

CUBE SYSTEM

New technologies
for sustainable concrete



CUBE system



From Mapei research, innovative solutions and services to help reduce the environmental impact of concrete production.

ROBUSTNESS



STRENGTH ENHANCEMENT



DIGITALIZATION



Roadmap for sustainable concrete

A complete portfolio of solutions and services as a contribution to reducing the environmental impact of the production of concrete

Concrete is far from being considered as a sustainable material, particularly due to the **massive amounts of CO₂** emissions associated with the production of Portland cement. In 2014, CO₂ emissions from the cement industry amounted to 2.2 GT, the second highest contributor of direct industrial emissions of CO₂.

Amongst the various levers in the hands of the cement industry to control greenhouse gas emissions and limit global warming to 2°C by 2100, relative to preindustrial levels (2DS Scenario), the industry has a number of **innovative technologies** that will assist in reducing its **carbon footprint**. These include **carbon capture** and **reducing clinker/cement ratio**. These options and solutions are paving the way to a reduction of cumulative CO₂ emissions in line with the roadmap for 2050.

One such approach is the use of **reactive additives** (such as blast-furnace slag, fly ash and natural pozzolans) to partially replace clinker in the manufacture of cement. This is a fundamental part of the strategy enabling the entire chain to **reduce CO₂ emissions by 55% by 2030** and to achieve **Carbon Neutrality** by 2050.

The use of **cement with lower clinker content** and **recycled aggregates** in concrete production presents several challenges however for the concrete industry. Mixes generally will demand increased water contents to achieve and maintain optimal rheological properties and the slower development of the mechanical strength at both early and late stage.

At **Mapei** we are committed to improving the sustainability of the construction industry, whilst supporting our customers in this very dynamic environment. To this end, we have developed a **range of admixtures** that can reduce or eliminate these problems the industry faces as a result of the changing performance of its cements and aggregates, ensuring the industry meets the environmental targets set whilst maintaining concrete performance at all stages.

The complexity of this challenge is increased further due to the regionality of the concrete industry. In recognition of this **Mapei** has developed the **CUBE system**. An integrated approach that helps the concrete industry overcome the difficulties of reduced clinker cements and aggregates of varying quality through the various phases: production, placement and in situ. **CUBE system** actively helps the industry maintain its **high standards** whilst **reducing the climatic impact**. Beyond the physical performance of a concrete developed by the **CUBE system**, it is possible to actively track and measure in real time the impact via digital monitoring.

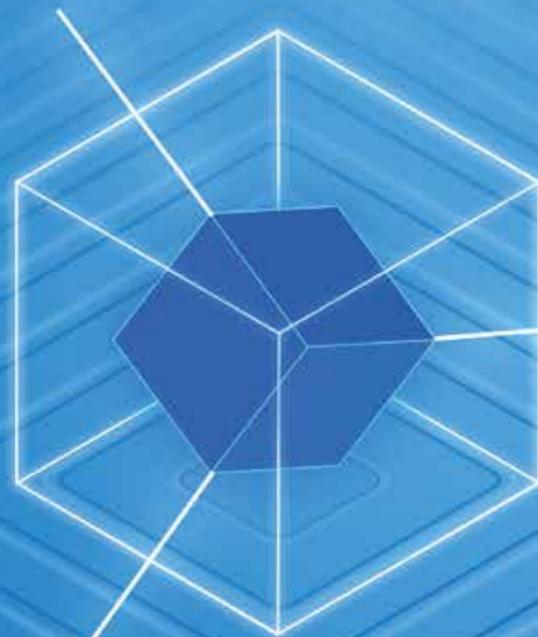
The **CUBE system** from **Mapei** helps the concrete market become more **sustainable**.



CUBE system

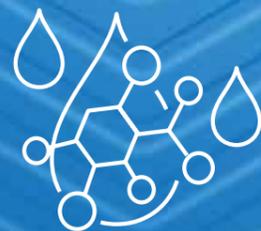
Robustness

Recycled
Aggregates



Rheology

Cement
Blends



New generation admixtures

A new concept of **superplasticizers** specifically designed to face the challenges of the sustainable concrete.

Cement blends

Polymers designed to work with CEM III, CEM IV and CEM V and any kind of SCM.

Recycled aggregates

Special **absorption inhibitors** (RE-CON AGG Technology) integrated into the formulations.

Rheology

Specific **gradual-release polymers** guarantee that workability and low viscosity are maintained for longer without delaying the setting phase.

