

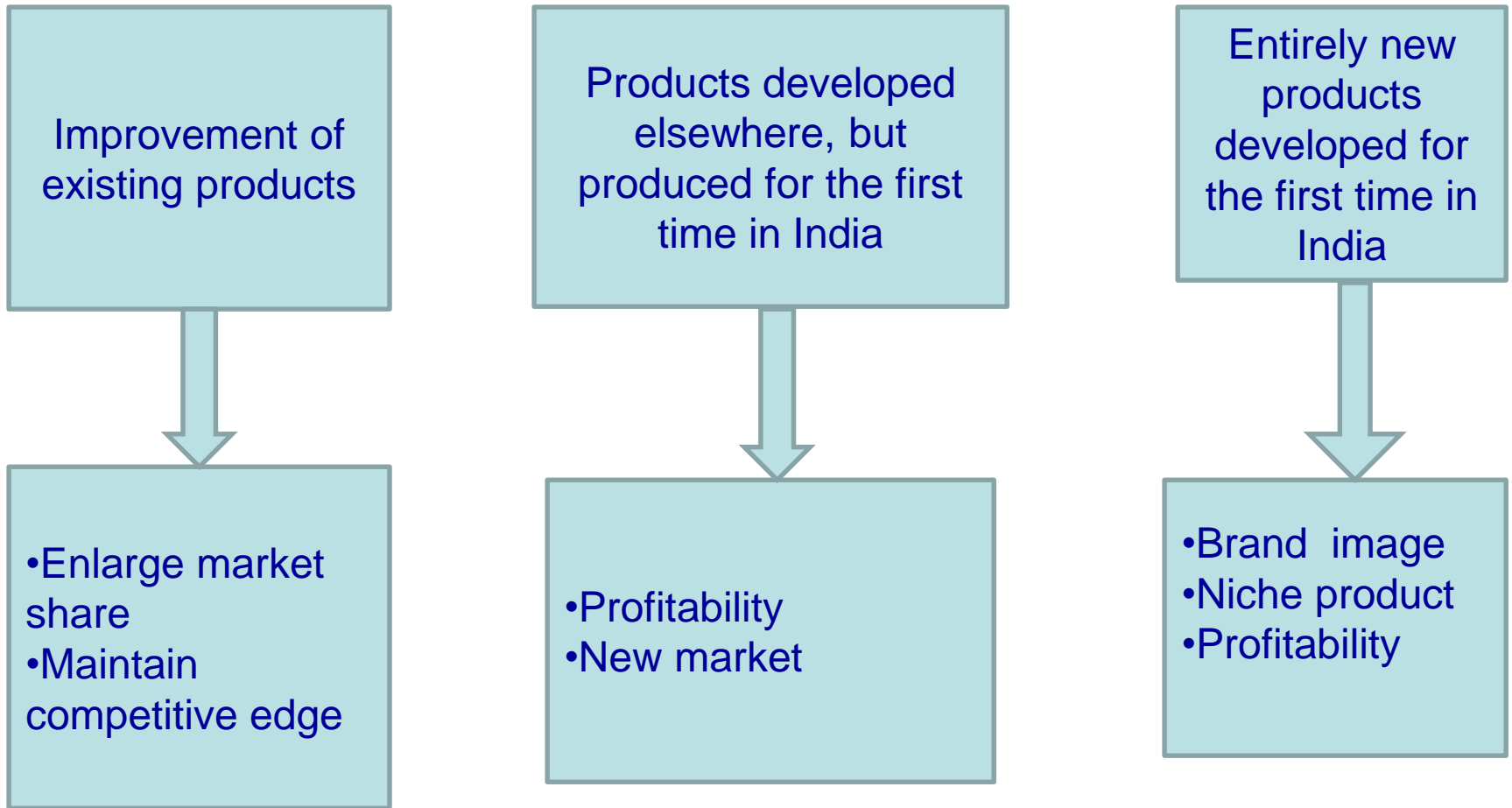
ADVANCES IN PRODUCT DEVELOPMENT

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KEY STEPS FOR PRODUCT DEVELOPMENT

