

## GRID+ EXCURSIE TNO, Helmond FRIDAY NOVEMBER 11, 2011

We are offering a challenging and comprehensive program for GRID+ (Genootschap Regeltechnische Ingenieurs Delft), with several interesting lab tours and an interactive business case, starting at 13:00 hrs with coffee and the official welcome. At 17:30 hrs we will have drinks and snacks in order to share the impressions of the rousing day.

### Program

- 10.30 Departure by bus
- 12.30 Arrival and coffee in Helmond
- 13.00 Welcome by *Jeroen Ploeg*
- 13:05 Introduction TNO by *Leo Kusters*
- 13:30
  1. Powertrains demo by *Frank Willems*
  2. Working at TNO by *Martin Slikkerveer*
  3. CACC demo by *Jeroen Ploeg*
  4. Coffee break
- 15:30 Business case: Cooperative Driving; introduction by *Sorin Stan*
- 17:00 Business case: Pitch by participants & pitch prices by *Martin Slikkerveer* (jury: Sorin Stan, Martin Slikkerveer, Jeroen Ploeg)
- 17:30 Drinks & snacks
- 18.30 Return trip to Delft
- 20.30 Arrival in Delft



The business case focuses on three aspects of cooperative driving:  
a. identification of promising/interesting cooperative driving applications,  
b. technical implementation of (a selection of) these applications,  
c. business cases/deployment scenario's.

After an introduction by Sorin Stan (about 20 minutes), four teams are formed. Each team will elaborate on the above topics and will shortly present the results. The presentations will be judged by the jury, upon which the winner will be rewarded with a nice gadget for each team participant.

### **Interested in a job or an internship at TNO?**

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Participants of this excursion are the regular members of GRID+, candidate members of GRID+ and DCSC students, PhD's and staff.

To subscribe for this excursion we ask you to pay €5,00 mentioning "Excursion 2011" to our bank account 6065902, Genootschap Regeltechniek Ingenieurs Delft, Mekelweg 2, Delft. Your payment is your subscription for this interesting excursion.

The number of participants is limited to 40. The preselection is based on the order of entry.

A touring car will be chartered from Delft to Helmond. Lunch is served in the bus and included in the price.

Participants will meet at Christiaan Huygensweg in Delft (next to the TU Delft Aula) to take the bus.

More details on the program, and departure and arrival times will follow in a later e-mail announcement.

### **Address Excursion Location**

Steenovenweg 1  
5708 HN Helmond

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## **Trips to Russia & Serbia for PUM Senior Experts**

*By Guus van Ditzhuijzen*

As mentioned before in Feedback editions earlier, I make sometimes trips to special countries for PUM Senior Experts. In Feedback of September 2010 I described an interesting technical trip to Iran.

PUM Senior Experts sends experts (mostly retired experts) as volunteers to developing countries and countries, where we expect to get jobs in helping them. The Dutch Ministry for Development Cooperation mostly sponsors visits to the first mentioned countries, the Ministry of Economic Affairs often sponsors other visits.

For this organization I was in India several times, in Nepal, Pakistan (Peshawar!!), Jordan, Iran, Russia and Serbia. In November 2008 I visited Veliky Ustyug in North Russia, in November 2010 Mladenovac in Serbia and in December 2010 Chelyabinsk in the Ural Region in Russia.

### **Veliky Ustyug, North Russia**

#### *Technical issues*

The company LLC Elektroheating has a number of boilers in the town for heating groups of houses. Some old ones are still fired by coal or wood and manually operated. The one that had to be assessed is fired by natural gas, and works with some old controls systems (30 years old). The question was if it was possible to improve the boiler systems so, that more energy could be supplied. Installing new boilers could only do this, as the existing ones were quite well maintained and had already

good working recuperators. Calculations show that the yield was already around 90%. New boilers can probably reach 95%. It must be noted, that Russian natural gas has a very high combustion value. In the week of this visit a new Lord Mayor was chosen and he agreed to allow the company to invest for extension of the boiler system.

#### *Interesting town*

Veliky Ustyug is an interesting old town in the Vologda Region (about 750 NE of Moscow). It was already mentioned in 1207 and in the 16<sup>th</sup> and 17<sup>th</sup> century it was an important market



place as there was a crossing of trading routes (rivers). Important was the Dvina river, which gives connection to the White Sea. The main street is still full of western style houses from that time, mainly built by German traders.

Not many people know that this was the birthplace of seaman and explorer Semyon Dezhnyov, who discovered the Bering Strait in 1648 long before Bering did. He is honoured with a big statue in a park in town. See photo.

In the forest nearby there is the Residence of Ded Moroz (Granddaddy Frost, the Russian Santa Claus). I visited him there. See photo. I also visited his post office in town, where all the letters from children to him are answered.

