

Optimizing Melting Furnace

Program

Goal

Melter design + melting method

Design of experiments + variables

PLC

Results

Conclusions

Recommendations

Questions/remarks

Goal

Increase melt rate

Decrease melt loss

Decrease specific gas consumption needed for melting

This all for different types of scrap

Goal(Ct'd)

Types of alloy(scrap):

- 8xxx: internal FRP, offset, thick wire, standard ingots
- 3xxx/5xxx: internal FRP, offset, thick wire, foil(3004), pressed bales, granules(shreddered), punchings
- extr. 6xxx: profiles, off set, thick wire

Melter design + melting method

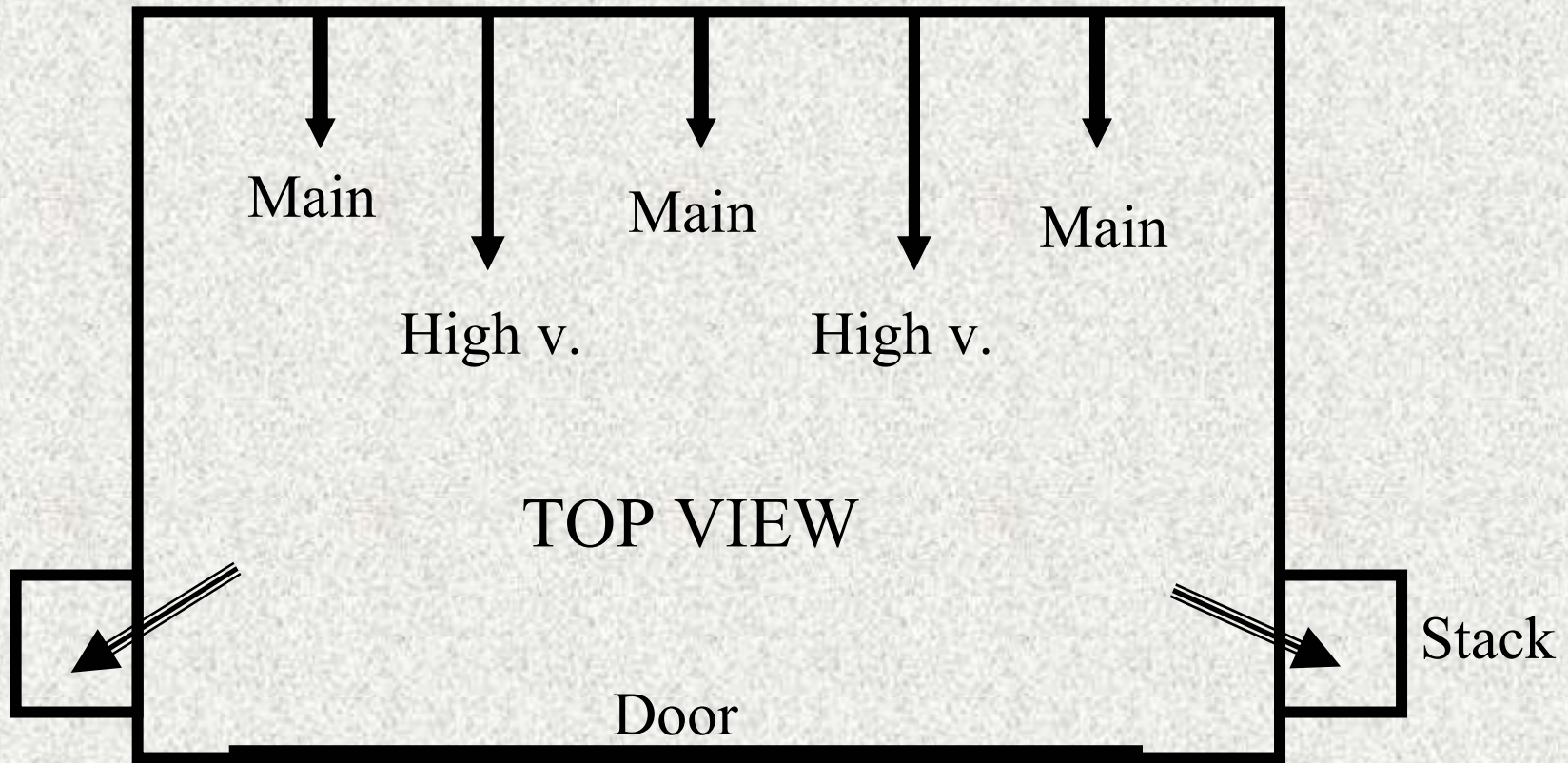
Open hearth type(reverb)

3 main burners(radiation)(3x 200 nM3/h)

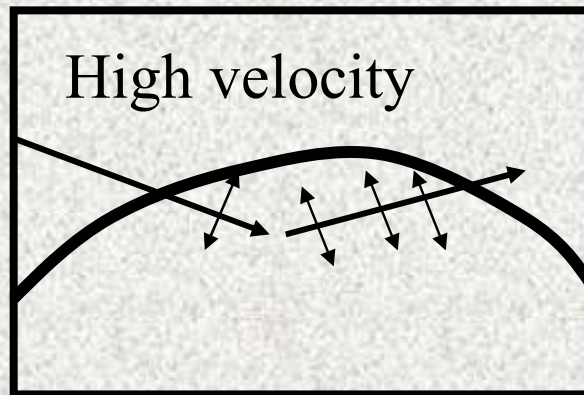
2 extra burners(high velocity, 2 x max. 100 nM3/h)