- Application/ Market
- Properties required
- Alloy Design
- Steelmaking & Processing
- Microstructure & Property Evaluation
- Field trials/ Customer Feedback
- Commercial Production

CLASSIFICATION OF NEW PRODUCTS



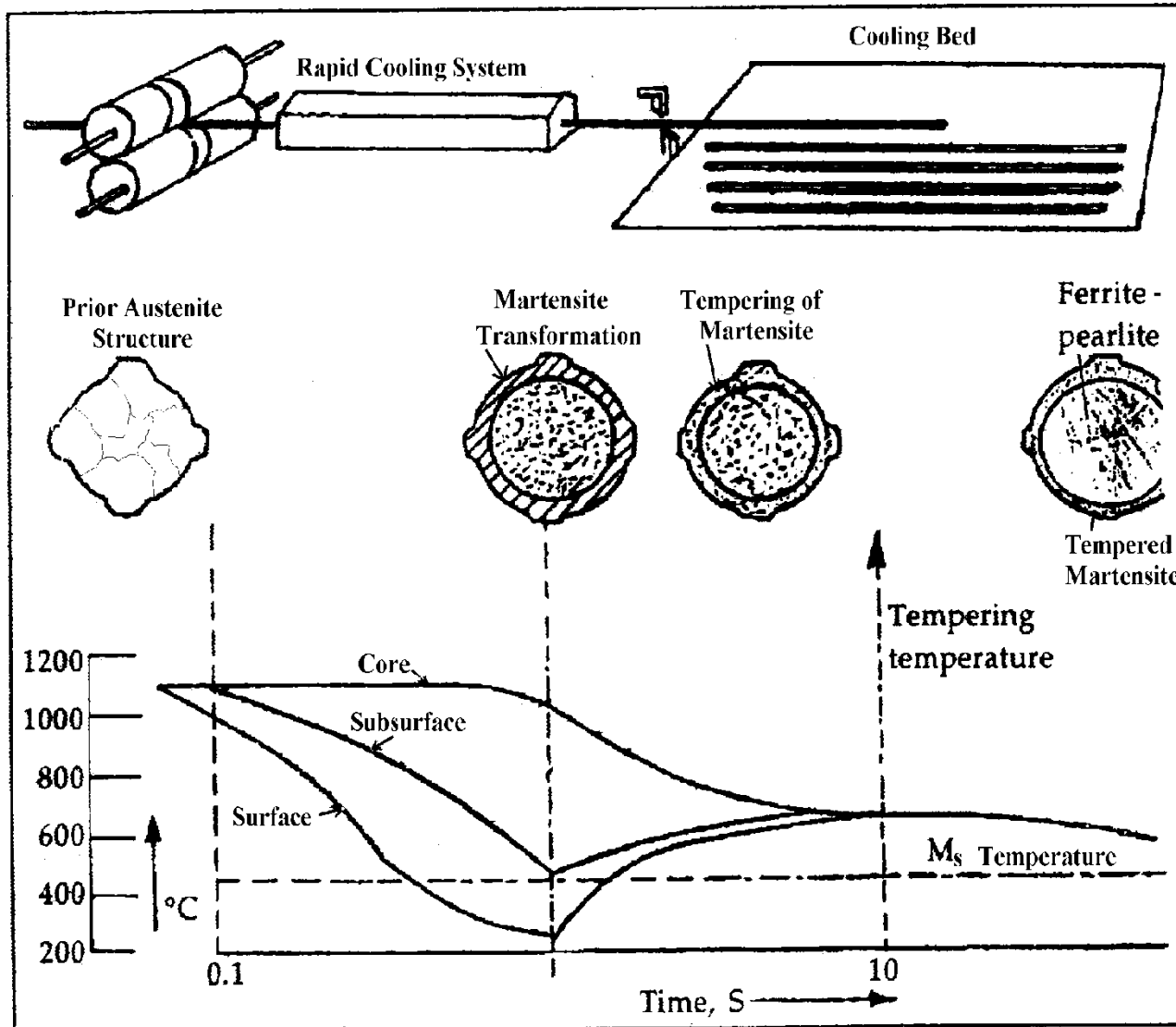
Major Products introduced for the first time in India

