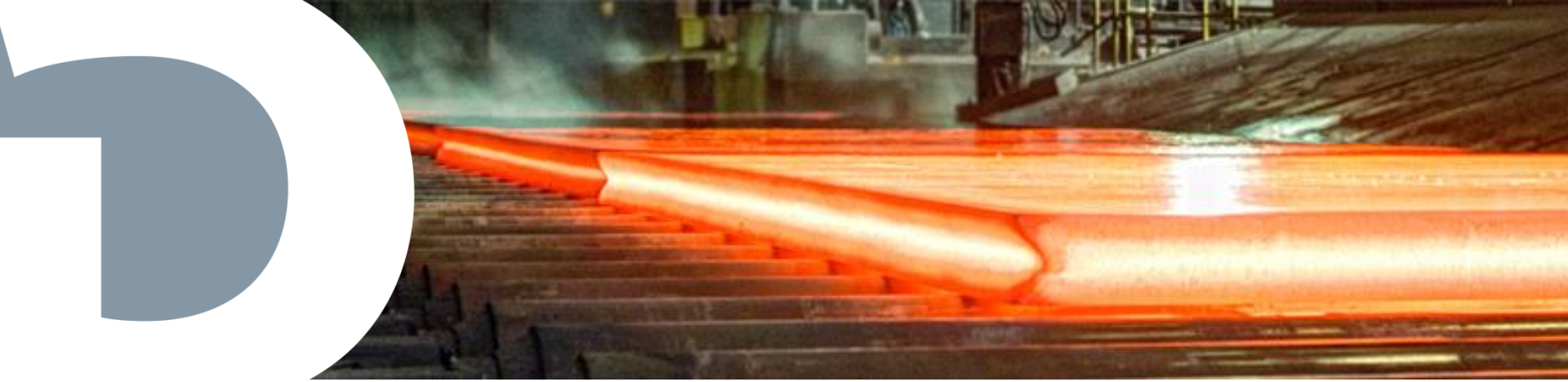

DILLINGER

Cost efficient and reliable fabrication with TM steel

Dr. Tobias Lehnert

Long experience in the Netherlands

Zuid Beveland Brug, 1992

Tonnage: 800 t S460M (10-80 mm)
900 t S355M (10-100 mm)

Proven in imposing bridge projects

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Zandhazenbrug

Total delivery: 8.200 t
with 6.900 t S460M/ML up to 120 mm

TM steel – a worldwide success story

Not only in Steel Construction...

Many other applications profit from TM Steels:

Pipelines, Offshore Platforms, Offshore Wind...

⇨ e.g. > 90 % of steel foundations for Offshore Wind built with TM Steel

So, why is TM Steel preferable?

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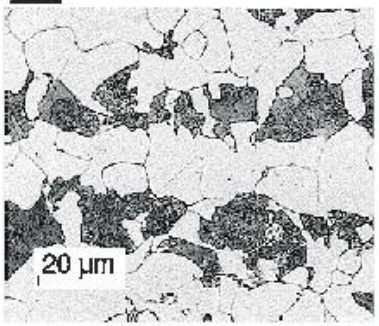
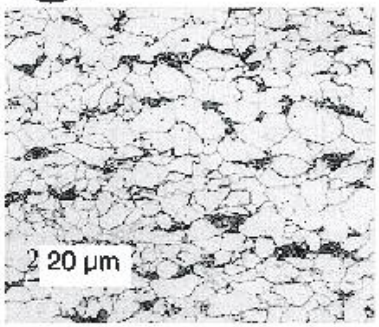
TM ⇨ fine grain

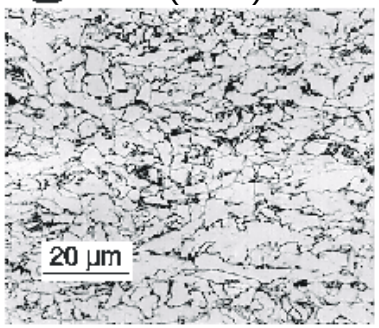
N Normalized



TMa TM (air)



TMb TM (ACC)



Hall-Petch relation:

Grain size ↓ → Strength ↑, Toughness ↑ + Excellent weldability

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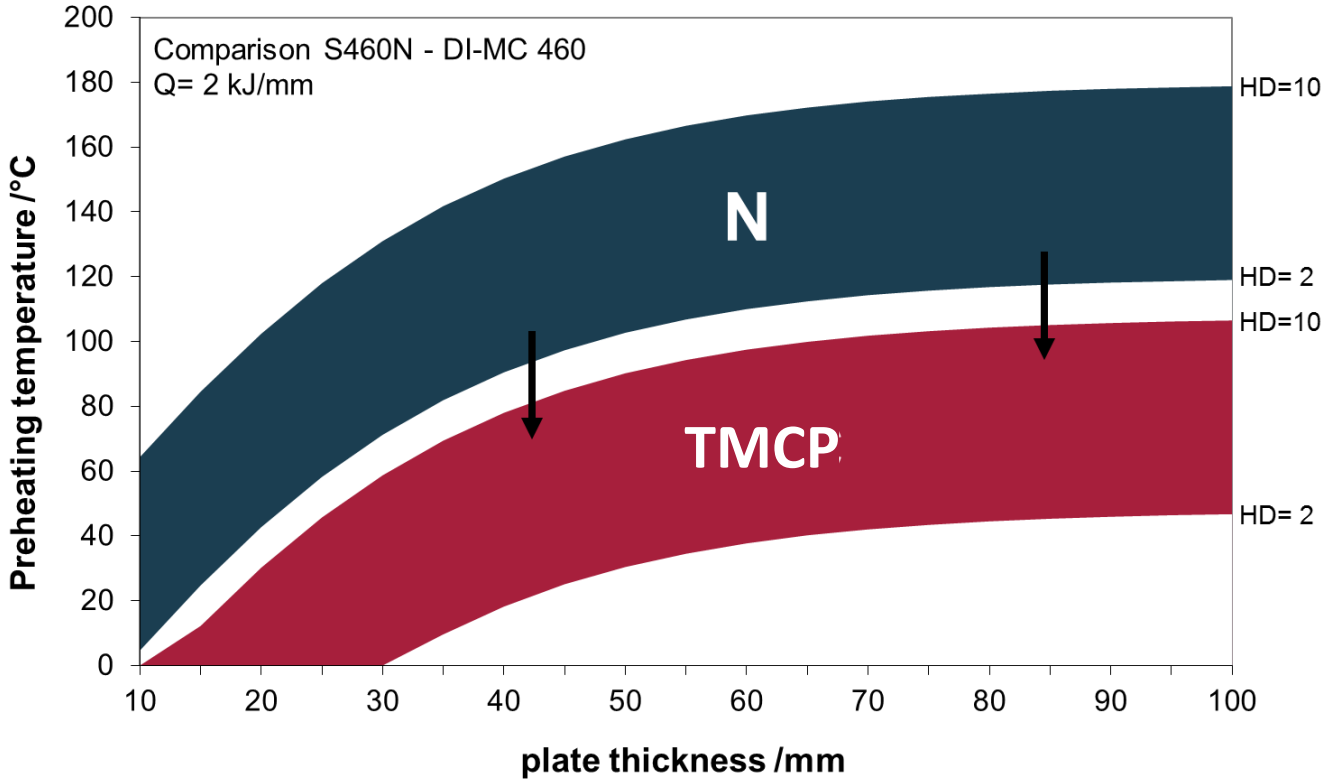
Reduction of preheating according to EN 1011-2 method B



⇨reduced fabrication time

⇨less energy needed

⇨HIGH COST-EFFECTIVNESS

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Flame cutting

(e.g. typical DI-MC 460 (~ Gr. 65) with plate thickness ~ 50 mm)

Recommended temperature management for flame cutting

Steeltype: DI-MC

Plate thickness [mm]: 50.0

Chemische Elemente

S Sulphur: <= 0.025	**C Carbon (<= 0.80)**: 0.075	**Mn Manganese (<= 2.10)**: 1.6	**Mo Molydenum (<= 1.50)**: 0.014
V Vanadium (<= 0.4): 0.0010	**Cu Copper (<= 0.80)**: 0.029	**Cr Chromium (<= 3.00)**: 0.237	**Ni Nickel (<= 9.50)**: 0.052
B Boron (<= 0.0035): 0.0030			

Preheating temperature or minimum temperature during flame cutting [°C]: RT*

*RT= room temperature

extracted from E-Service Tool from Dillinger Hütte Website

Cold forming:

- Excellent behaviour due to

  high toughness values

Hot forming:

- No classical hot forming possible

  due to formation of new grain structure

- but medium-hot forming up to 580 °C

Stress relief heat treatment:

- Temperature: 530 -580 °C

- Soaking time: max 4 h

Advantages of TM-Steel

TM ➔ lower carbon equivalent

- ⇨ excellent weldability
- ⇨ no or less preheating
- ⇨ cost as well as time savings

TM ➔ high toughness

- ⇨ toughness buffer for secure fabrication
- ⇨ additional construction safety

TM ➔ improved surface quality