12 poros plugs for melt stirring

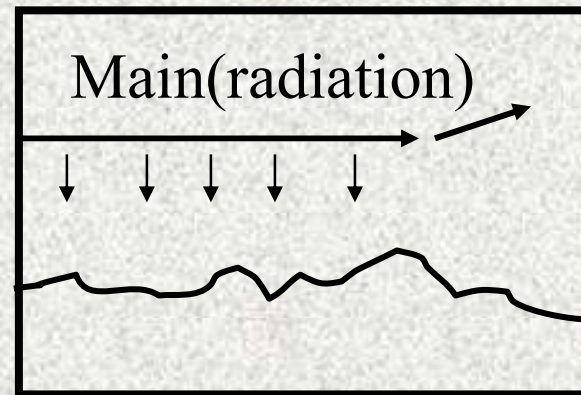
Melter design + melting method(Ct'd)



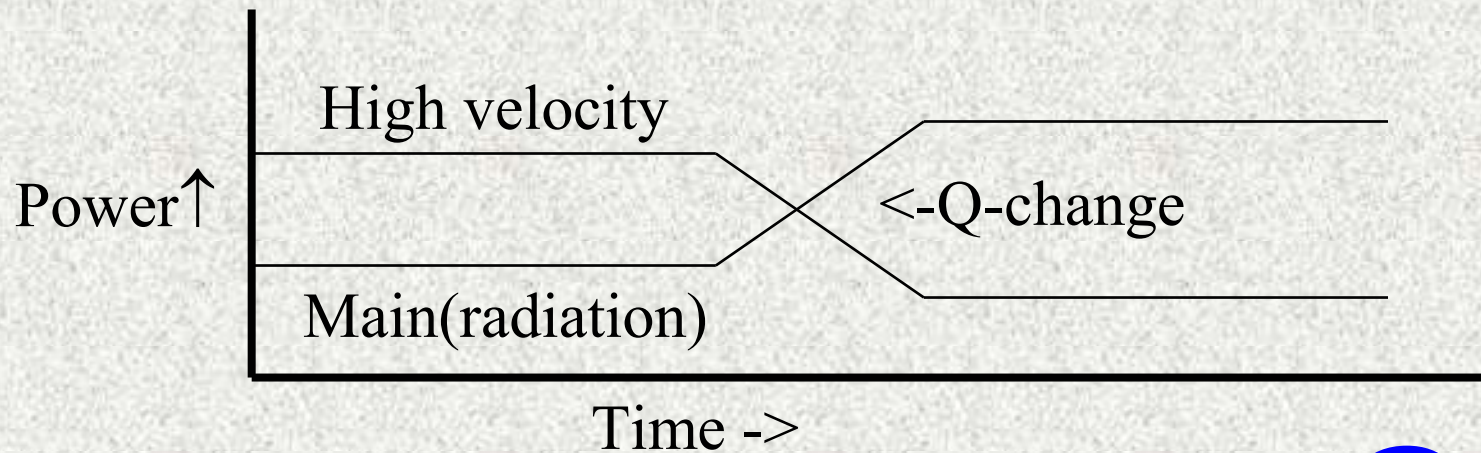
Melting method(Ct'd), theory



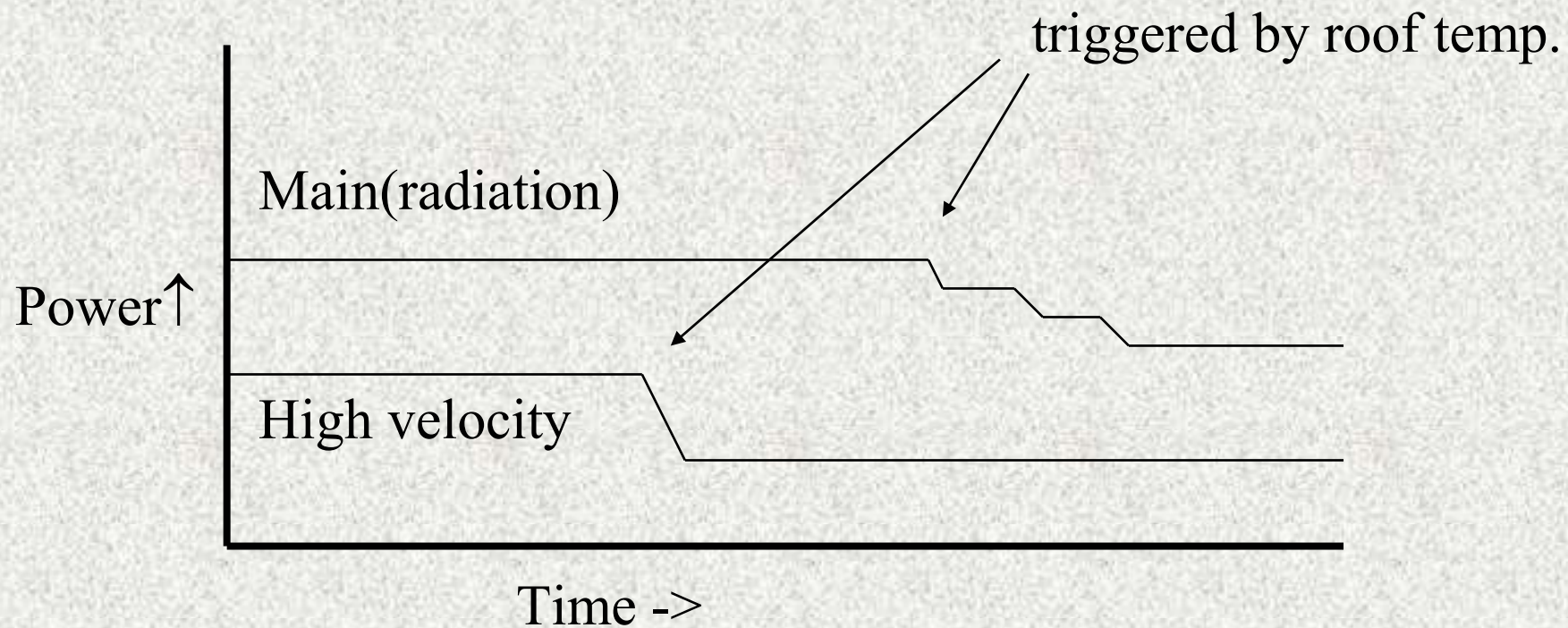
Scrap(solid)