- ❑ High Strength Micro Alloyed Plates, HR Coils and Structural for Construction Segment
- ❑ SAIL HITEN Plates (UTS > 690 MPa) for ATM Chest
- ❑ High Strength Quenched & Tempered Plates for Defence
- ❑ Formable Quality HR Coils for LPG cylinder (Domestic & Export)
- ❑ High Strength Fine grained Steel for Automotive & PEB Segment
- ❑ TMT Rebars for Construction
- ❑ CRNO Electrical Steels for Power Segment
- ❑ High Strength Steel for Rails & Wheels

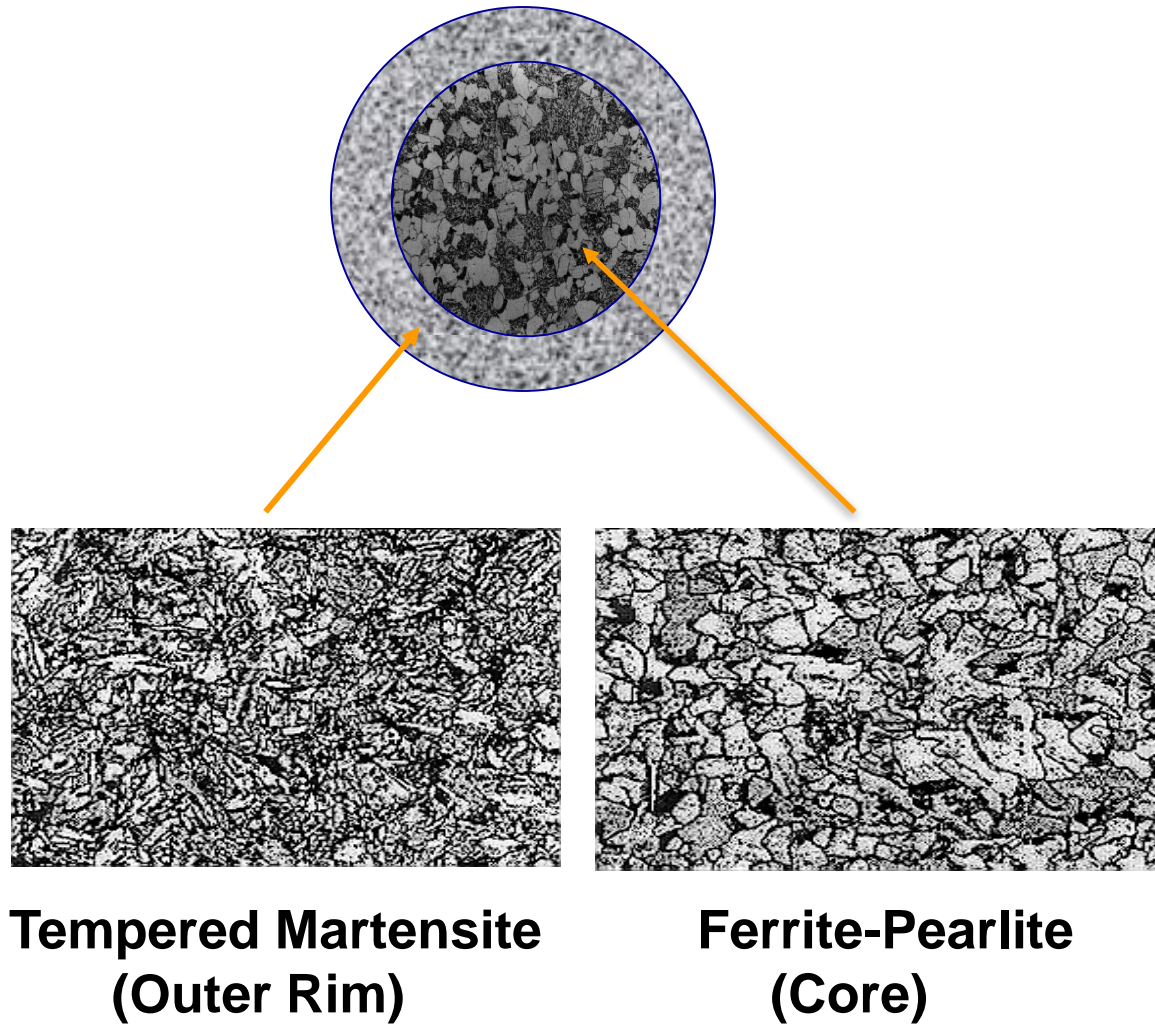
REBARS FOR CONSTRUCTION SEGMENT

- **CTD rebars**
- **Introduction of STELMOR/
TEMPCORE technology for TMT
rebars**
 - *Fe – 415 to Fe – 600 TMT rebars*
 - *Corrosion resistant TMT rebars*
 - *EQR TMT rebars*

SCHEMATIC TIME-TEMPERATURE COOLING CURVE FOR TMT-BARS



COMPOSITE MICROSTRUCTURE



EXPECTATIONS FROM EQR-TMT REBARS

- ✓ **High Yield Strength (>500 MPa)**
- ✓ **Low variation in YS (50 MPa max.)**
- ✓ **High UTS / YS ratio (1.25 min.)**
- ✓ **Good ductility (>16%)**
- ✓ **Good Plastic Energy Absorption Capacity**
- ✓ **Weld Toughness**
- ✓ **Fire Resistance ($YS_{600} > 2/3^{rd} YS_{RT}$)**

