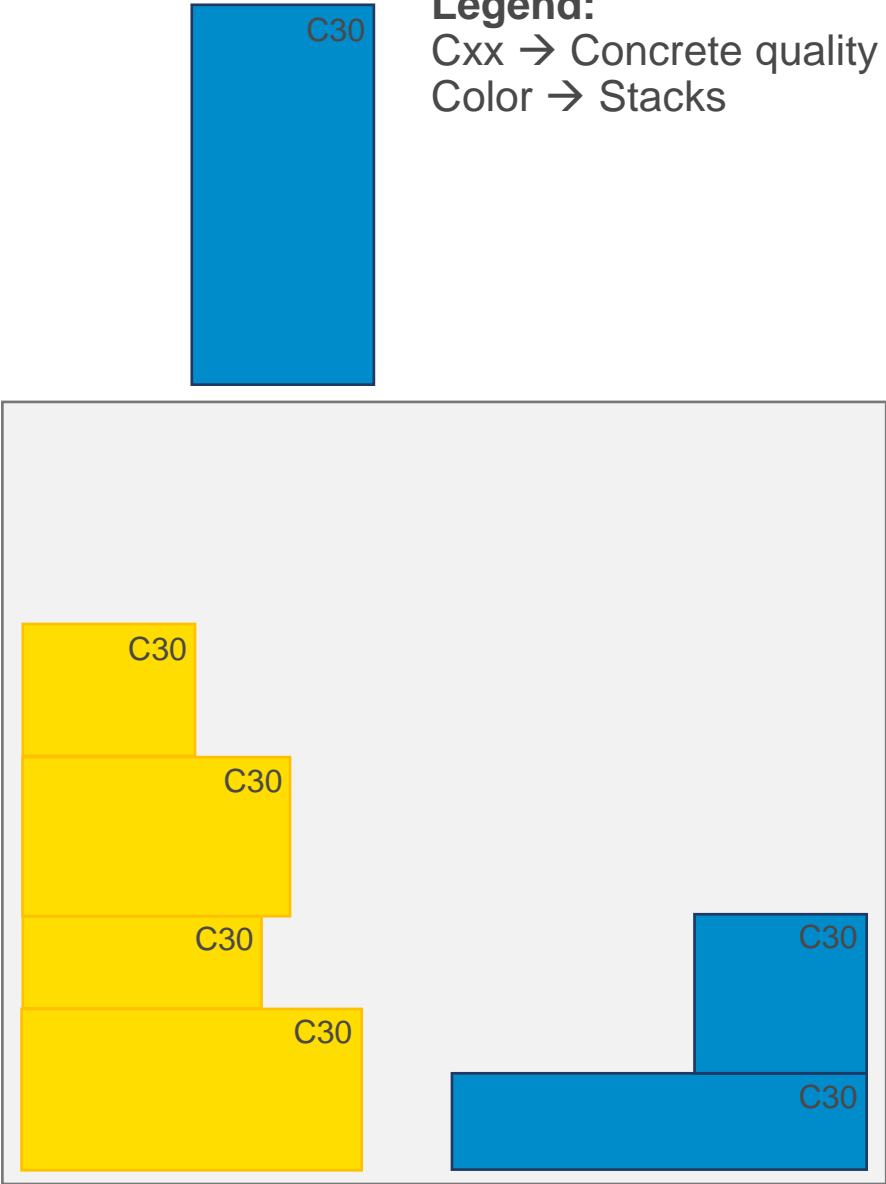
Beds



PROGRESS GROUP

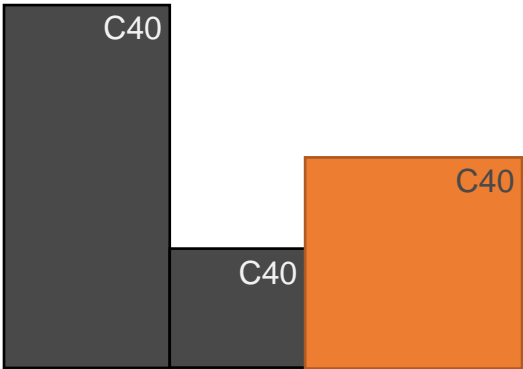
Legend:
Cxx → Concrete quality
Color → Stacks