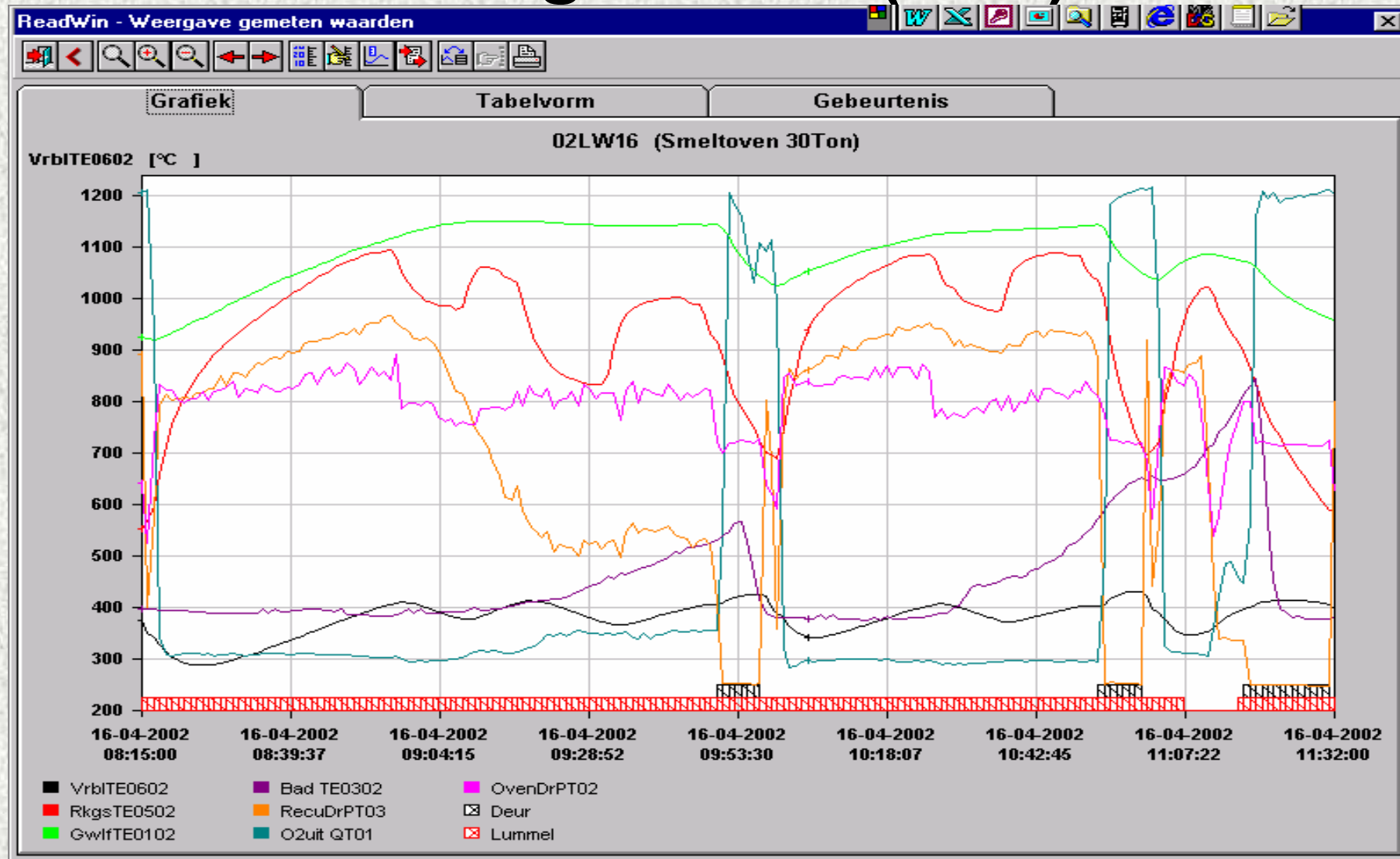
Semi-liquid



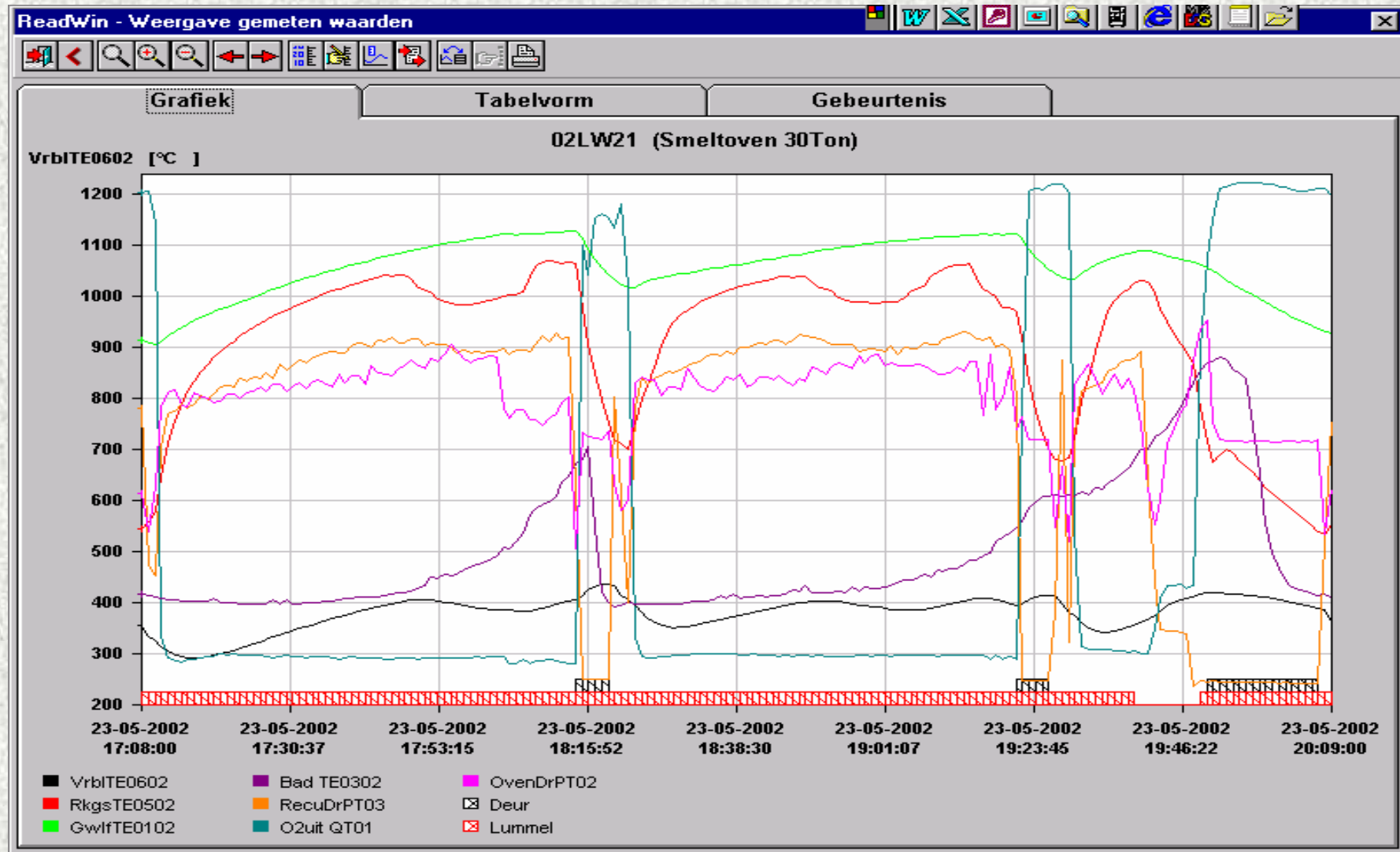
Melting method(Ct'd), current situation



Melting method(Ct'd)



Melting method(Ct'd)



Design Of Experiments(DOE)

Semi-black box approach

Variables(high-low):

- oxygen level in fumes
- temp at which high velocity burners turn low
- power of high velocity burners
- power of main burners
- number of times loading the melter each batch

PLC

Possibility to select a “melt receipt” for each type of alloy(scrap)

DOE results only in directions, fine tuning is needed.