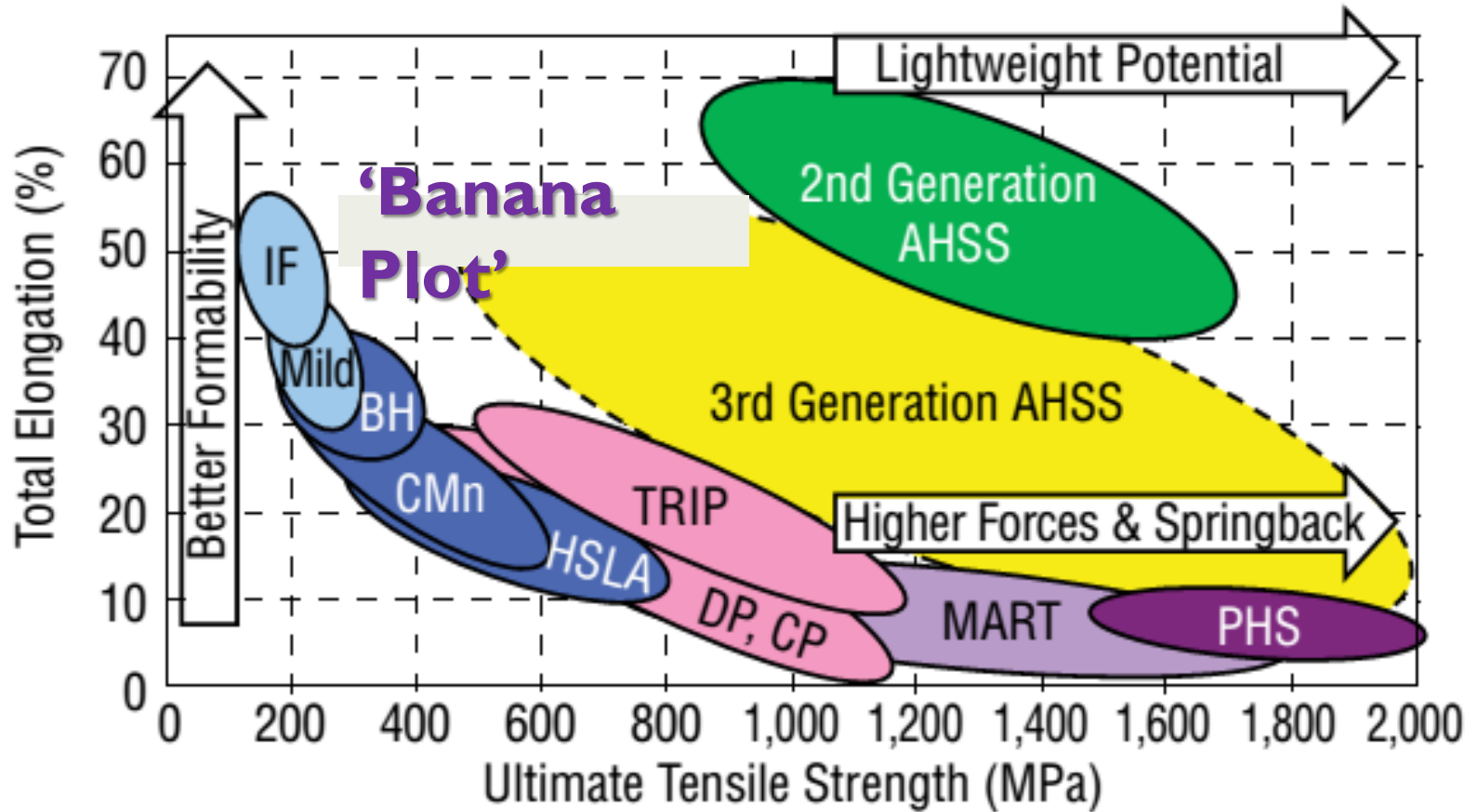
EQR – TMT REBARS

Grade	YS, MPa	TS, Mpa Min.	TS/YS Min.	EI, % Min.	Uniform Elongation %
Fe-415S EQR	415	540	1.25	18	8
Fe -415S HCR EQR	415	540	1.25	18	8
Fe-500S EQR	500	650	1.25	16	8
Fe-500S HCR EQR	500	650	1.25	16	8

AUTO GRADE STEELS

- DD/ EDD Steel
- IF/ IF(HS) Steel
- Dual Phase Steel
- CP/ TRIP Steel
- Multiphase Steel
- Triplex Steel/ Martensitic Steel
- TWIP Steel
- AHSS (3rd Generation)

Steels for Auto Segment



- Mild Steels
- Conventional HSS
- AHSS (1st Generation)
- 2nd Generation AHSS
- 3rd Generation AHSS (planned)

ADVANCED HIGH STRENGTH STEEL (AHSS)

First-Generation AHSS

- Dual-phase (DP), Complex Phase (CP) Steels, Transformation-Induced Plasticity (TRIP) Steels, Martensitic (MS) Steels, Hot-Formed (HF) Steels

Second-Generation AHSS

- Austenitic microstructure often having transformation induced plasticity (TRIP) effect.
- TRIP Steel, TWIP Steel, Triplex Steel

3rd Generation AHSS (Futuristic Steel)