Open stacks (max. 2)



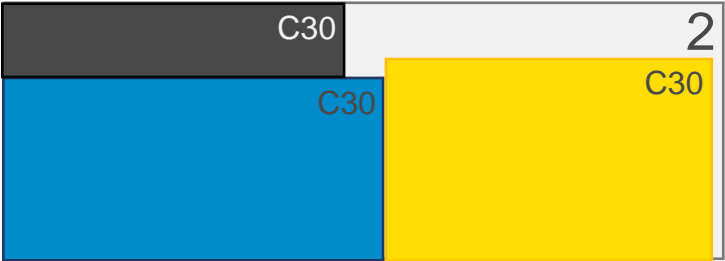
EXAMPLE – t₇

Elements

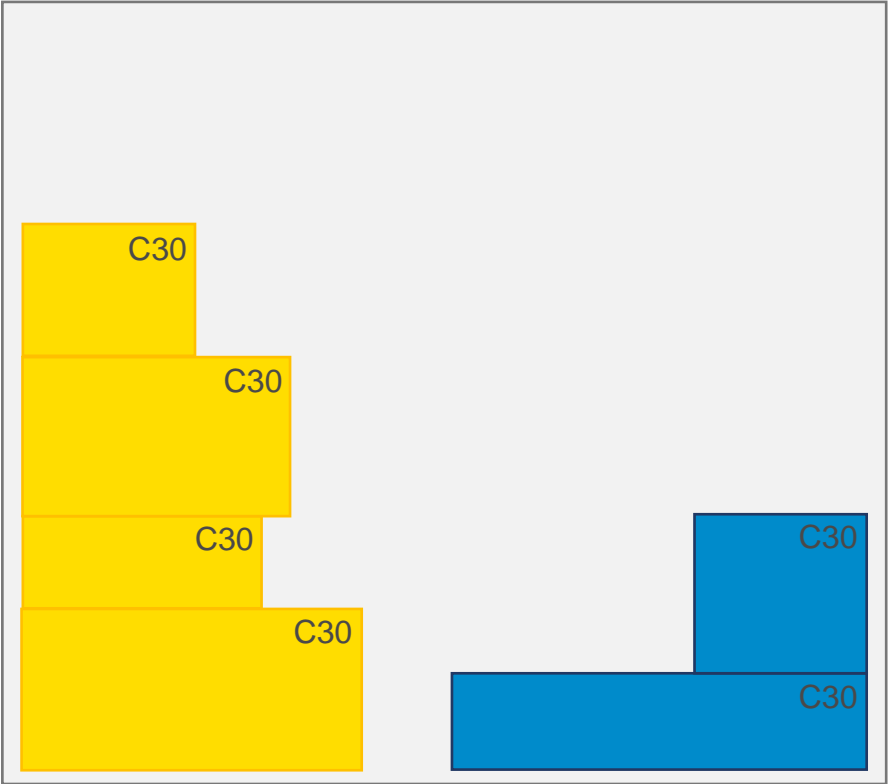


Legend:
Cxx → Concrete quality
Color → Stacks

Beds

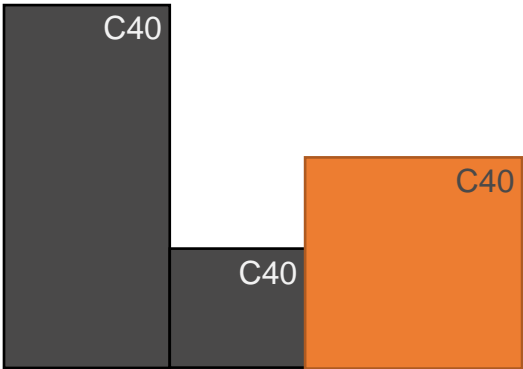


Open stacks (max. 2)