PLC makes Q-change possible

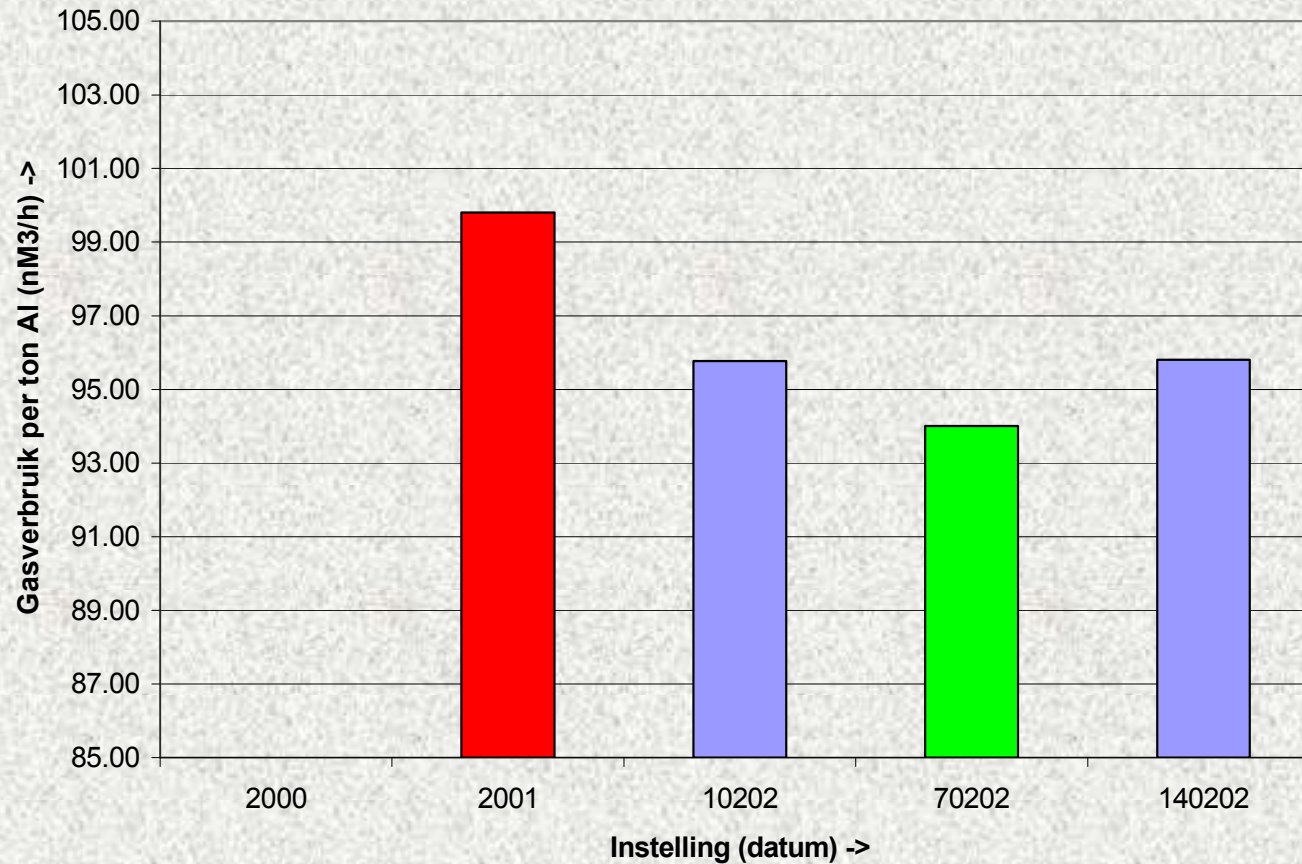
Results

DOE:

	8xxx	3xxx/5xxx	extr.6xxx
Oxygen level	Low	Low	Low
Temp Hv burners low	High	Low	High
Power of Hv burners	High	High	Low
Power of main burners	Low	High	High
# of loading times	Low	low	low

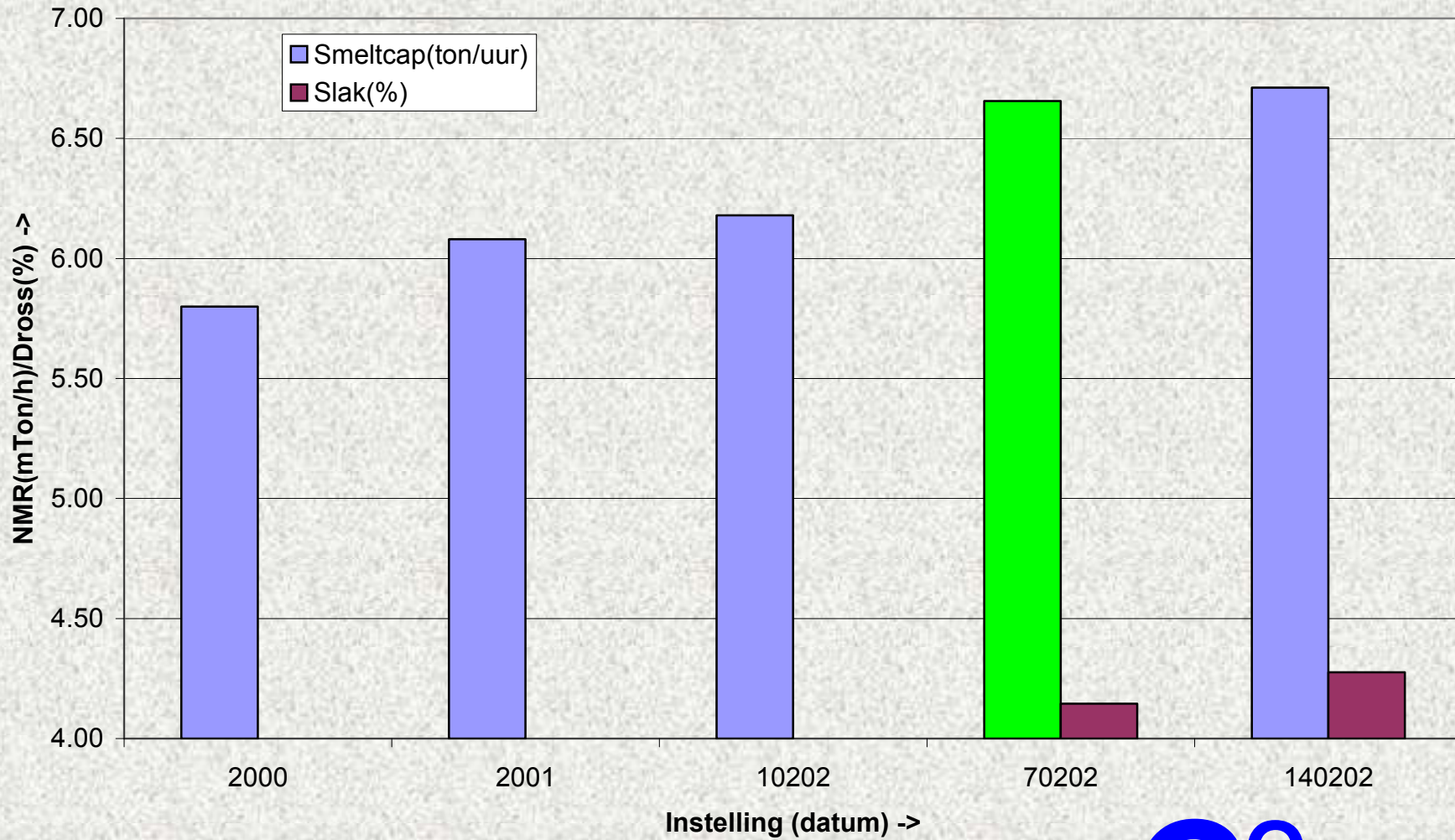
Results

Gasverbruik (item 12/1468, 8xxx)