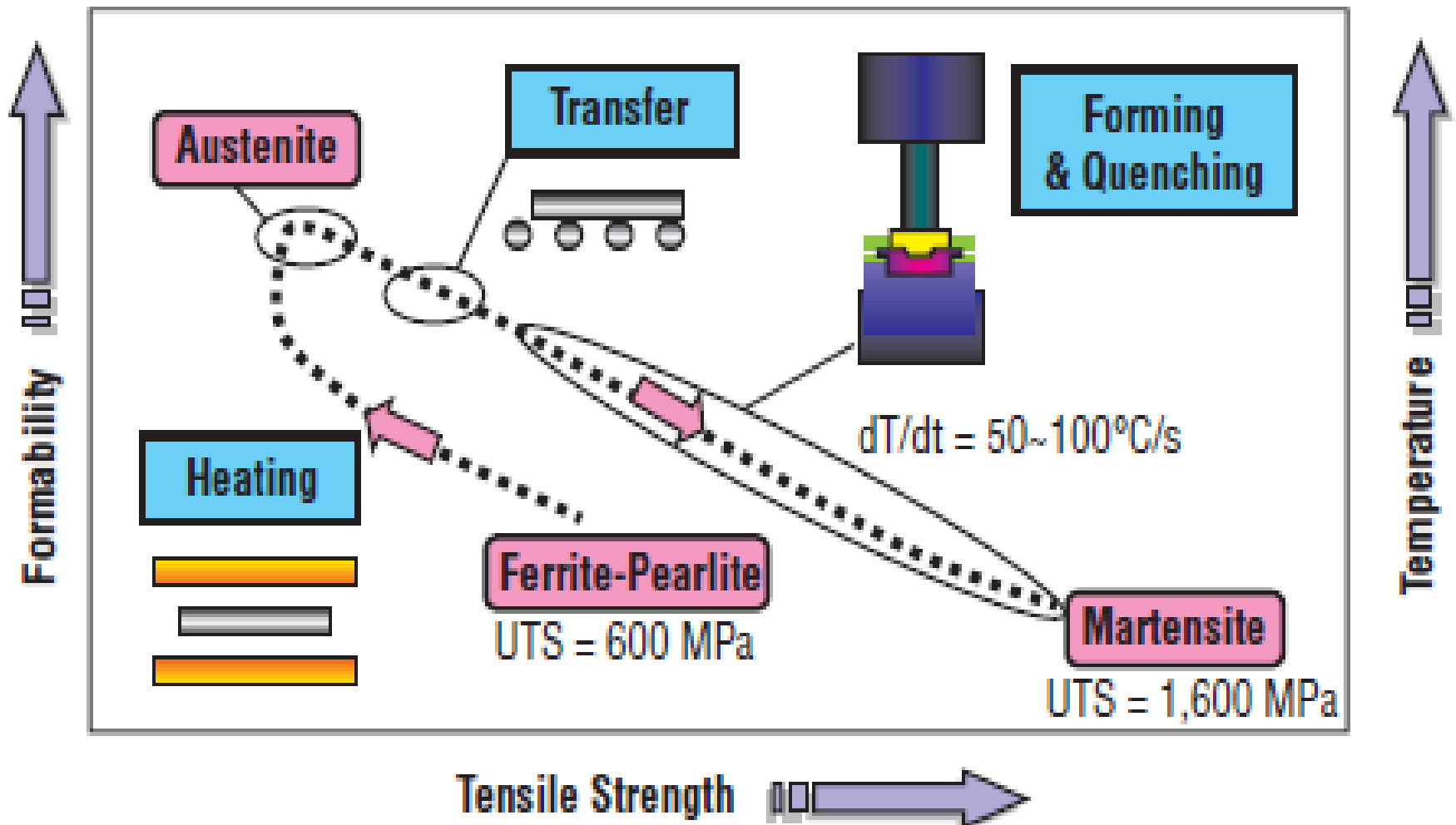
Need for 3rd Generation AHSS

- 2nd generation AHSS have very high alloying additions. This makes the materials **very expensive** which in turn has led to their use only in luxury cars.
- There is a tendency to **delayed cracking** in 2nd generation steels.

3rd Generation of AHSS

Quenching and partitioning (Q&P) steel,
TRIP-aided Bainitic Ferrite (TBF) Steels,
Nano-Structured (NS) Steel,
Three-Phase Steel with Nano-Precipitation (TPN steel)

HOT STAMPING TECHNOLOGY





Thank you