

GEOPOL®

**The technology of mould and core
production with inorganic binder system -
Practical using in foundry industry**

Saint Quentin 2014

Characteristics of mixtures with a binder

Geopol[®]

- environmentally friendly binder system
- during hardening increased polymerization and formation of the inorganic polymer.
- Production of moulds and cores like selfhardening mixtures and also hardening with CO₂
- adhesion destruction of grain envelopes
- very good disintegration at low temperatures
- effective regeneration recycled mixture – simple mechanical reclamation
- high percentage use of reclaim sand
- Is possible to use additives for better technological properties
- Is possible to use coating for moulds and cores

Why using the technology Geopol®

- It is environmental friendly binder system. Improve work environment in foundry.
- Does not contain dangerous substances like some organic binder systems
- Low dosing of binder and hardener
- Workability and strip time is possible to control with our own range of hardener
- Mechanical reclamation with high percentage of using reclaimed sand like by organic binder systems.
- Technology Geopol® was developed and is implemented into foundries by company SAND TEAM spol. s r.o.

Influences which affects quality of mixture and hardening course

1) BINDER:

- For geopolymer self-hardening mixtures are used three basic binders:
- GEOPOL[®] 510
- GEOPOL[®] 515
- GEOPOL[®] 618

- Binders have different polymerization threshold value and the amount of high polymers have different densities and viscosities

Influences which affects quality of mixture and hardening course

2) HARDENER:

- Workability time
- Speed of hardening

- SA - basic series SA71 SA76
- CE - a range of hardeners with long workability

- You can determine the cure speed with the type of hardener

- The dosage is **14 % to 18 %** on binder

Influences which affects quality of mixture and hardening course

3) RECLAIMED SAND

What affects the quality of reclaimed sand?

- Return mixture properties
- course and the method of reclamation

Influences which affects quality of mixture and hardening course

Typical dosing:

Facing sand:

75% reclaim sand

25% new sand

1,6 – 2,0% binder Geopol

14 – 18% of hardener SA (to quantity of binder)

Backing sand:

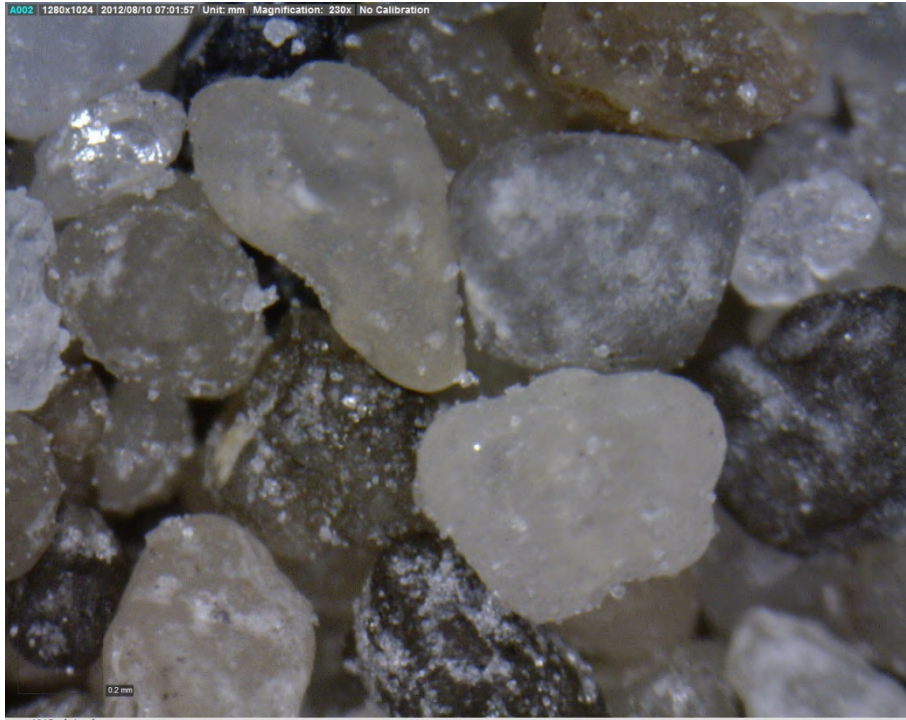
100% reclaim sand

1,6 – 2,0% binder Geopol

14 – 18% of hardener SA (to quantity of binder)

