Success Story
COMET

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K1 MET
metallurgical competence center

K1-MET
Competence Center for Excellent Technologies in Advanced Metallurgical and Environmental Process Development
Programme: COMET - Competence Centers for Excellent Technologies
Programme line: K1-Centres
COMET-Einzelprojekt, Laufzeit und Projekttyp:
P1.2 Centralised Recycling, 07/2012 - 06/2015, 100 % strategic / multi-firm

From an idea to full scale pilot-plant and further

From the idea to a 300 kg/h pilot plant is the success story of the Flash-Reactor. It is designed to recycle precious materials from waste products of the iron and steel industry. Especially iron and zinc in dust and sludge from integrated steel mills cause huge losses within the by-product management of the steel producers. Usually landfilled or external recycled, the Flash-Reactor is able to separate the waste fraction into two usable products with no solid or liquid waste formation.

From the idea to a pilot plant

Constructing a pilot plant always starts with calculations. Mass and energy balances, cost calculations and the whole detail engineering of the 300 kg/h pilot plant had to be made. Made by a few technicians, under graduated and Ph.D. students in close cooperation with Professors and industrial partners.

The hall at the University site had to be remodelled so the pilot plant could be assembled and fit in. Furthermore the whole commission for the authorities had to be accomplished before the pilot plant could start up. Finally, in June and July 2010 the start-up happened. Weeks of preparation and a proper first time heating up of the plant were necessary before the first drop of liquid material could be tapped. The underequipped hand drill soon had to be replaced through a big air hammer and a huge Drill. After hours of fighting beneath the hot surface plate the first tapping happened at the 13. July 2010.

With the excellent results of the start-up campaign, the continuation of the project with additional trials was no question.

From the pilot plant to a controlled process

The first regular campaign was a setback due to a critical failing of the cooling. So the refractory was renewed and further significant changes to the cooling device were made. With the experience of the following campaigns, the tapping had to be improved and after one very successful campaign another failure of the cooling device happened. With the experience of our industrial partners we were able to solve the problems and within the last 5 campaigns only minor modifications to improve the handling of the pilot plant were necessary. Campaigns usually take one to two weeks after excessive preparation and a premature end is rewarded only with experience.

bmwfw Federal Ministry of Science, Research and Economy
bmvit Austrian Ministry for Transport, Innovation and Technology

Fig. 1: Flash-Reactor pilot plant

Impact and effects

About 2 % of the total crude steel production is lost in the dust phase. High zinc content limits the reuse of these dusts within the steel mills. These dusts also contain a significant content of iron and slag formers, which are also valuable for the iron and steel industry.

With the RecoDust-Process the recycling of dusts and sludge from an integrated steel mill is possible with no waste formation. It separates the input material in 2 products, a synthetic iron ore and a crude zinc oxide.

The iron ore is low in zinc, the primary quality criteria for the reuse in the blast furnace route. The crude zinc oxide is high in zinc (> 95 % zinc) and low in other elements which could limit the reuse in primary production.

The quality of the products allows a reuse as secondary resources in iron and zinc industry.

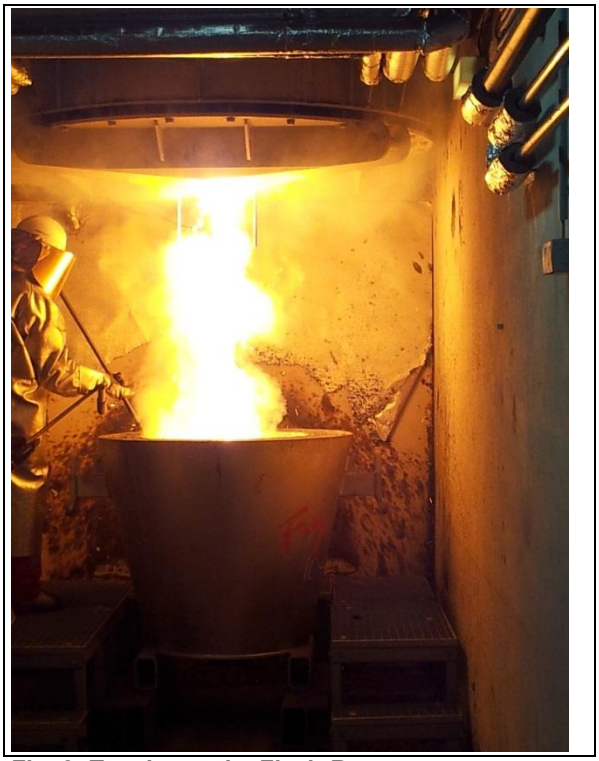

Fig. 2: Tapping at the Flash-Reactor

With the excellent results of the pilot plant trials the next step is to evaluate the possibilities of an upscaling of the pilot plant for industrial application.

Due to the leap from 300 kg/h to a full size industrial plant, there will be enough technological and scientifically questions to answer within the newly founded K1-centre.

Contact and information

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Further information on COMET – Competence Centers for Excellent Technologies:www.ffg.at/comet
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