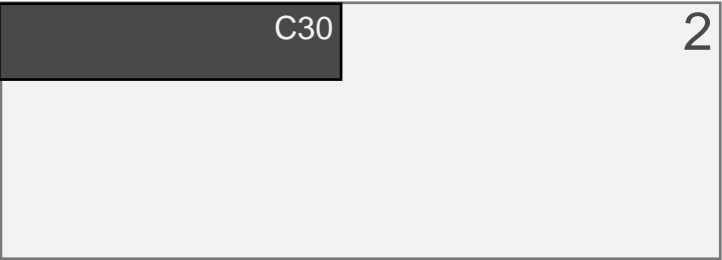
EXAMPLE – t₈

Elements

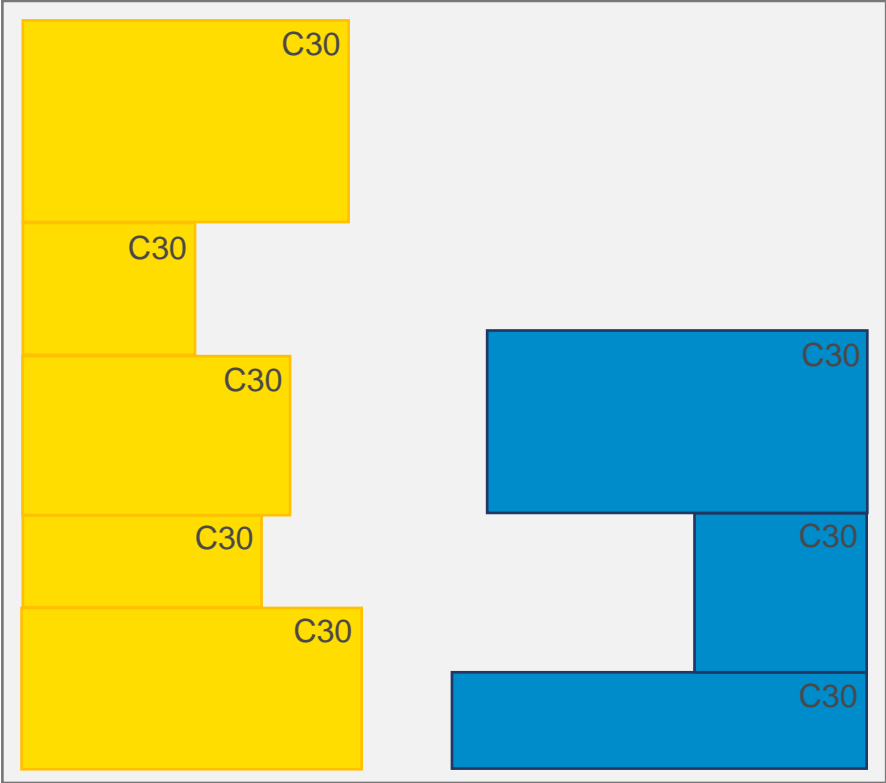


Legend:
Cxx → Concrete quality
Color → Stacks

Beds

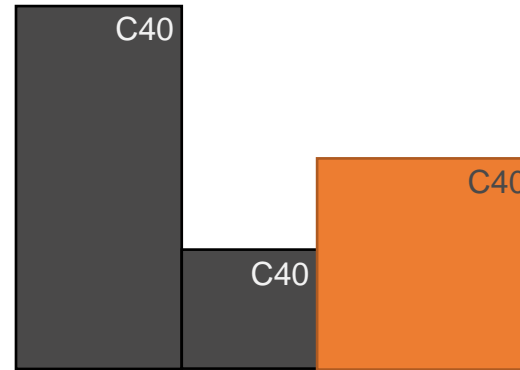


Open stacks (max. 2)



EXAMPLE – t₉

Elements

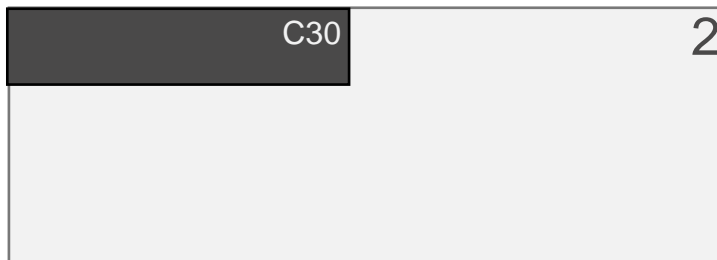


Legend:

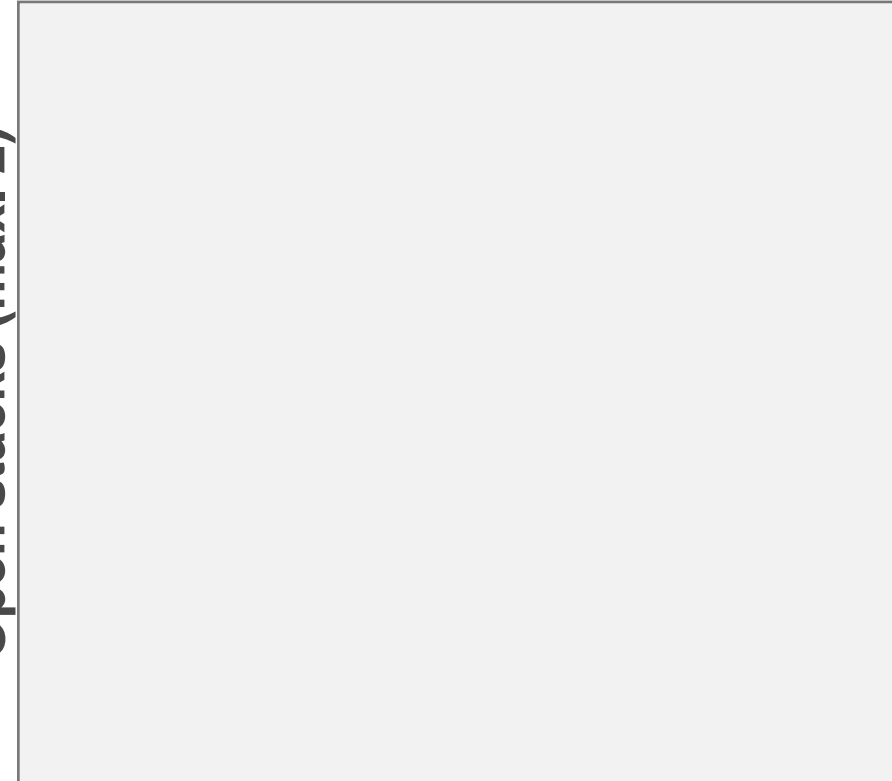
Cxx → Concrete quality

Color → Stacks

Beds



Open stacks (max. 2)



EXAMPLE – t_{10}

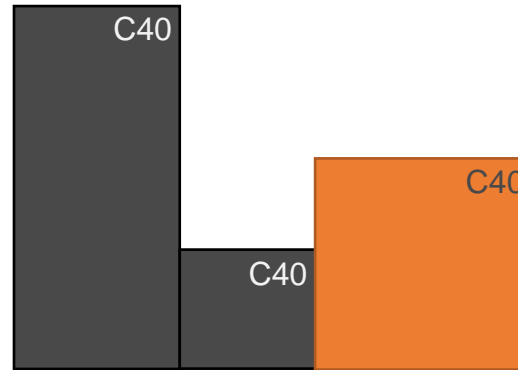
PROGRESS **GROUP**

Legend:

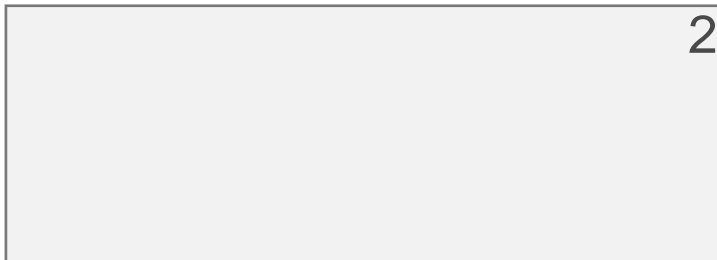
Cxx → Concrete quality

Color → Stacks

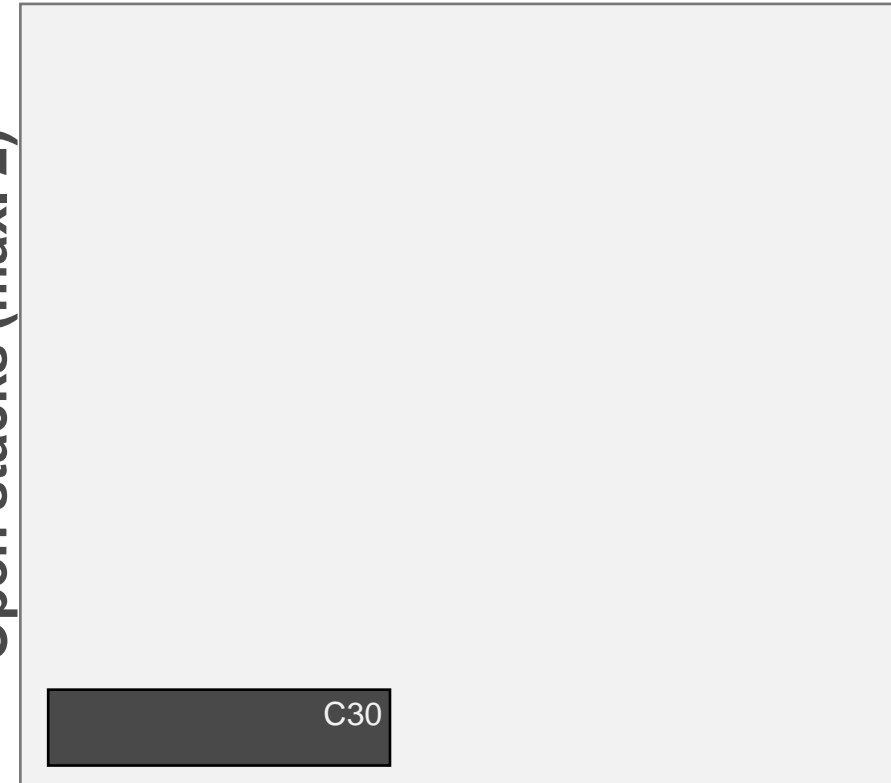
Elements



Beds

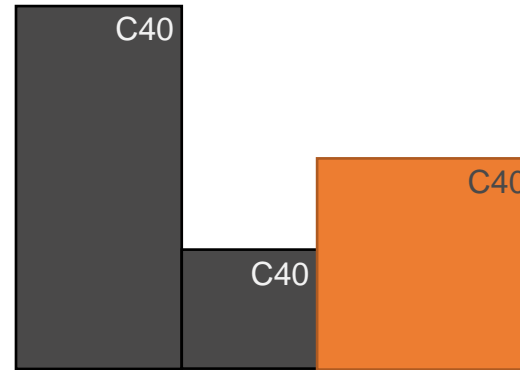


Open stacks (max. 2)



EXAMPLE – t_{11}

Elements

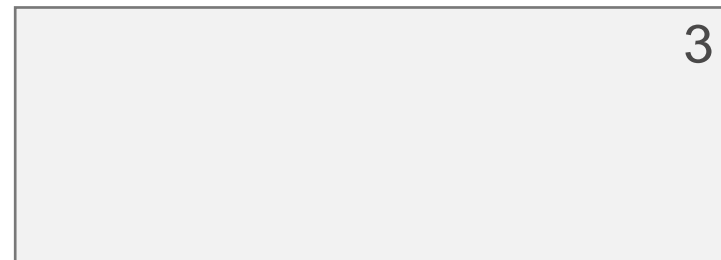


Legend:

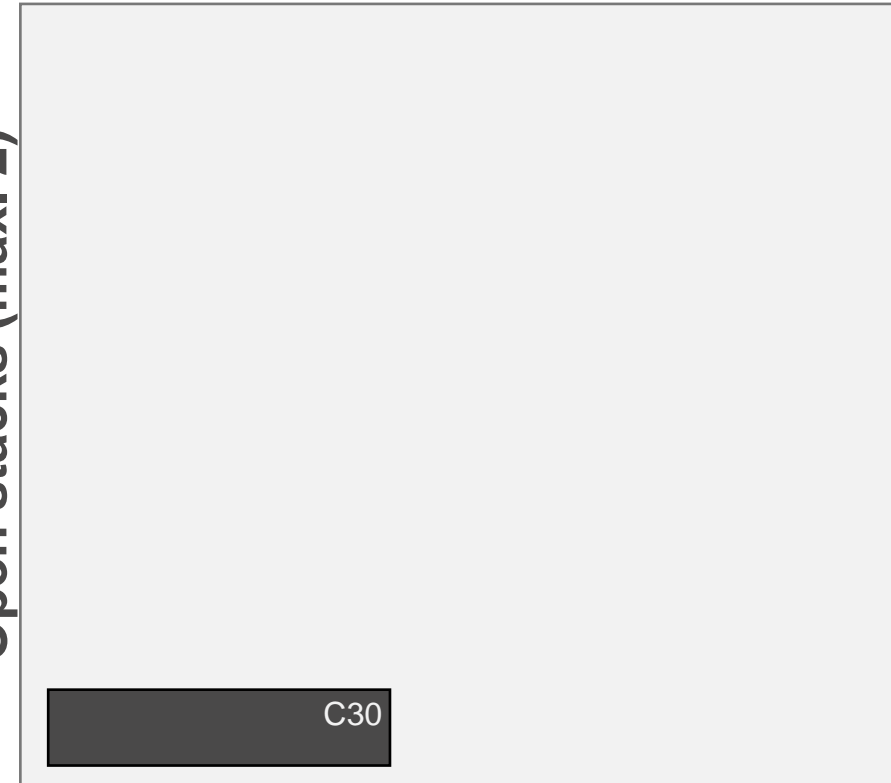
Cxx → Concrete quality

Color → Stacks

Beds



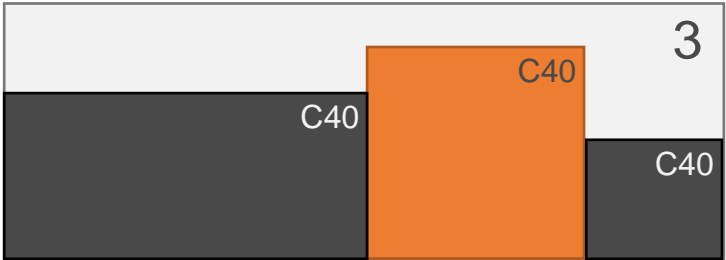
Open stacks (max. 2)



Elements

Beds

Legend:
Cxx → Concrete quality
Color → Stacks



Open stacks (max. 2)



