"Gas nitriding of a Fe-C-Mn Alloy - a thermodynamic analysis"

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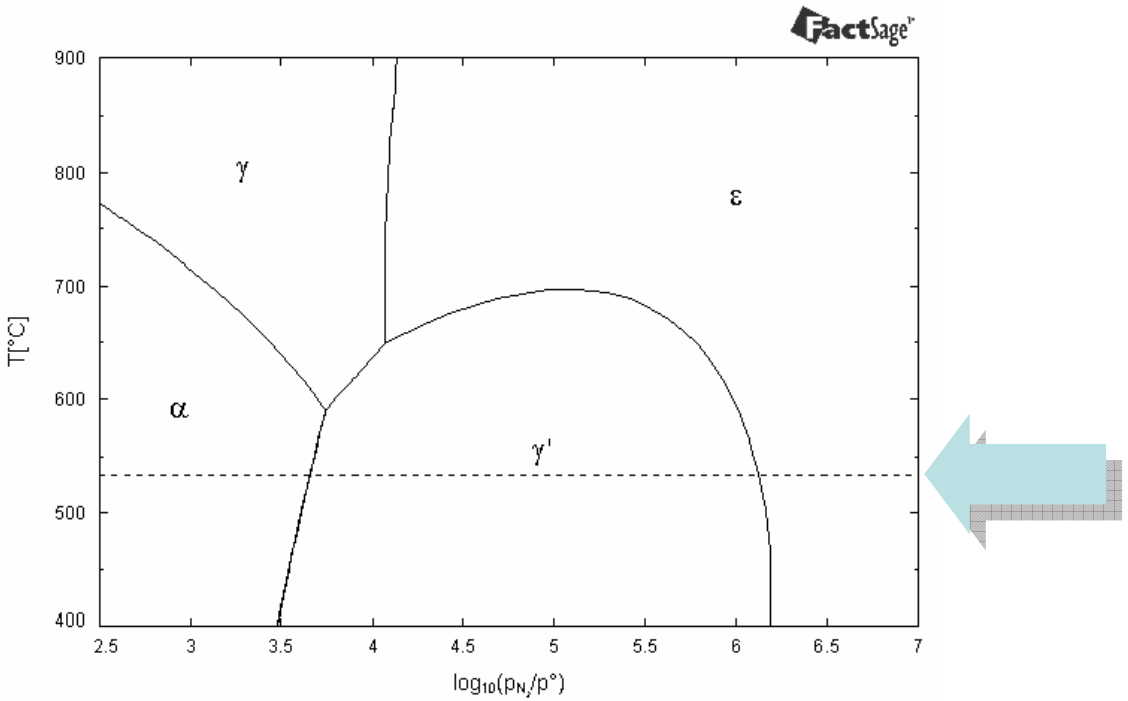

Fe-N Lehrer diagram
Nitriding of Fe

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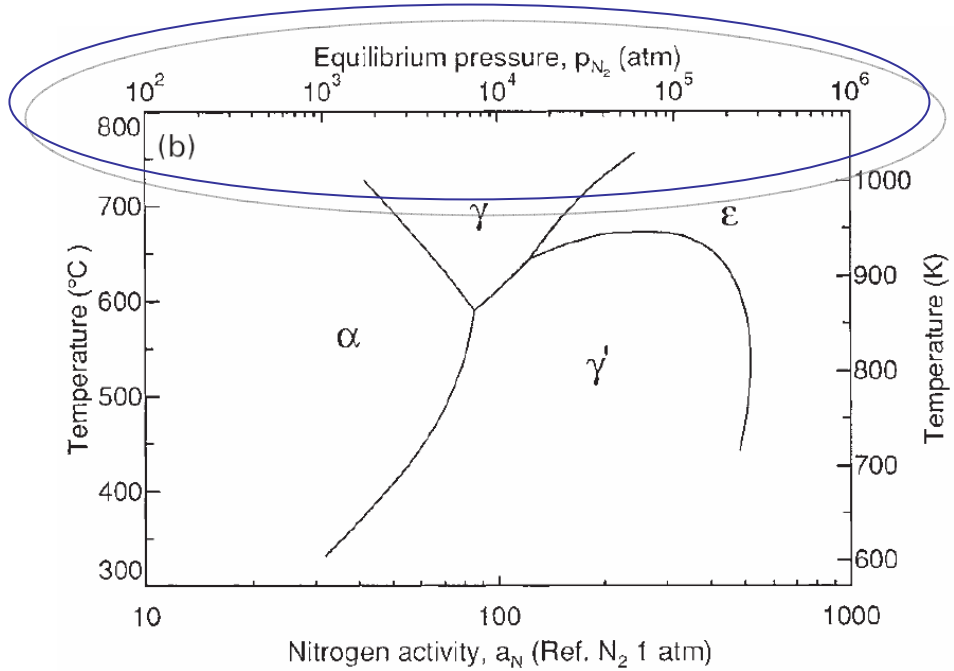
$$G_{N_2} = G^{o}_{N_2} + RT \ln P_{N_2}$$