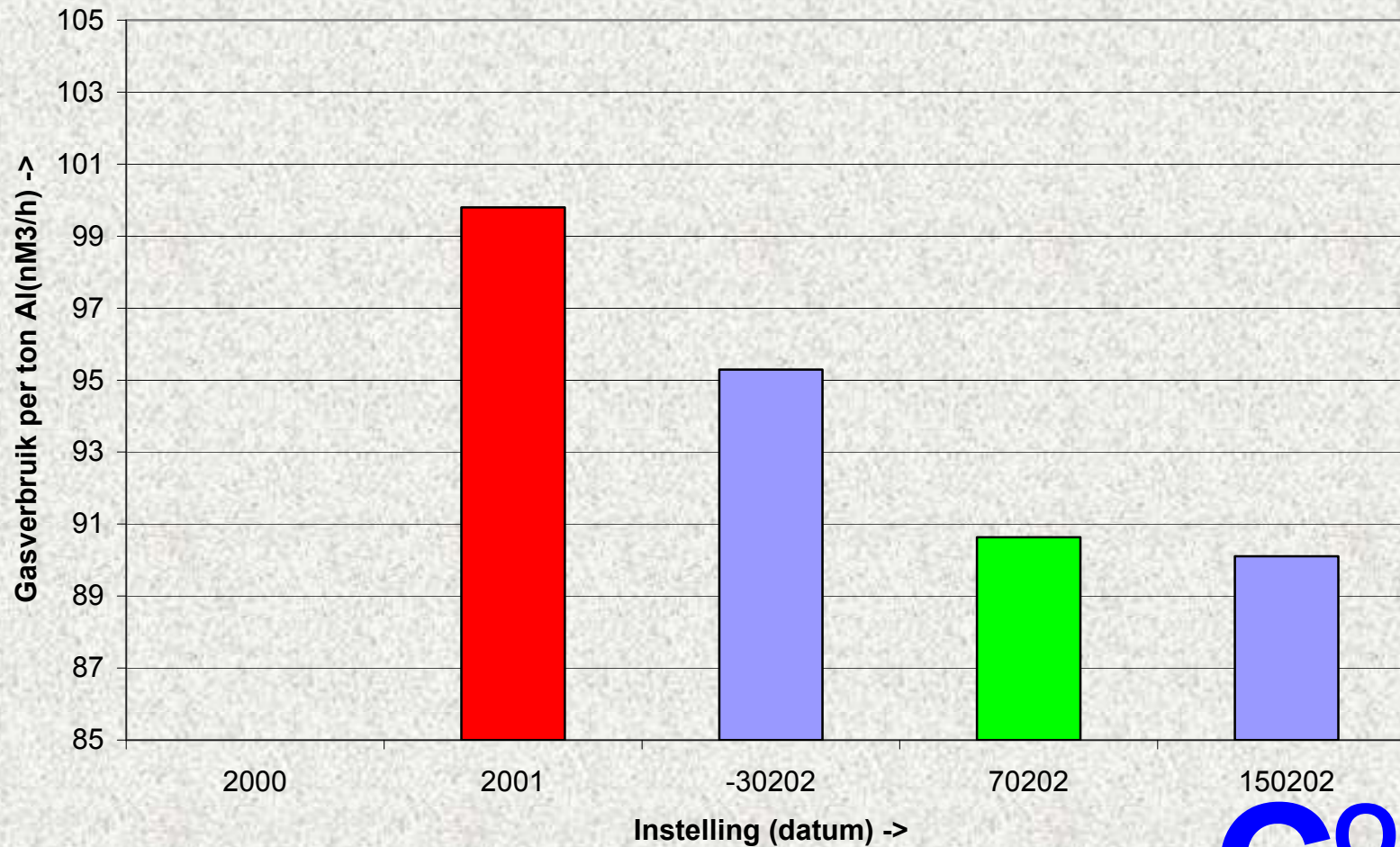
Results(Ct'd)

Items 12/1468(8xxx)