The town used to have 48 churches, but the Soviets closed them all. One is now used again as cathedral and pilgrimage for a special local saint, one is museum, one library and one is used as archive. The others are ruins or disappeared.

I asked the people how they experienced the Perestroika. Well that was not very easy. After the change they had no income at all for more than a year! They had to live from the production of their little gardens.

### Mladenovac, Belgrade, Serbia

#### Technical Issues

In this town a company making sanitary ceramics (toilets, sinks, etc) and chimney parts (ceramic pipes) had requested assistance for energy saving for their ceramic furnaces. It is a company with reasonably old technology. Up to the privatisation the energy was wasted and the government paid most of the bills for it. Now the process has to be modernized and energy is too expensive to be wasted.

A ceramic kiln can be described as flows:

A long tunnel shaped furnace consists of a preheating zone, a baking zone and a cooling zone.

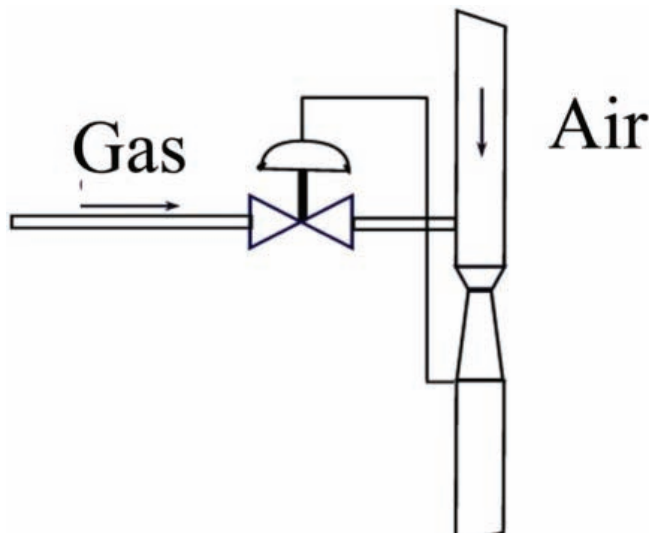
Typical inner sizes are a length of 124 m, height of 1.70 m and a width of 1.40m. The preheating zone is 50 m long, the baking zone 24 m and the cooling zone 50m. Trolleys with products to bake upon it are moved through the furnace. The pipe-making kiln can contain 70 trolleys, the sanitary kiln 47 (length 100 m). The product weight per trolley is 1150-1350 kg in the pipe making case and 200 kg on the sanitary kiln trolley.

There were already energy saving measures taken:

- The exhaust gases were partly used to preheat the ceramic products;
- Air for combustion is preheated in the preheating zone.

Also the engineers of the plant have good ideas about improvements.

Calculations are made to define a heat balance and to see where improvements could be made.



Discussions were held about the amount of excess air, but that could conflict with the baking process. Significant improvements could be made by isolation of the furnace walls and the trolley bottoms. 2-5% saving can be made according to the calculations.

A special control system was seen here. To keep the ratio air/fuel constant, the air pressure in the air supply line (after a Venturi pipe) governs the gas flow control valve. See picture and scheme.

### Belgrade, a fascinating town

On the next photo is shown the military headquarters of the Serbs bombed in 1999 by NATO. The Serbs leave the ruins intact to show the world how nice the Americans are. Actually Serbia was a constitutional Monarchy until the First World War, when Yugoslavia was founded. Many Serbs look proud on that as one sees many statues of kings in Belgrade, Pictures of kings in offices and in the flag and the coat of arms are still the royal crowns present. A very interesting thing is the huge fortress of Belgrade with a splendid view over the rivers Danube and Sava.

### Chelyabinsk, Ural, Russia

#### Technical issues

The company's main office (Rico) is located in Chelyabinsk, Ural, Russia close to the border with Kazakhstan. In Zlatoust – 150 km to the west is European Russia - there is a big slag-dumping place next to the Zlatoust Steelworks. This location is 53 ha great and 30 m deep and contains 13 million tons of slag dumped since 1910. All this dump is now separated in scrap pieces, slag pieces and slag containing iron. The slag pieces are separated in fractions of less than 3 mm, 3-6 mm, 6-40 mm and 40-70 mm. The non-ferrous slag is further treated and can be used in road and building industry. Magnetic drums separate the ferrous slag pieces. The ferrous scrap and slag is sold as scrap.



The question was to find out if it is possible to melt the slag and refine the slag to fluid iron (Fe) and fluid slag, useful for cement making. This smelting process is very complex as the basic and acid

oxides – of which slags are composed; e.g.  $\text{MnO}_2$  &  $\text{SiO}_2$  – do not smelt at acceptable temperatures (below  $1500^\circ\text{C}$ ). To make calculations for these complex processes one needs the phase diagrams for the combinations of these oxides. See **Error! Reference source not found..** Here it can be seen, that melting can take place at  $1251^\circ\text{C}$  for 40%  $\text{SiO}_2$ .