$$\mu_N = \mu^{o}_N + RT \ln a_N$$

$$\mu_N = \frac{1}{2}\mu^{o}_{N_2} + RT \ln a_N$$

$$\frac{1}{2}G_{N_2} = \frac{1}{2}G^{o}_{N_2} + RT \ln\left(P^{1/2}_{N_2}\right)$$

$$a_N = P^{1/2}_{N_2}$$



Mittemeijer and Slycke. Potentials and activities in gaseous nitriding and carburising. Surface Engineering 1996 Vol. 12 No. 2

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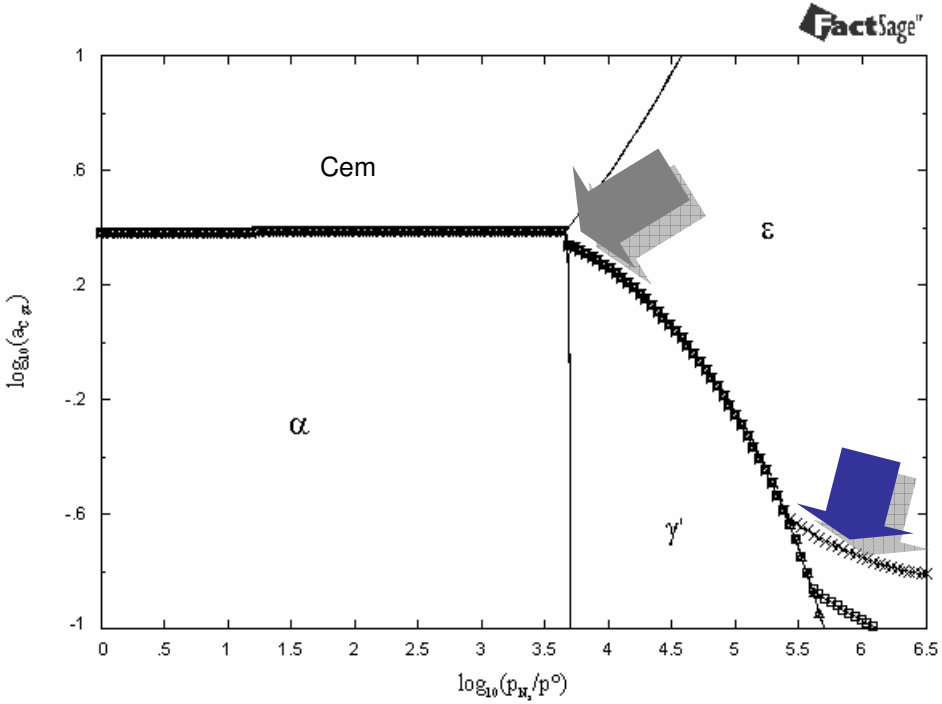

Fe-N-C Isothermal section of **Lehrer** diagram; T = 560 [ºC]
Nitriding of Fe-C alloy

(x = 1%C, □= 0.8%C, Δ= 0.4%C and ○= 0.2%C)