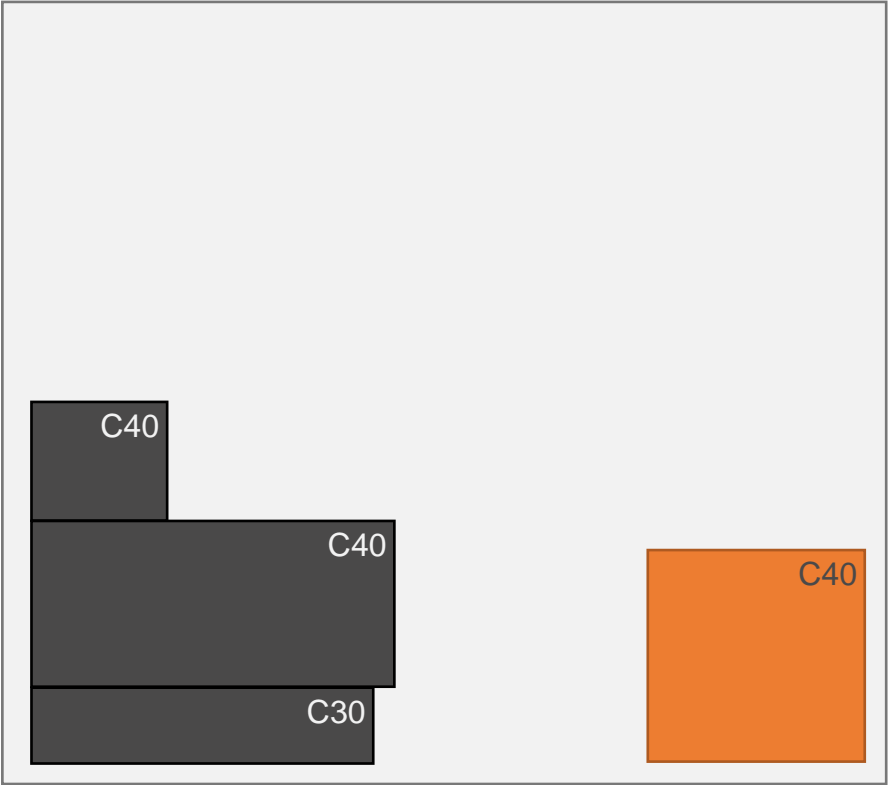
Elements

Beds

Legend:
Cxx → Concrete quality
Color → Stacks



Open stacks (max. 2)



