

# ABB Turbo Systems



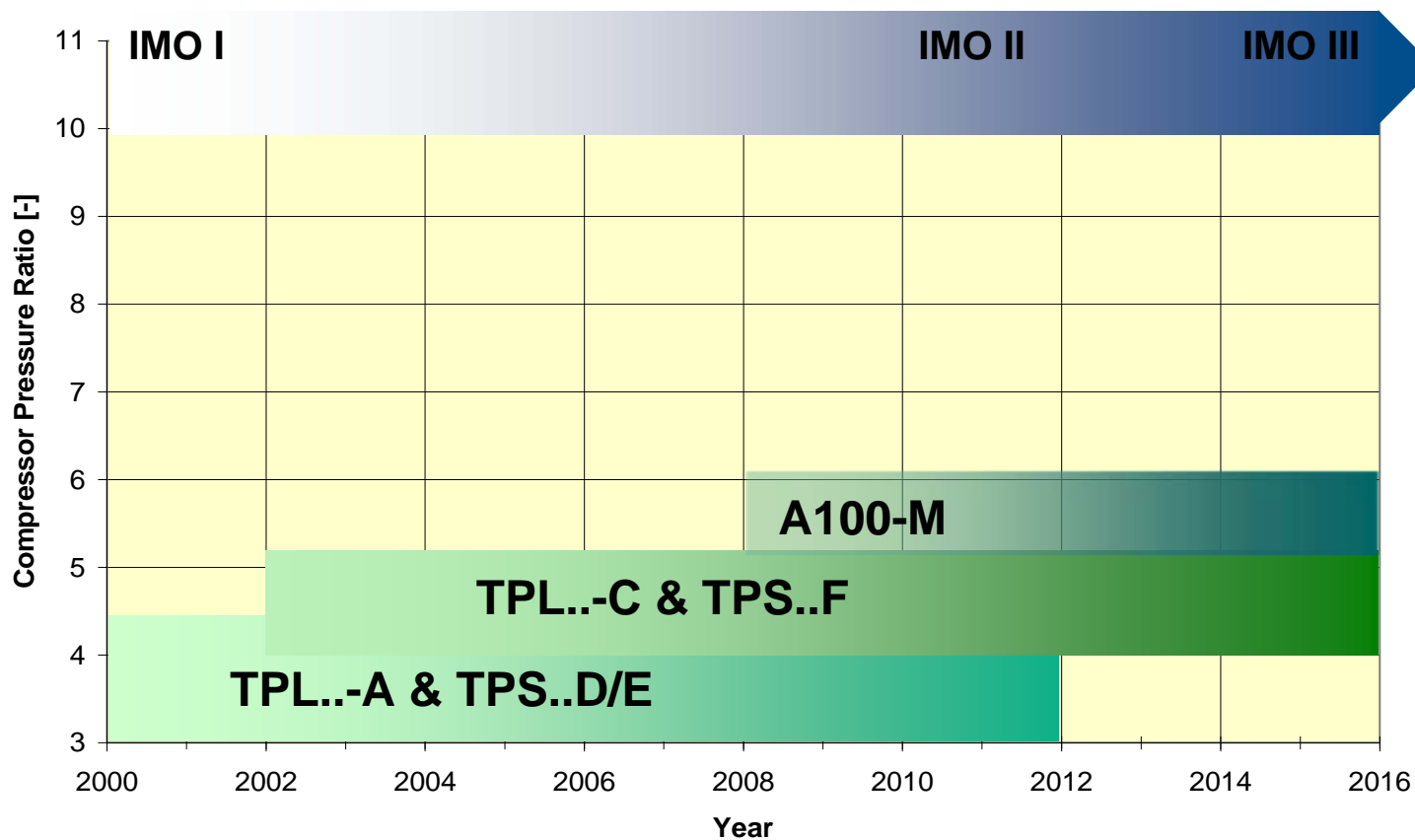
**CIMAC Panel @ Marinetechnica**  
Low emissions – a new challenge for turbocharging