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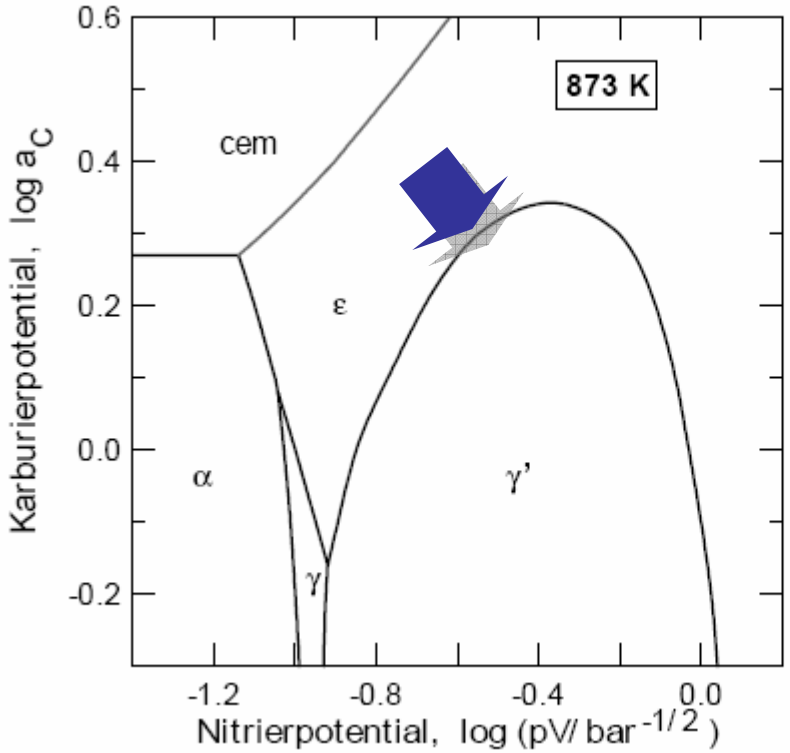

Abb. 16:
Stabilitätsbereiche der Phasen bei 600 °C in Abhängigkeit von Nitrier- und Carburierpotentialen

Dr.-Ing. habil. Joachim Kunze
Physikalisch-chemische Grundlagen der Wärmebehandlung und Randschichttechnik
Lecture Notes

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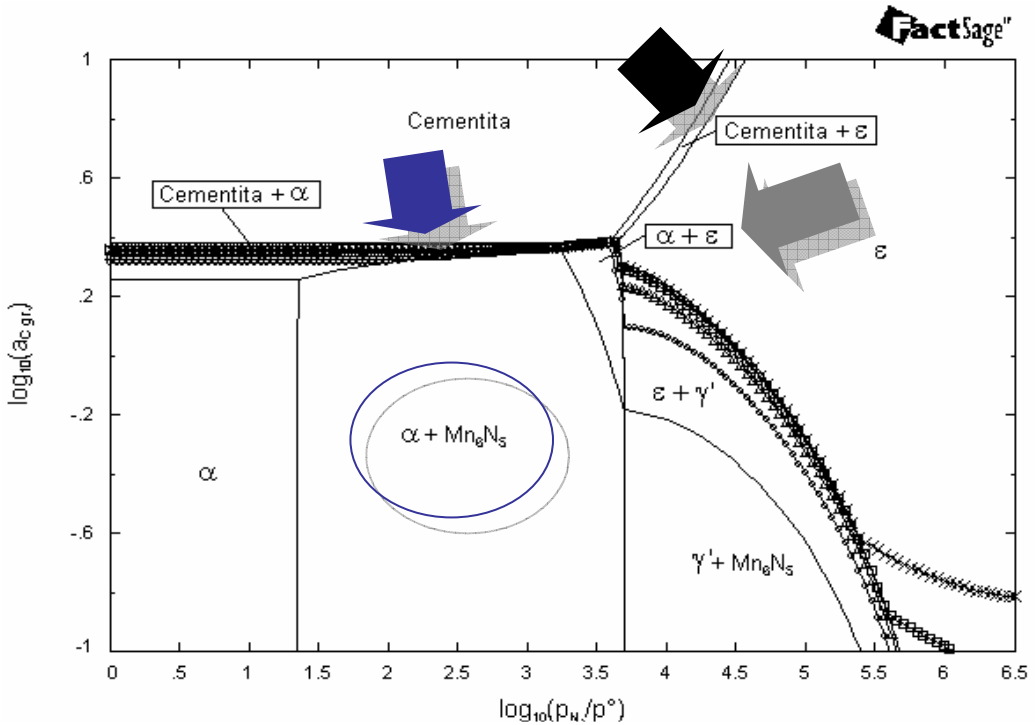