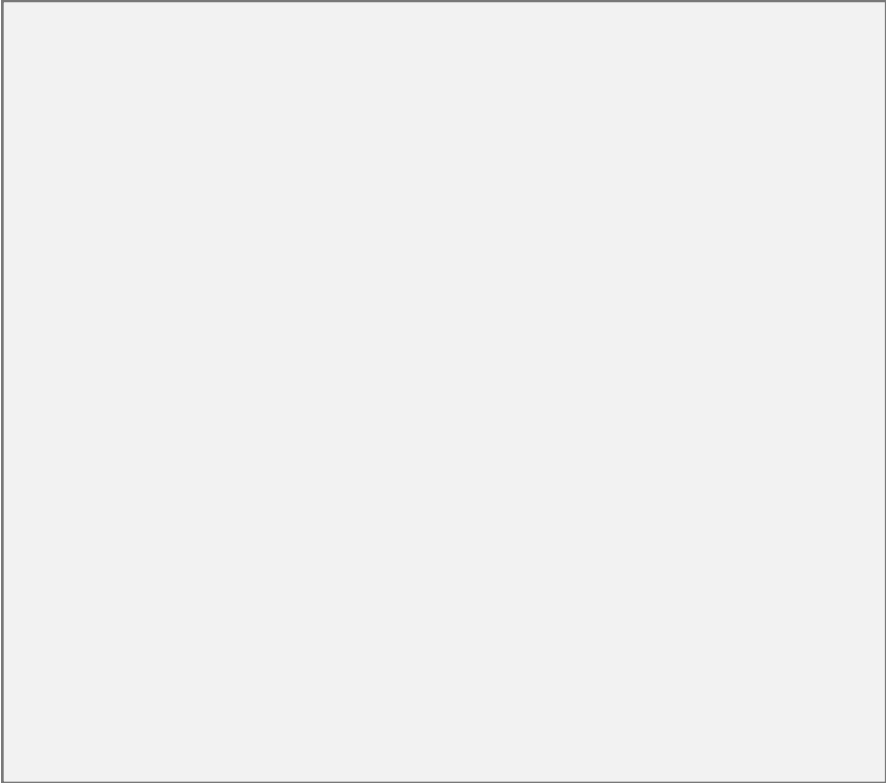
Elements

Beds

Legend:
Cxx → Concrete quality
Color → Stacks

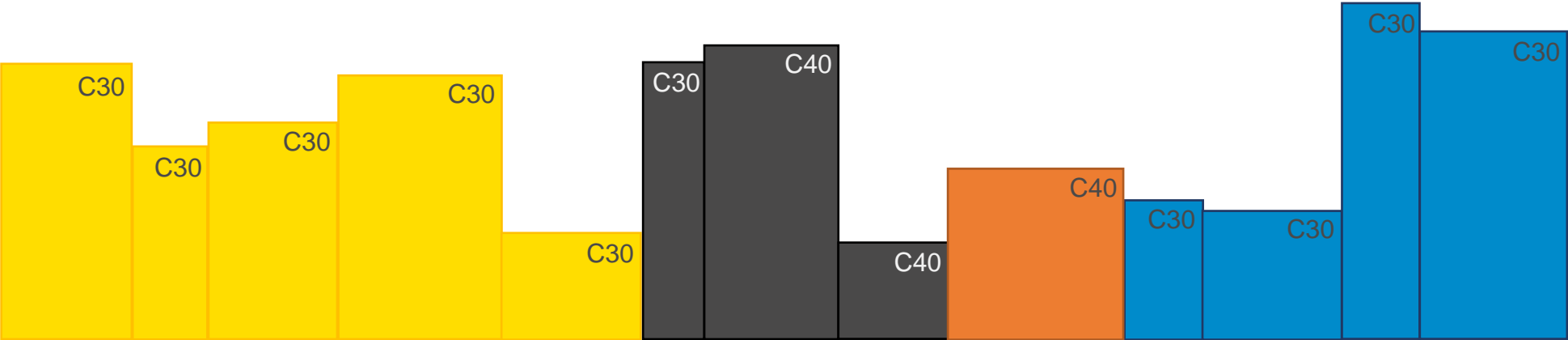


Open stacks (max. 2)



EXAMPLE – result

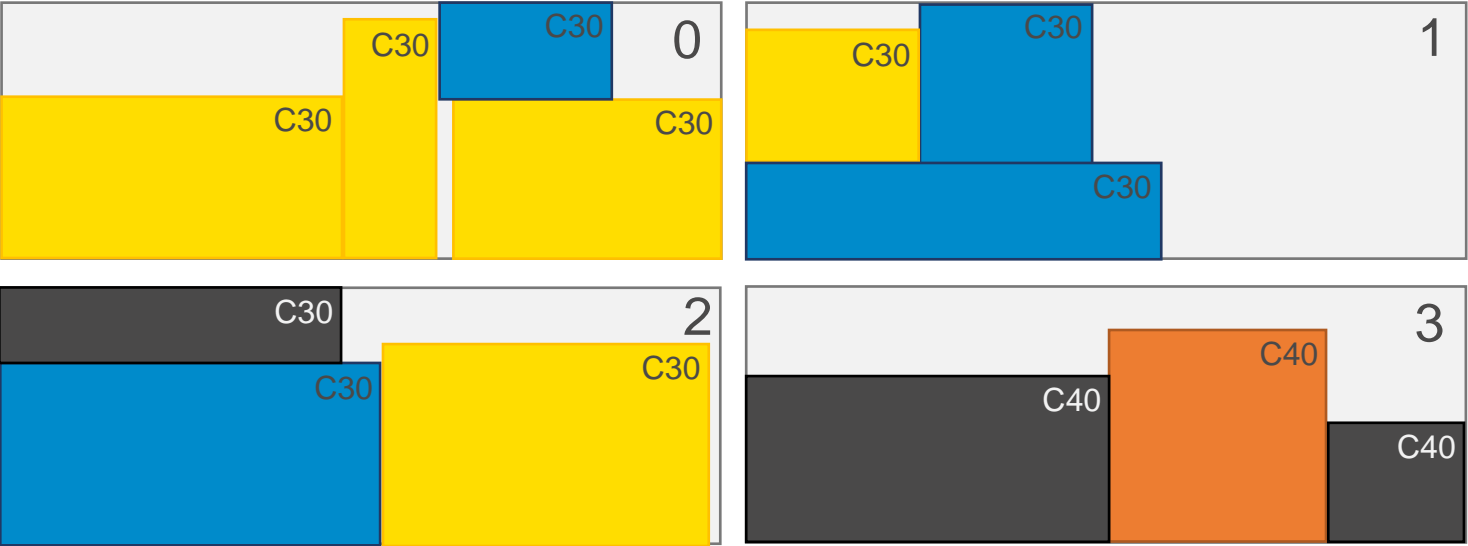
Elements



Legend:
Cxx → Concrete quality
Color → Stacks



Beds



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