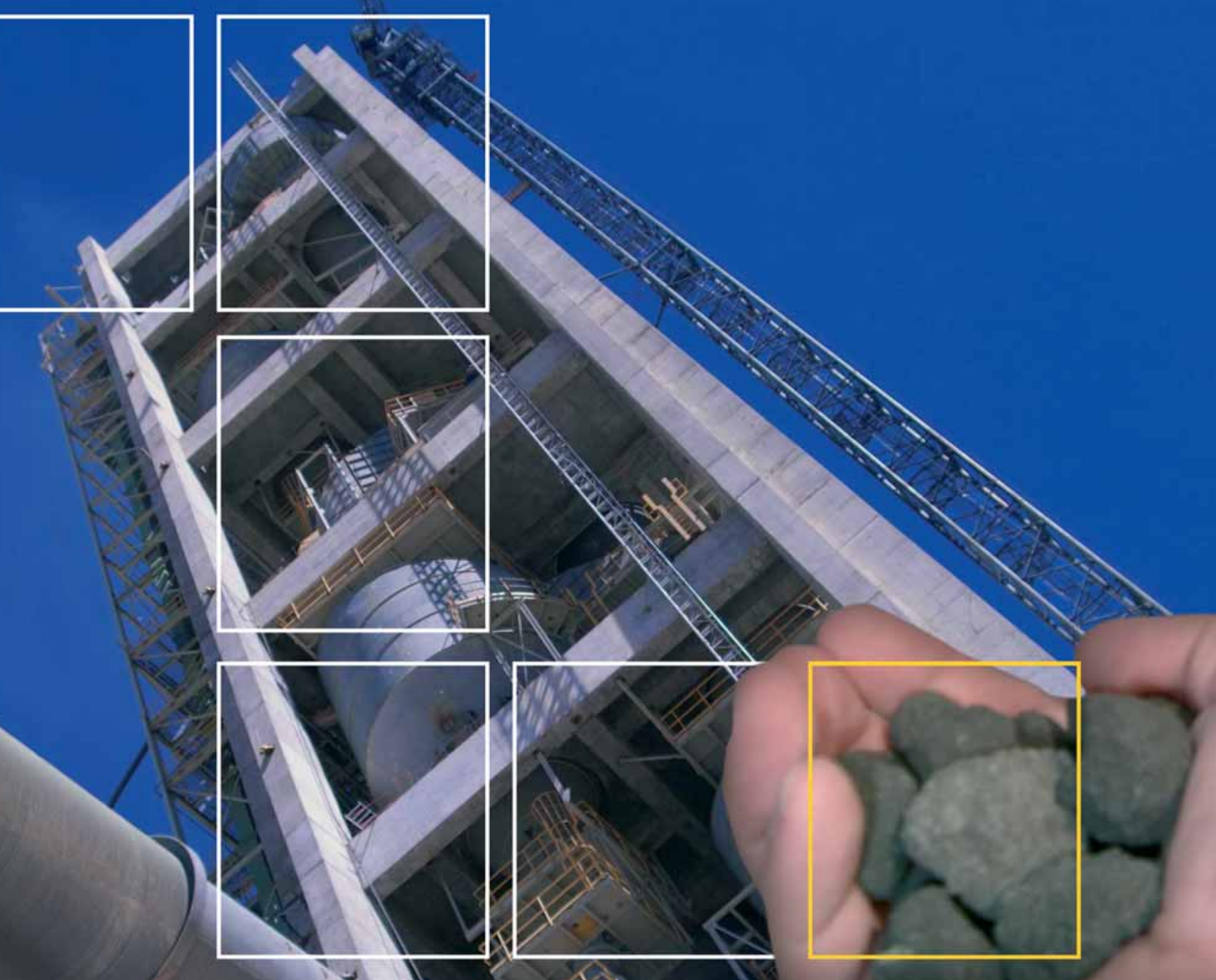


# DOPOL® '90 preheater and PREPOL® calcining system.



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## For every requirement an optimally customised DOPOL® / PREPOL® concept.

Innovation is at the centre of the Polysius company philosophy. This means purposive innovation as an answer to concrete requirements of the industries we serve.

In the case of the cement industry, today's requirement profile for the manufacturing process is directed at high production capacities with low operating and capital expenditure.

For this reason, multistage cyclone preheaters with integral calciner and tertiary air duct are indispensable components of modern kiln lines.

Polysius offers preheater/calciner concepts that are innovative and nevertheless technically mature for the production of white and grey cement; for new plants as well as plant conversions, and tailored to the desired production capacity – no matter whether this is less than 1,000 or more than 10,000 tonnes per day.

The heat produced by the burning process in the rotary kiln and calciner is used for preheating the raw material.

The preheating and extensive precalcination of the raw material shorten the burning process.

The high degree of heat utilisation reduces the fuel requirement and the capital expenditure for the rotary kiln.

Moreover, it is possible to use low-priced substitute fuels and materials in the calciner and to positively influence the NOx and CO emissions – an additional plus point for operating economy and environmental compatibility.

To assure correct dimensioning of the various preheater/calciner systems, the properties of the raw materials and fuels are tested in the central research centre of the Polysius Group.

This ensures that all the systems and plant components are optimally harmonised.



5-stage DOPOL® '90 preheater including PREPOL®-CC-MSC calcining system for 2,600 t.p.d. of cement clinker in Spain.