Fe-N-C-Mn T = 560 [°C]
Alloy composition: 99,7%Fe, 0,3%Mn, with several wt.% C
Nitriding of Fe-Mn-C

x = 1%C, □= 0,8%C, Δ= 0,4%C e ○= 0,2%C

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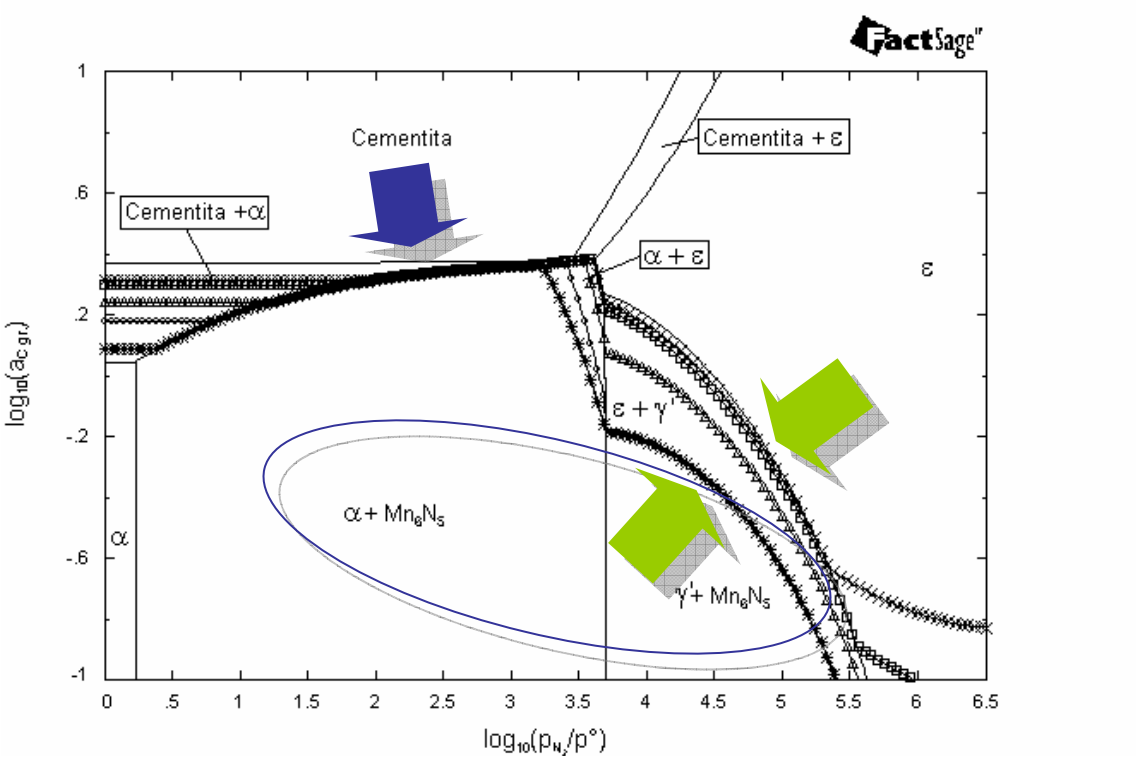

Fe-N-C-Mn T = 560 [°C]
Alloy composition: 99,1%Fe, 0,9%Mn, with several wt.% C
Nitriding of Fe-Mn-C

