High Grade Ferromanganese from Spent Primary Batteries

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High Grade FeMn from Spent Primary Batteries

- The new directive for battery recycling (draft 11/ 2003) demands for primary batteries a minimum recycling rate of 55 %

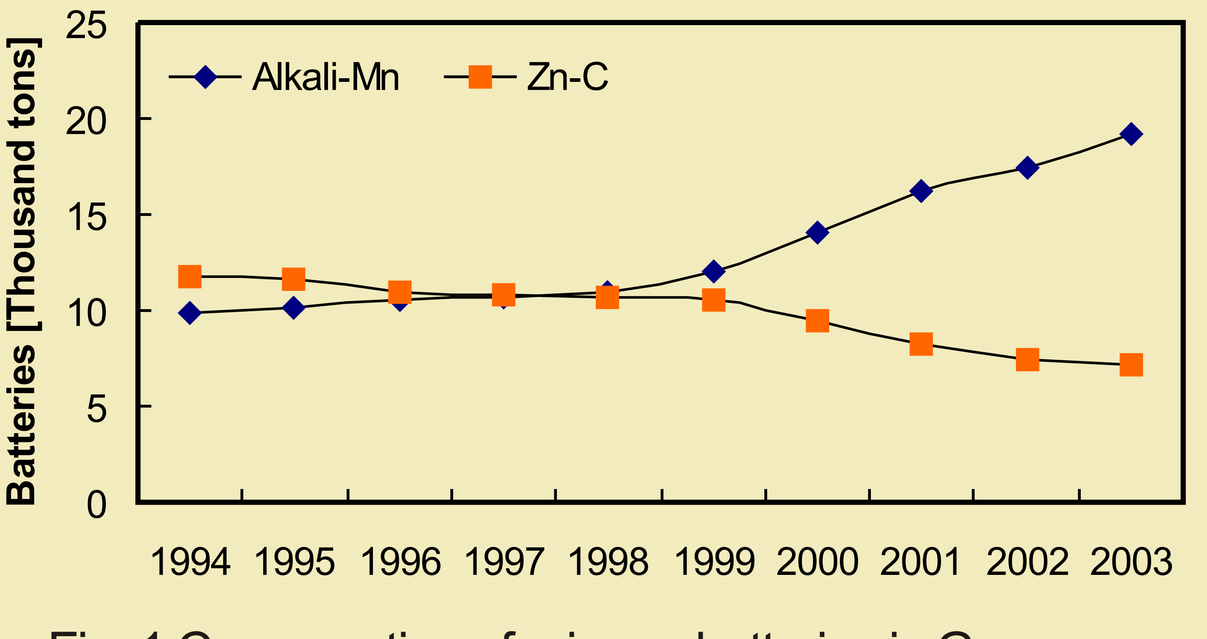


Fig. 1 Consumption of primary batteries in Germany

Aims of the research project at IME, Aachen

- Producing a > 50 % high manganese-FeMn
- Safeguard a recovery yield higher than 50 %
- Investigation of the feasibility of a metal condenser process attached to DC-EAF