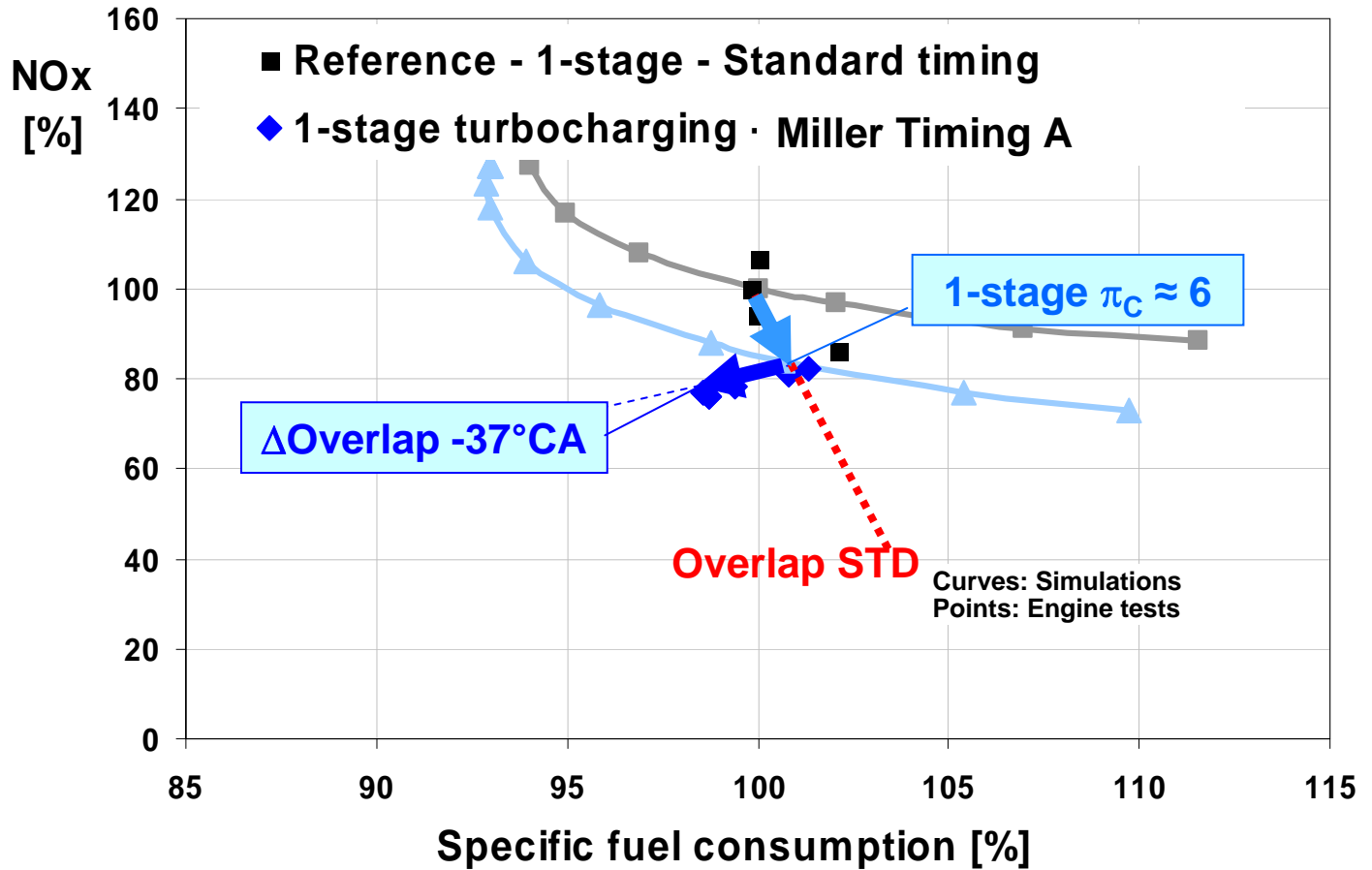
[www.abb.com/turbocharging](http://www.abb.com/turbocharging)