PRODUCT RANGE

DYNAMON CUBE 800

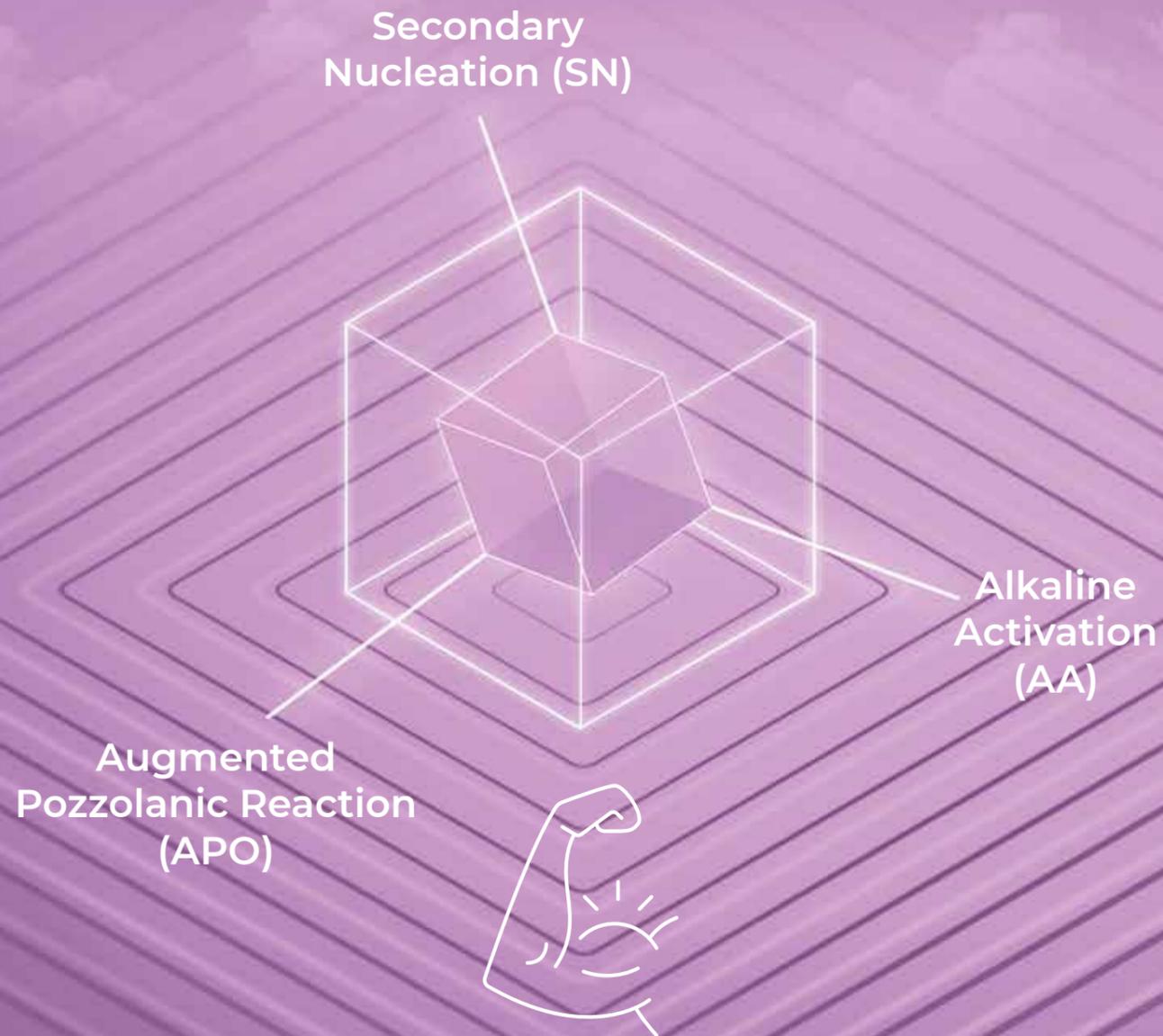
Superplasticizer with a neutral effect on setting times

DYNAMON CUBE 805

Superplasticizer to extend and maintain workability for longer

CUBE system

Strength enhancement



Property technologies

Thanks to the use of property technology based on **nano-compounds of silicate hydrates**, our patent pending system, **CUBE system** represents the fundamental cornerstones of the next generation of admixtures for the new cements with reduced clinker content

Secondary nucleation (SN)

The addition of **nano-composite silicate hydrates** produces hydration reactions more rapidly and diffusely in the cement paste.

Augmented pozzolanic reaction (APO)

The combination of **nano-compounds of silicate hydrates** with retarding accelerators produces a more **powerful pozzolanic reaction**, thereby enabling faster development of mechanical strength after both short and long curing cycles.

Alkaline activation (AA)

The new **hybrid cements** have a **smaller carbon footprint** and combine the properties of Portland cement (20-30%) with the properties of alkaline activation materials (70-80%). Development of the mechanical strength of hybrid cements is promoted by the alkaline activation of their components.

PRODUCT RANGE

MAPECUBE 1	Strength enhancer after short curing cycles
MAPECUBE 2	Strength enhancer specific for CEM type II
MAPECUBE 3	Strength enhancer specific for CEM type III
MAPECUBE 4	Strength enhancer specific for CEM type IV
MAPECUBE 5	Strength enhancer specific for CEM type V

CUBE system

Digitalization

Advanced monitoring
of the quality of concrete

Mix
design

Results
tracking



Monitoring and control technologies

A **complete proposal of hardware and software**, developed by **Elettrondata** in collaboration with **Mapei**, for the optimization of mixtures, quality control and reduction of the environmental footprint of concrete.

Advanced monitoring of the quality of concrete

A system to **automatically control** and **regulate** the quality of concrete during transport.

- Measurement of slump in real time during transport and pouring.
- Regulation of slump by automatic dosing of superplasticisers.
- All data concerning quality, slump, temperature, rotation speed, mixing procedures, admixture dosage, etc. is recorded.
- Data is available in the cloud in real time.

Mix design

System to optimise the **concrete recipe**.

Results tracking

RFID-based system for **monitoring, managing** and **tracking** samples of concrete.

EVERYTHING'S OK WITH MAPEI

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