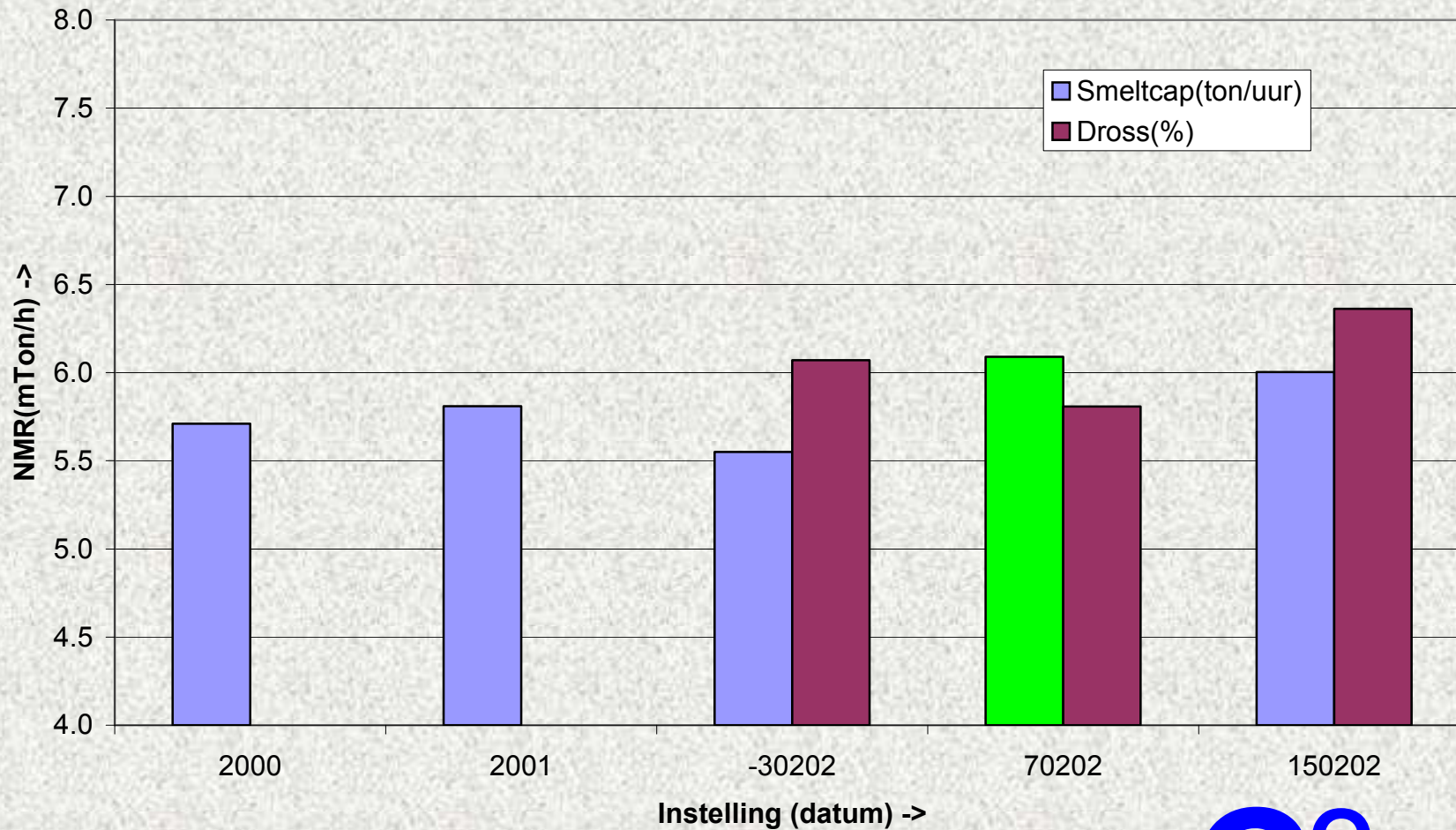
Results(Ct'd)

Gasverbruik Item(52-53, 3xxx-5xxx)



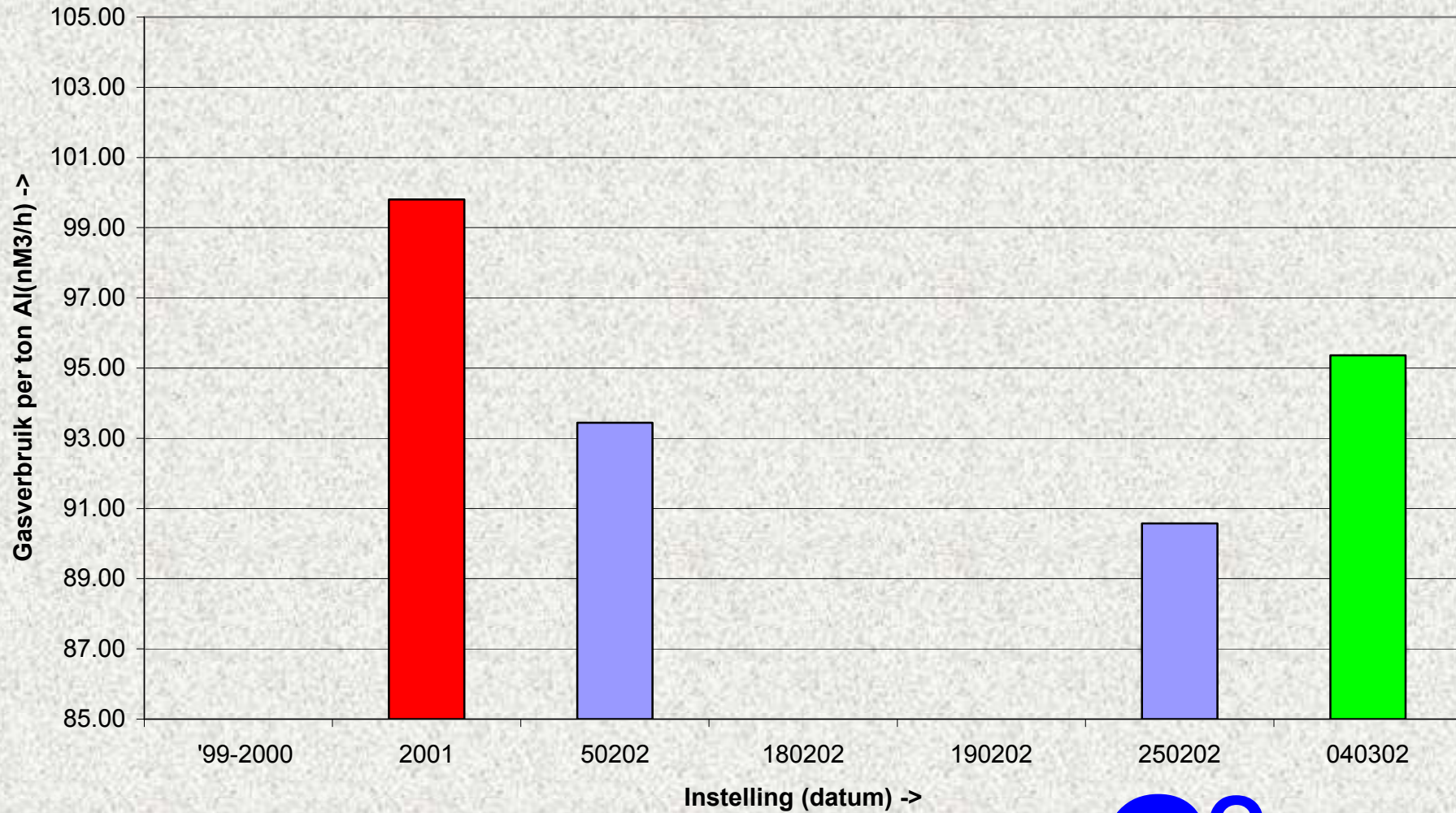
Results(Ct'd)