### DOPOL® '90: the economical preheater generation:

The number of cyclone stages is selected to suit the individual application.

As a rule, the throughput and moisture content of the raw materials and fuels, which have to be dried by the remaining exhaust gas heat, decide whether 2, 3, 4, 5 or 6 cyclone stages are used. The cyclones and gas ducts have a refractory lining, which keeps the radiation losses low (below 2%

of the heat consumption).

Due to the optimum flow-dynamic design, the pressure drop of the preheater system is small, minimising the electrical energy requirement for the exhaust gas fan.

The high collection efficiency of the cyclones ensures that the exhaust gas has a low dust content.

### Advantages of the DOPOL® '90 concept:

- **Minimal power requirement** due to high degree of heat recuperation and low pressure drop.
- **High efficiency – low heat consumption** due to high cyclone collection rate and uniform meal distribution over the gas duct cross-section.
- **High availability** thanks to the proven, reliable design and construction.



### Special PREPOL® calcining systems for different requirement profiles.

The calciner fulfils the functions of heating-up and calcining the raw material and of burning the supplied fuel. The burning of the different types of fuel takes significantly more time than heating-up and calcining the raw meal and is therefore the determining factor for the dimensioning of the calciner.

In addition to assuring complete combustion of the fuel, the calciner has to function

with great flexibility, in order to cope with the wide range of fuel grades used (from highly reactive to extremely unreactive).

Today, great importance is placed on systems incorporating primary measures for emission reduction, and this trend is increasing.

For such requirements Polysius has developed the PREPOL®-MSC-CC system in addition to the proven PREPOL®-MSC calciner. This system permits the use of unreactive fuels and simultaneously reduces the nitrogen oxide emissions.

The Polysius PREPOL®-AS calciner programme (AS stands for Air Separate; a concept which all PREPOL® types share) thus includes a selection of versions, -CC, -MSC and -MSC-CC, in order to optimally fulfil individual requirements with regard to operating reliability, product quality, flexibility and emission reduction.

5-stage DOPOL® '90/PREPOL®-AS preheater calciner combination in Saudi Arabia; designed for a daily production rate of 3,500 tonnes of grey cement clinker.







**Advantages of PREPOL® calcining systems:**

- uniform kiln operation, thanks to extensive precalcination of the raw meal,
- long refractory lining service life in the rotary kiln, as a result of the low thermal loading,
- minimal coating formation in the preheater, due to the low circulation of alkalis,
- low pressure drop in the preheater because of the optimum flow-dynamic design of the calciner, and
- superior economy of operation thanks to the high fuel flexibility.

4,000 t.p.d. grey cement production line in Vietnam with 5-stage DOPOL® '90 preheater and PREPOL®-CC system (for anthracite firing).



The first of two 10,000 tpd kiln lines with 5-stage DOPOL® '90 and PREPOL®-MSC calciner to be constructed in China.

3-stage DOPOL® '90 with PREPOL®-MSC-CC calciner in the USA; output: 2,700 tpd of grey cement clinker.

White cement production line in Spain with 6-stage DOPOL® '90 preheater.



PREPOL®-CC with separate combustion chamber (picture at top).

Split tertiary air supply of the PREPOL®-MSC process.



### PREPOL®-CC

In order to improve the burnout rate when using non-reactive fuels, Polysius developed the PREPOL®-CC (Combustion Chamber). The calcining system achieves outstanding results when raw materials with poorly combustible constituents are used and in cases where high internal alkali cycles may arise in the kiln plant due to the fuel and raw material compositions, resulting in impairment of the combustion.

The separate combustion chamber, which is connected to the calcining loop by a gas duct, is the main feature of the PREPOL®-CC. Providing the possibility to influence the combustion temperature, it ensures calciner efficiency when using solid fuels.



### PREPOL®-MSC

The PREPOL®-MSC calciner is the standard calcining system for reducing NOx emissions. The MSC (Multi Stage Combustion) process is based on the split feeding of fuel, tertiary air and raw meal. The effect is only achieved by means of this special mode of operation. This means that the operating costs are no higher than those of classical calcining processes. At the numerous MSC plants installed all around the world it has been

proved that, depending on the fuel, the NOx emission rate is reduced by up to 50 %.

### PREPOL®-MSC-CC

To reduce operating costs, it has today become common practice to operate the calciner with fuels which have poor burnout behaviour, as well as with secondary fuels.

At the same time, many plants have to observe regulations stipulating low

PREPOL®-MSC-CC system installed in the USA.

limit values for nitrogen oxide emissions. To enable nitrogen oxide reduction while maintaining the flexibility of fuel usage, Polysius developed the PREPOL®-MSC-CC process.

This combines the combustion chamber of the PREPOL®-CC process with the split introduction of fuel, tertiary air and raw meal that is characteristic of the PREPOL®-MSC process.

The kiln inlet is equipped with a kiln inlet burner for reducing the nitrogen oxide created in the clinkering zone of the kiln. The greater portion of the fuel is fed into the combustion chamber. That leads into the MSC calciner, where there is a further split infeeding of air and raw meal.

#### Selection matrix for calciners

PREPOL® type		AS	CC	MSC	MSC-CC
Fuel properties	High ash content	●●	●●	●●	●●
	Non-reactive	●	●●	●	●●
Flexible change of fuel		●	●●	●●	●●
Emission reduction		○	○	●●	●●
Suitability for bypass		●●	●●	●	●

●● Very suitable    ● Well suited    ○ Suitable