Now for heat calculations for a smelting furnace all the other phase diagrams are necessary. For  $\text{CaO}$ ,  $\text{MgO}$ ,  $\text{Al}_2\text{O}_3$ , etc. etc. Fortunately all those diagrams and data are available on internet!! Now good energy consumption calculations could be made based upon the slag analysis.

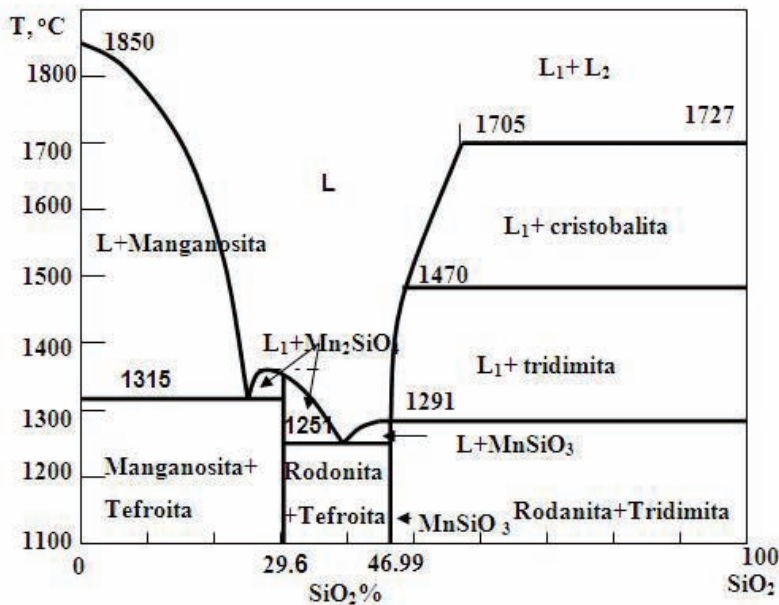


Figure 1 Phase diagram  $\text{SiO}_2$  -  $\text{MnO}_2$ .

For a furnace the company had already proposals from 2 suppliers. However, one was a standard electric arc furnace and the other was a gas burned furnace for making copper and not much experience in producing iron. Another possibility was found in the “Zero Waste” furnace developed by CRM – a well-known Iron & Steel Research Institute – by a good friend of one of my old colleagues. Contacts were made and a follow-up could be organized. However, some weeks after my visit, Rico decided not to invest in a new furnace, but to continue in cold separation.



Figure 2 Monument for tank industry.

### *Chelyabinsk, from tea trading to war industry*

It is really a steel town and was often called "Tankograd", due to the production of T-34 tanks and Katyusha rocket launchers. The town was built from scratch by the Soviets for their war industry. Very many tanks were produced in the communist time, even when they were not necessary at all. Now thousands of tanks are rusting away somewhere far in Siberia. Chelyabinsk has had a long association (since the 1940s) with top-secret nuclear research, though this is more properly applicable to Chelyabinsk Oblast as a whole, as nuclear facilities such as Chelyabinsk-70 (Snezhinsk) are, or were, located far outside the city. A serious nuclear accident occurred in 1957 at the Mayak nuclear fuel reprocessing plant, 150 km north-west of the city, which caused deaths in Chelyabinsk Oblast but not in the city. The province was closed to all foreigners until 1992. A funny thing is that in the coat of arms and the flag of Chelyabinsk there is a camel. The camel is a symbol for the tea trade in the beginning of the 20<sup>th</sup> century. At that

time it was still done with camels.

Now it is a huge town with 1.1 million inhabitants. Most of the busy traffic is buses, trolleybuses and trams. In the time I was there it was snowing for 2 days, resulting in meters snow. That was in the same period as the huge snowfall in Western Europe. The only difference was that in Chelyabinsk the life went on as normal: all trams, buses and airplanes running in time.

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## CONTACT INFORMATION

We live in a digital age. We ask you to send changes in your (e-mail) address to [gridplus@tudelft.nl](mailto:gridplus@tudelft.nl). Your address information will be handled confidentially.

GRID+  
Alumni Association of Control Engineers Delft  
Delft Center for Systems and Control  
Mekelweg 2  
2628 CD Delft, The Netherlands  
Web: <http://gridplus.nl>  
T +31 (0)15 2785119  
F +31 (0)15 2786679  
E-mail: [gridplus@tudelft.nl](mailto:gridplus@tudelft.nl)

Bank account 6065902  
Genootschap Regeltechniek Ingenieurs Delft  
Mekelweg 2  
Delft, The Netherlands  
IBAN: NL 12 PSTB 0006 0659 02  
BIC: PSTBNL21

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You can register online until 01-10-2011 via:  
[www.alumni.tudelft.nl/alumnisymposium2011](http://www.alumni.tudelft.nl/alumnisymposium2011)

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7 October 2011

**Debate on innovation**