x = 1%C, □= 0,8%C, Δ= 0,4%C e ○= 0,2%C

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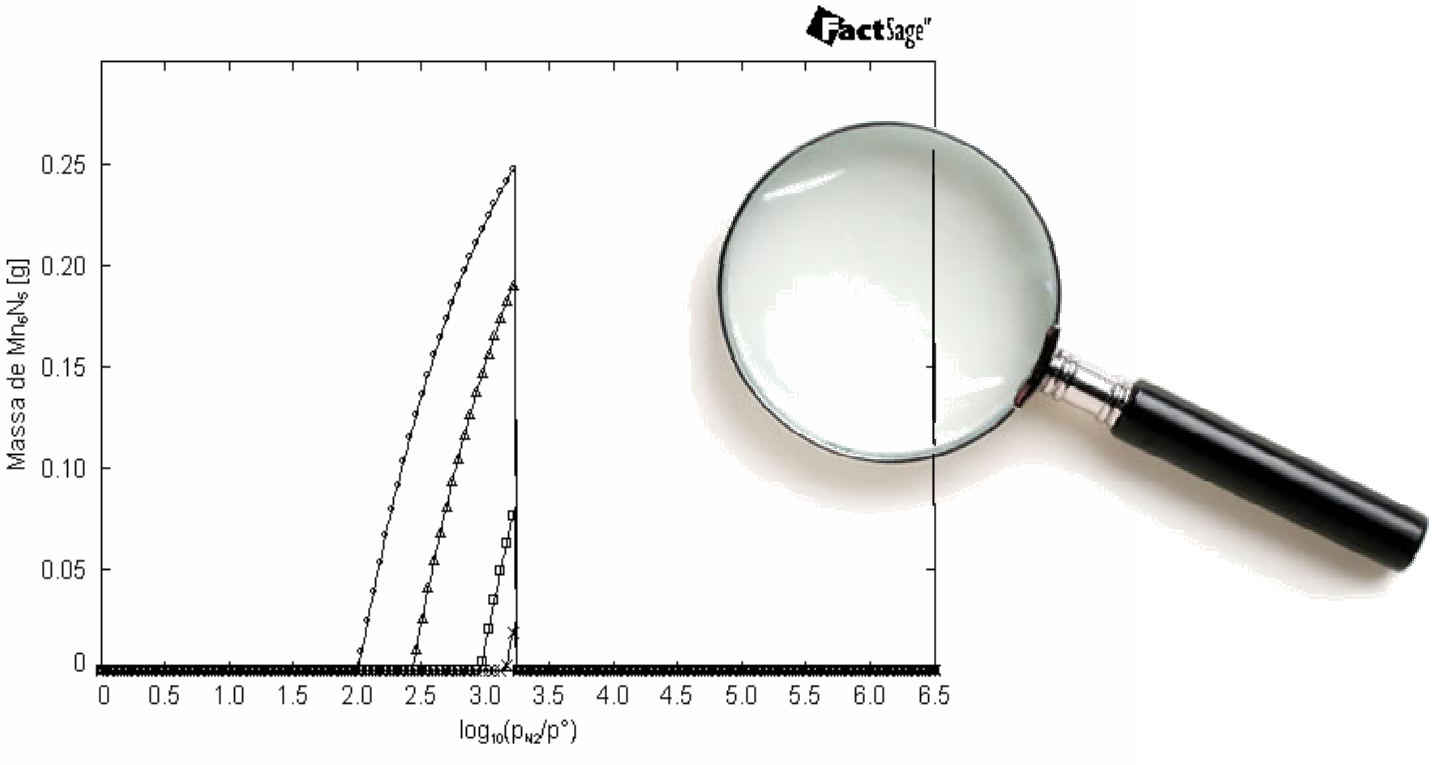

Mn6N5 amount, Fe-N-C-Mn T = 560 [°C]
Alloy composition: 99,1%Fe, 0,3%Mn, with several wt.% C
Nitriding of Fe-Mn-C

x = 1%C, □= 0,8%C, Δ= 0,4%C e ○= 0,2%C

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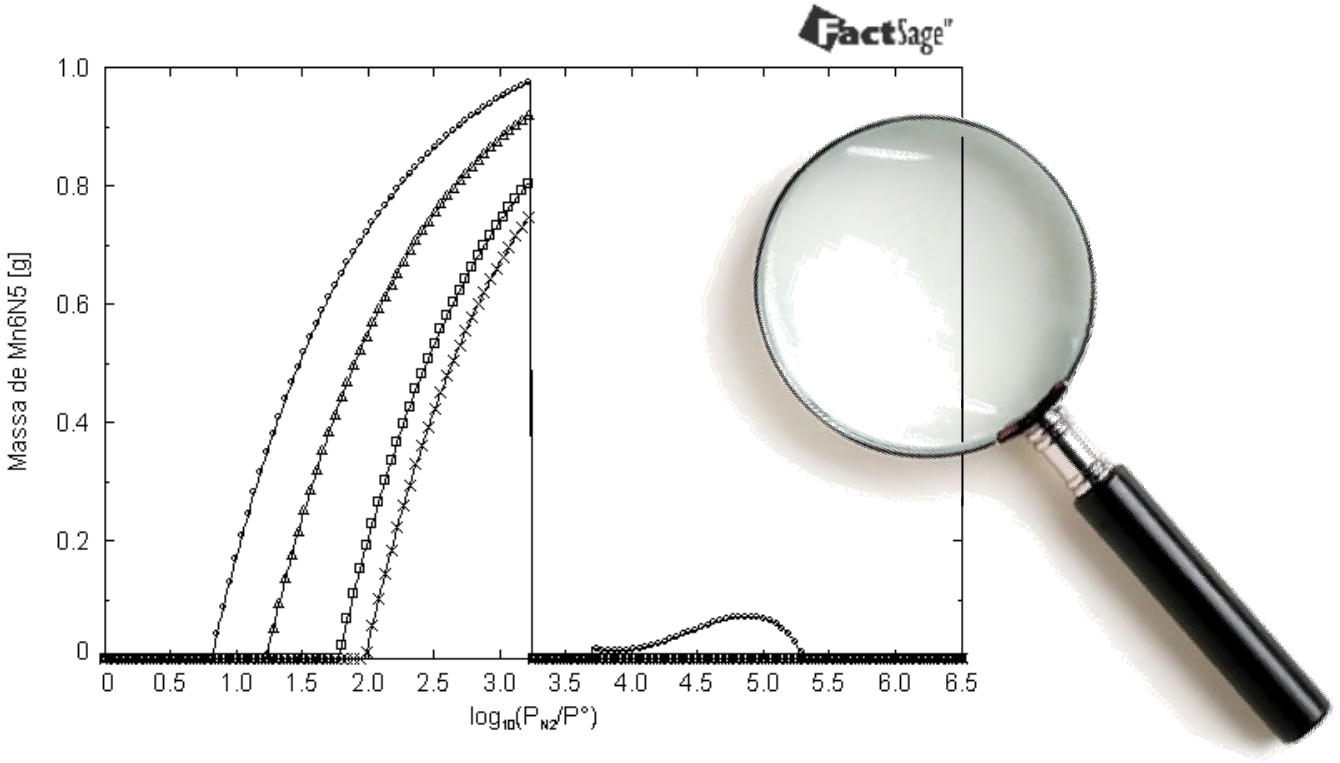

