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 aditives for better technological properties
- Is possible to use coating for moulds and cores
Why using the technology Geopol®

- It is environmentally 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 $\text{CO}_2$

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 $\text{CO}_2$
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 Alphaset 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 decide to change technology, and they change Alphaset 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 CO$_2$, 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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