Items 52-53 (3xxx-5xxx)



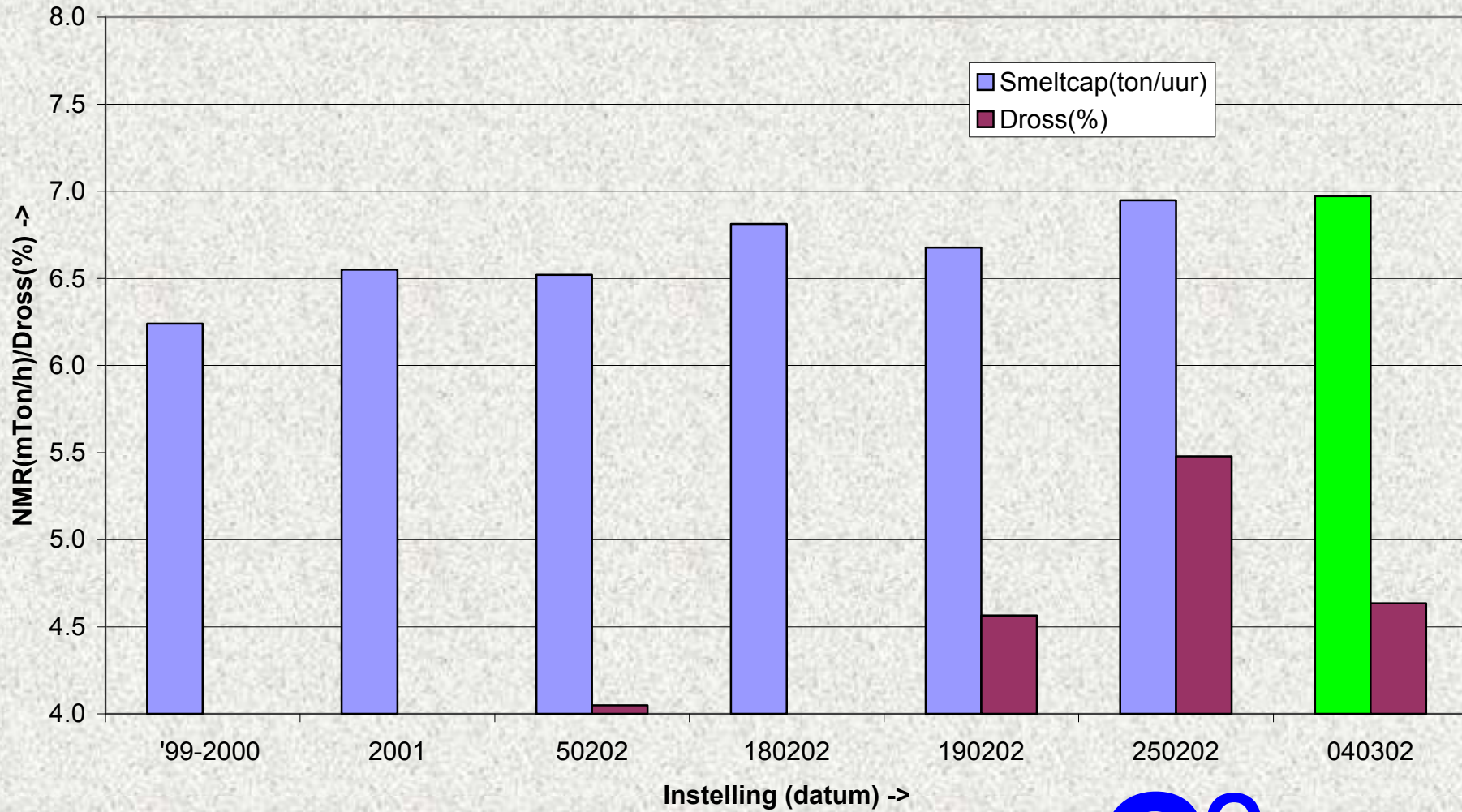
Results(Ct'd)

Gasverbruik (extrusie items, 6xxx)



Results(Ct'd)

Extrusie item(6xxx)



Results(Ct'd)

Gasverbruik(nM ^ 3/h)			
Alloy type	2001"	huidige instelling	
8xxx	100	94	-6 %
3xxx/5xxx	100	91	-9 %
extr.6xxx	100	90-95	-7 %

Smeltcap(m Ton/h)			
Alloy type	2001"	huidige instelling	
8xxx	6.1	6.7	+10 %
3xxx/5xxx	5.8	6.1	+5 %
extr.6xxx	6.6	7.0	+6 %

Slak(%)			
Alloy type	2001"	huidige instelling	
8xxx	---	4.1	
3xxx/5xxx	---	5.8	
extr.6xxx	---	4.6	

Conclusions

Furnace parameters depend on type of alloy(scrap)

DOE is a suitable tool for optimizing furnace performance

Gas consumption could be reduced while productivity increases

Recommendations

Address the extrusion alloy settings(6xxx) question with more data

Set-up a DEO with the Q-change system

Questions/remarks

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