- SAND TEAM has reclamation unit, which make possible this dosing

Visual comparison of recycled sand



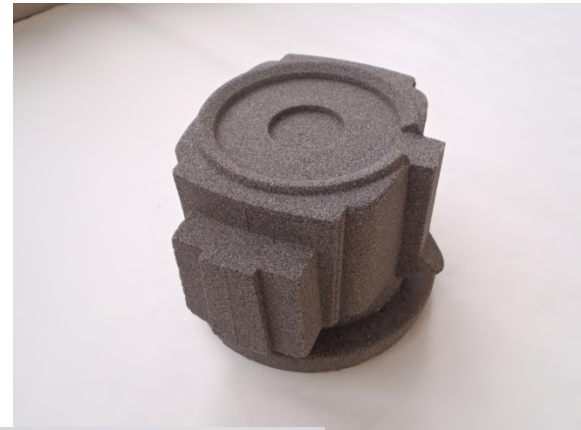
Before reclamation

After reclamation



Examples of the use of recycled sand

**100% recycled sand after mechanical reclamation
1.4% binder**



Hardening with CO₂

The binder system contain 2 parts – Binder and accelerator

Type of accelerators:

- Geotek 001 – base type
- Geotek 007 – suitable for sands, which shows slower hardening
- Geotek 005 – in case of requirement of higher strength. Improves disintegrating in second maxima

Using of Geopol[®] technology in the world

- Czech republic 19 foundries
- Germany 16 foundries
- Slovakia 3 foundries
- USA 2 foundries
- UK 2 foundries
- Poland 4 foundries
- Taiwan 2 foundries
- Israel 2 foundries

Implementation of the binder in a Czech steel foundry

In 2008 we supplied our binder system (including machinery) to a Czech steel foundry:

- The maximum weight of casting is 5 tons
- The facing sand – 75% of reclaimed sand and 25% of new sand
- The backing sand – 100% of reclaimed sand

Dosing:

- 2% of binder
- 15% of hardener (to the binder)

The moulding line for selfhardening sands



Samples of mould production



- Facing sand - 75% of reclaim sand and 25% of new sand
- Backing sand - 100% of reclaim sand



Core production



Cores are made from selfhardening sands and are also hardened by CO_2



Samples of castings



Castings for mining industry

Samples of castings



Sheaves



Grids

Implementation of the binder system in a Czech gray cast iron foundry

In 2004 we supplied technology Alphasert including machinery to this foundry. After 2 month solved foundry ecological problem, because this foundry is situated in the city centre.

They have two possibility – change the technology or close the foundry

They decided to change technology, and they change Alphasert technology to GEOPOL.

Cast material:

- **gray cast iron to weight aprox. 600kg**

Mould production:

- **Facing sand - 80% reclaim sand a 20% new sand**
- **Backing sand – 100% reclaim sand**

Core production:

- **Selfhardening cores and cores hardened CO₂**
- **some types of cores produce also with 40% of reclaim sand**

Moulding line for production selfhardening mixture



**Continuous mixture OMEGA
Spartan 205 P – installed in 2006**

Output 5t/hour



**Continuous mixture OMEGA
Spartan 5P – installed in 2004**

Output 5t/hour



Reclamation unit

- ❖ Knock out deck
 - ❖ Reclamation unit – Gammavator 3
- Throughput 3t/hour



- ❖ Cooler G3
- Throughput 3t/hour

Samples of mould and core production



Examples from practice – selfhardening sands



Examples from practice – hardening with CO₂



Future of Geopol[®] technology

Near future:

- 2014 – we finishing implementation Geopol technology including machinery to Czech aluminium foundry
- 2015 – realization of Geopol technology in Czech cast iron foundry including machinery

Future of Geopol[®] technology

- We start on research and development of core production hardened with CO₂, hot air and microwaves
- Regarding selfhardening sands – increase strength development and get closer with properties of Geopol mixtures to organic binder systems

Thank you for your attention

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