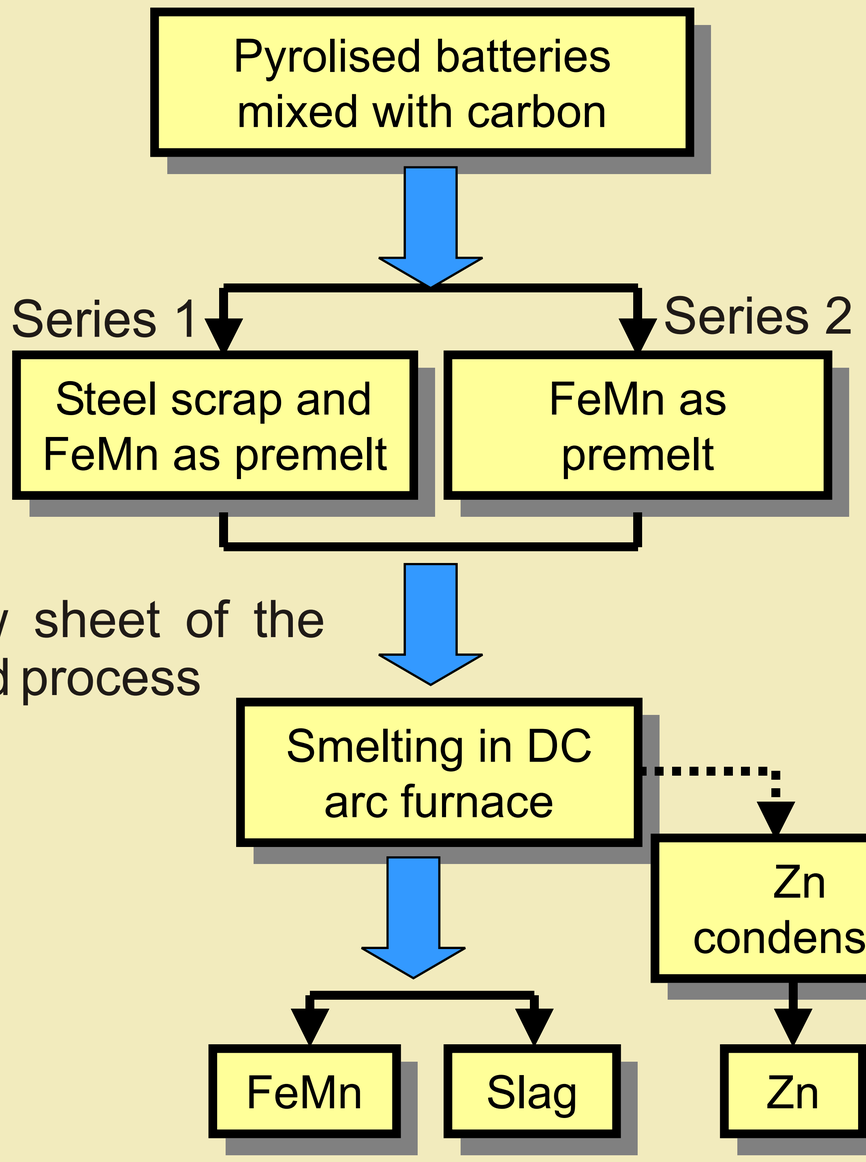


Fig. 2 Flow sheet of the investigated process

Table 1. Chemical composition of potentially recycable materials in spent primary batteries

Battery system	MnO_2 [w%]	Zn [w%]	Fe [w%]	C [w%]
Alkaline	32-40	15-19	20-25	4
Zn-C	23-27	20-24	15-20	8