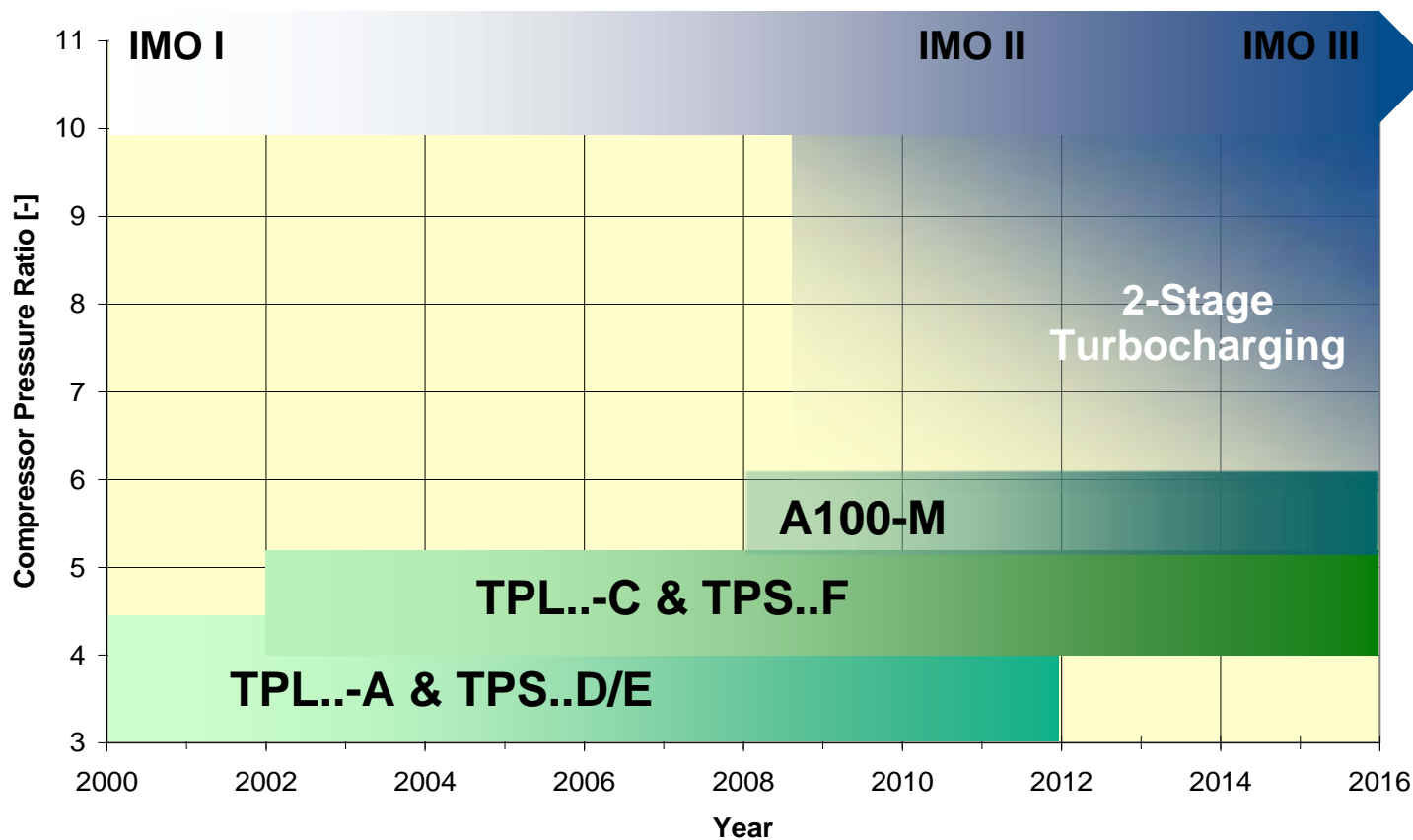
# Turbocharging Outlook (4-stroke)



