

29 September -1 October / 29 Eylül - 1 Ekim 2016 TÜYAP Fair, Convention & Congress Center, İstanbul

8. Uluslararası Döküm Kongresi / 8th International Foundry Congress by TUDOKSAD Academy In conjuction with Ankiros / Annofer / Turkcast fairs

#### «Yaş Kum Kalıplamada Reklamasyon»

#### «Green Sand Back To Coreshop Reclamation»

### Chris Wilding (Omega), Bert Duit, Bülent Şirin, Adnan Demirel (Componenta)

### 2.Oturum: Döküm Teknolojileri Demir&Çelik 2nd Session: Casting Technologies Iron&Steel

Oturum Başkanı/Session Chairman: Gürolhan Yaşar (Demisaş Döküm Emaye Mam. San. A.Ş.)



Oturumlarda yer alan sunumlar 3 Ekim 2016 Pazartesi tarihinde akademi web sayfasına (akademi.tudoksad.org.tr) yüklenecektir.



Green Sand Reclamation Moulding sand back to Core Shop using Secondary Attrition

#### **Componenta's Experience**

Chris Wilding (Omega Foundry Machinery Ltd) Bert Duit (Componenta Netherlands) Bulent Sirin (Componenta Orhangazi) Adnan Demirel (Componenta Orhangazi)

















#### **Requirement for Investment**

- Existing sand scrubbing machines worn out, due for replacement
- Low reclamation capacity.
- Cores successfully being made with 70/30 mixed sand but increased binder content necessary
- Experienced sand testing laboratory
- Proven process





#### **Existing Sand Scrubbing System**

- Batch Capacity 1150kg
- Four scrubbers
- Cycle time approx 30 min

(cycle times vary between 24 and 30 minutes according to level of oolitization of input sand)







#### Sand Trials Held at Omega's Test Plant

Four tons of waste sand, which was collected from different departments of the foundry, was sent to U.K (Omega test plant) for trials on USR (secondary attrition unit)

Potentially, this reclamation plant would be the highest capacity of its type in the world.





#### **USR Secondary Attrition**





#### **Ceramic Scrubbing Unit**





**Dedusting with Fluidised Bed** 



Combined Single Cell Scrubber or double cell Scrubber with Fluidised Bed Classification







**37kW Drive Motor** 



#### **Ceramic Drum and Rollers**













COMPONENTA Casting Future Solutions

#### **Improving the Sand Characteristics**



As received

First scrub

Second scrub









#### Water jacket cores made with cold box resin and 100% reclaimed sand (test sand).

COMPONENTA

**Casting Future Solutions** 







### Advantages of the new Omega plant compared to old (+GF+) plant

- ✓ 15 ton/ hour continuous capacity (higher capacity)
- Adjustable scrubbing parameters to obtain high grade reclaimed sand.
- ✓ Less sand grain loss and properly dust seperation through fluidising system.
- Rounding operation during the process thus less
  binder requirement for core and moulding production
- Possibility to seperate chromite sand to prevent chromite contamination.
  - Possibility to use 100% of reclaimed sand in the circulation system.





# The Omega Installation at Componenta









#### **HMI Screenshot**





#### **Operational Cost of Reclamation plant**

Consumption/Hour	GF Regeneration	Omega regeneration
Electric energy (kW, € )	650 = 36,40 €	750 = 39,6 €
Pressured air (m³/h, € )	1050 = 7,70 €	1500 = 10,50 € est.
Dust extraction capaxity (m³/h, € )	65.000	57.000
Natural gaz consumption (dryer) (m³/h, € )	Not implemented	60 = 15,75€
(dryer) (m³/h, € )	Not implemented	15= 0,35 €
Cost/Hour	€ 44,10	66,20 € max.
Maintenance Cost	Equal	Equal
Ton/Hour inlet / outlet	9,6 / 7	15 / 11,0
Cost €/ton	€ 6,3	€ 6,01





# Laboratory Test Results of Omega Reclaimed Sand







## **Conductivity of Reclaimed Sand**

## Active Clay and L.O.I Content of Reclaimed Sand



First step

Second step Third+fourth step

**Casting Future Solutions** 

As received



### Reclaimed Sand Laboratory Test Results for Moulding Sand (Tested by IKO)

	Omega	Com-S34	F32
Moisture %	2,39	2,09	1,95
Sample Weight (g)	153	144,5	143,5
Compactability (%)	47	47	47
Green Comp. (N/cm2)	8,5	6,05	7,5
Green Shear (N/cm2)	2,1	1,35	1,35
Splitting (N/cm2)	1,1	0,8	0,8
Wet Tensile (N/cm2)	0,277	0,219	0,227
Permeability	110	150	116













- Increased sample weight : The rounder shape and perfect silica distribution shows benefits in sample weight increase. From such increase Componenta will definitely benefit from surface quality where the molten metal to sand interaction surface area reduced. In addition to that within reduced surface contact with molten metal molding sand requires less coking material and lustrous carbon need which will result in less consumption of coal dust.
- Increased green compression strength : 40% increase in strength is measured with same rate of bentonite addition, resulting in a reduced bentonite addition.
- Increased green shear strength : With rounder grains molding sand increased shear strength, which will also improve the flowability and reduce broken mold incident. 55% increase is seen in test.
- Increased wet tensile strength : 26% increase in seen in test measurement. However with increased sand weight and compacting density the risk for scabbing increases this will be compensated with increased WTS values.
- Under test conditions Omega reclamated sand requires higher demand for moisture, I believe this will not be seen in line conditions as with better strengths Componenta will be able to run the system at lower active clay levels resulting in less moisture demand.





### **Specific Consumption of Raw Material**

#### (before-after Omega)



#### New sand(kg/ton) (For moulding)



#### New core sand(kg/ton)(For Core shop)





Casting Future Solutions

OMPONENTA

# **Key Benefits:**

- Improved Casting Surface Finish
- Reduced Fettling Times
- Reduced Consumption of Coal Dust
- 20% Reduction in Bentonite Addition
- Increased Green Strength of Cores
- 20 25% Reduction in Resin Addition in Coreshop
- Reduction in New Sand Consumption











### Thank You



# COMPONENTA

**Casting Future Solutions** 