Mn6N5 amount, Fe-N-C-Mn T = 560 [°C]
Alloy composition: 99,1%Fe, 0,9%Mn, with several wt.% C
Nitriding of Fe-Mn-C

x = 1%C, □= 0,8%C, Δ= 0,4%C e ○= 0,2%C

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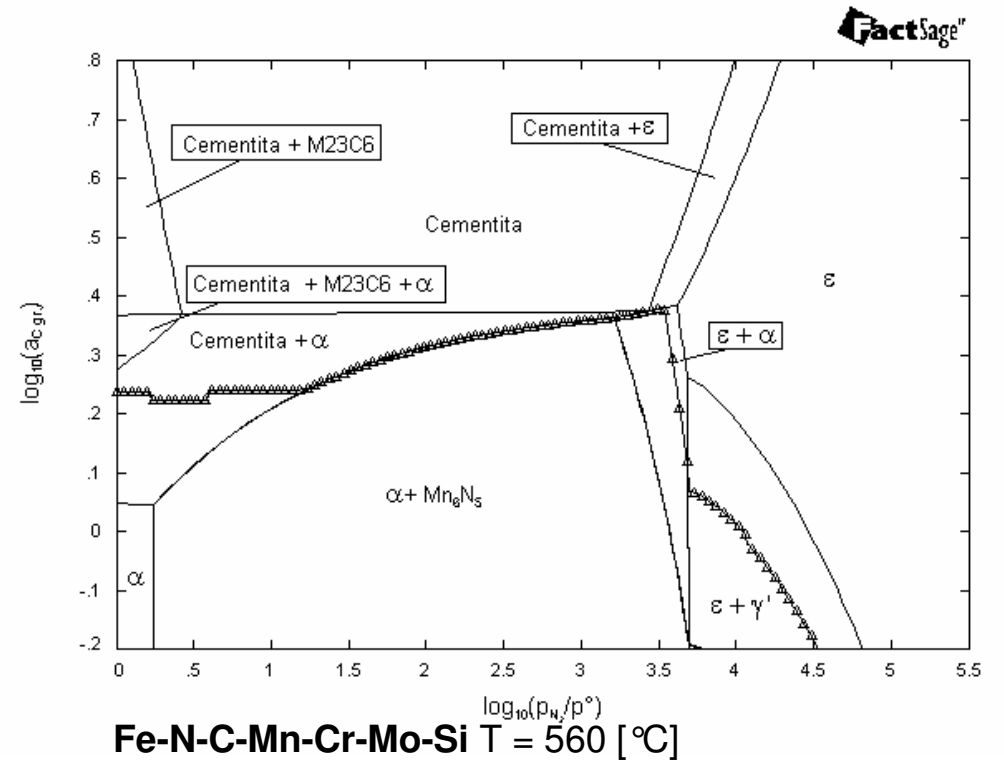

Fe-N-C-Mn-Cr-Mo-Si T = 560 [°C]
Ref. states: N2(g), p°= 1 [atm], graphite
CrN and Si3N4 present in all phase fields

∆ nitriding of a 0,4%C, **0,95%Cr**, **0,2%Mo**, 0,9%Mn e 0,3%Si, rest Fe alloy
~ SAE 4140

NTCm

Danke!