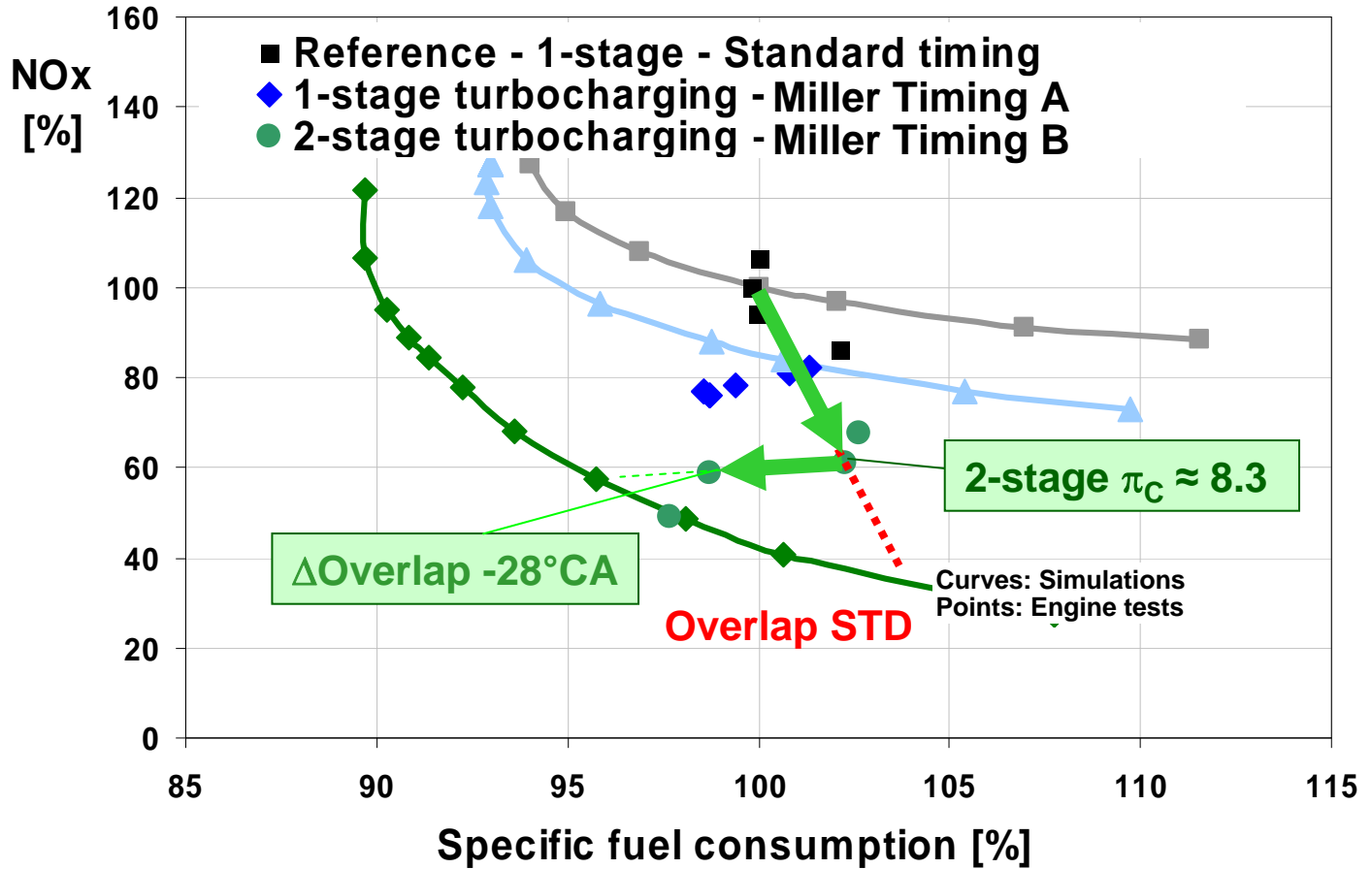
# Engine Performance Results



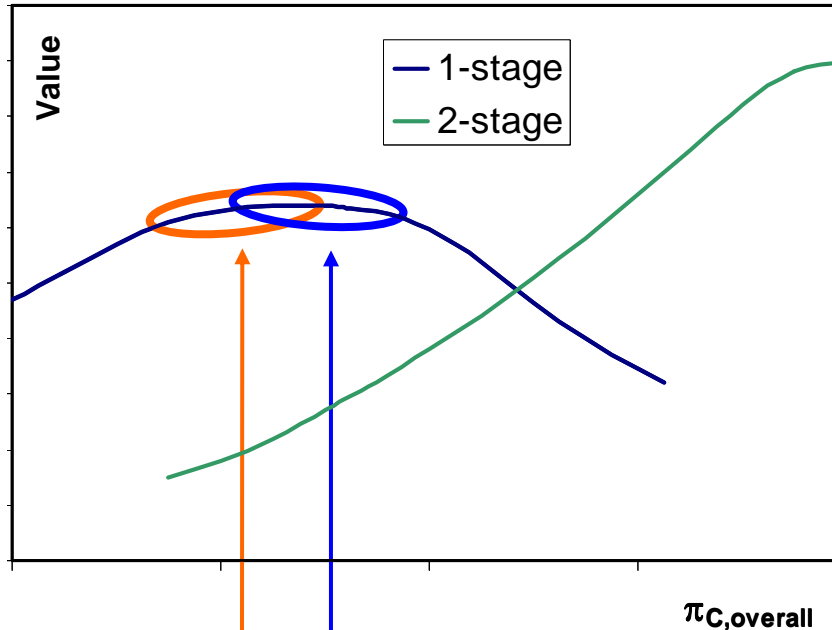
# Turbocharging Outlook (4-stroke)



# Engine Performance Results



# Limits and Chances



TPS-F / TPL-C



A100

## 1-Stage $\pi_{sV} > 6$ :

- increased TC-size
- limited  $\eta_{TC}$
- limited matching flexibility
- higher stress level

## 2-Stage $\pi_{sV} > 8$ :

- smaller TC sizes
- increased  $\eta_{TC}$
- matching flexibility high
- lower stress level
- improved load response

# Conclusions



- Emission regulations are becoming a major driver in engine- and turbocharger-development
- Higher  $\pi_{sV}$ ,  $\eta_{TC}$  and specific air flows are contradictory market requirements calling for new ways in turbocharging
- Traditional drivers as reliability, service friendliness e. a. remain still valid
- More advanced turbocharging solutions including new control elements are a must for the future

**ABB**