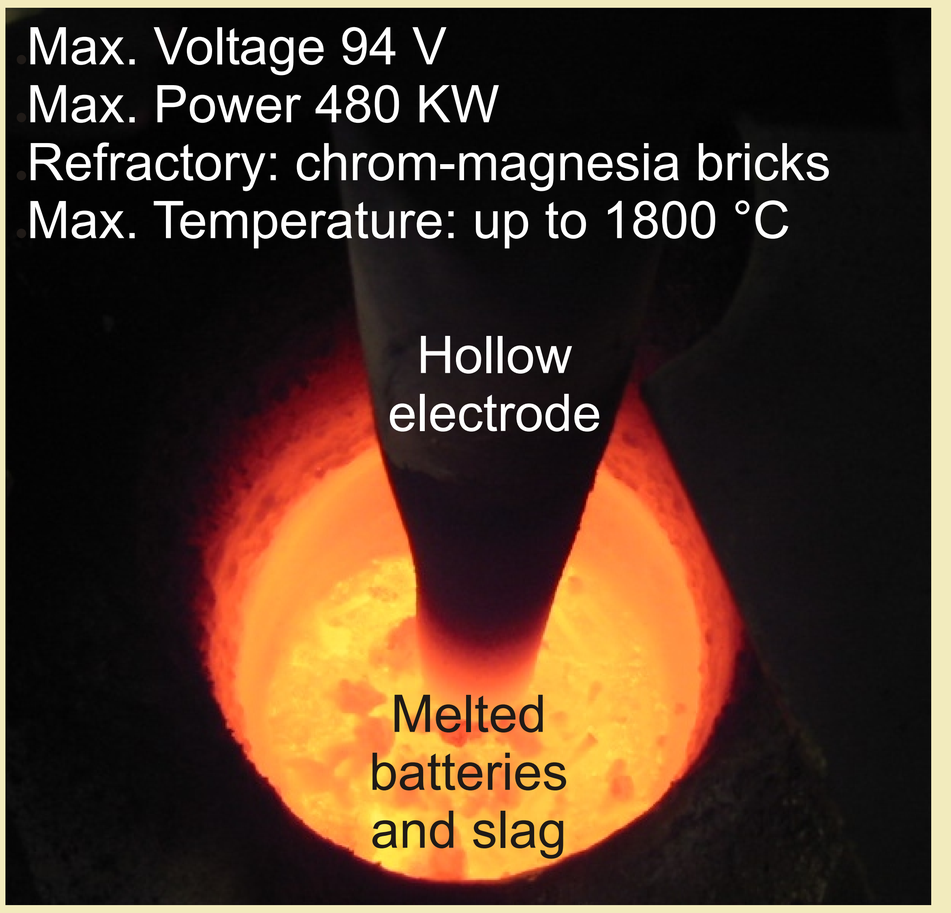
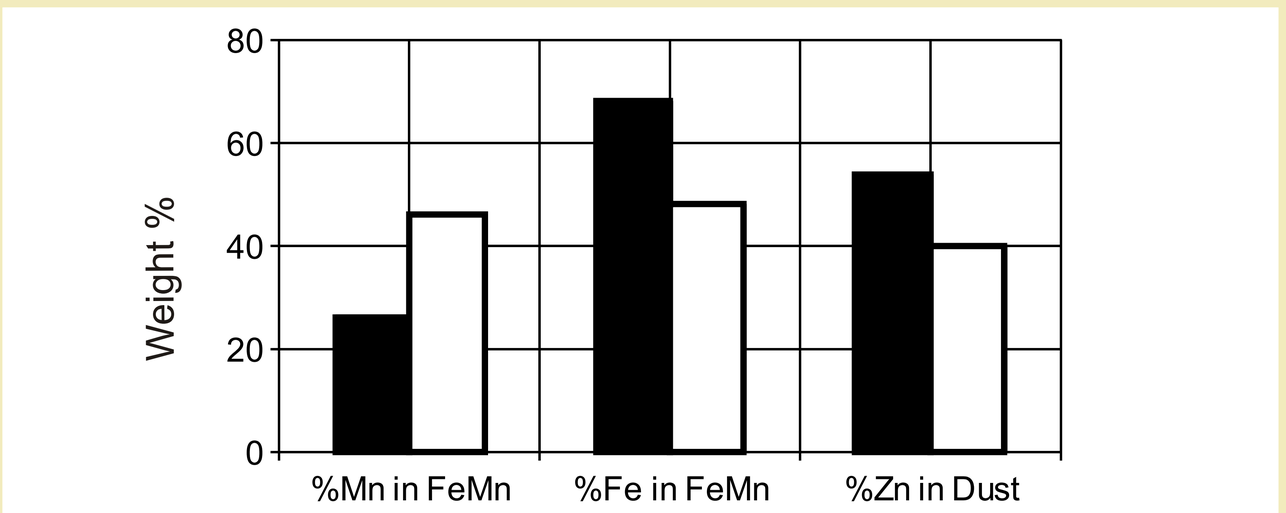


Fig. 3 Treatment of primary batteries in a DC-EAF with hollow electrode

Results

- A metallic premelt was used. In series 1 the manganese content is diluted to 26 % due to the added steel scrap
- In series 2 FeMn simulating the residue of continuous process after tapping worked very well as premelt. The Mn content in FeMn is about two times higher compared to series 1



	%Mn in FeMn	%Fe in FeMn	%Zn in Dust
series 1	26	68	54
series 2	46	48	40

Fig.4 Results of the pilot plant trials at IME, Aachen

Conclusions

- According to the results, the DC-EAF serves good possibilities to produce FeMn from spent primary batteries. However a further development of the slag system will give important additional information to improve the efficiency of the process
- Zn was won in oxidic form because it was not feasible at this stage of development to install a Zn-condenser

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