

Challenges in making Dies for AHSS

Part Process & Tool Design

18th January 2024



Key driver for Advanced High strength steels (AHSS)



Stringent Regulation (Bharat NCAP)

- Higher Energy Absorption

S



-Affordable Quality-

Affordable

- Car for every Family

A



Fuel Efficient

- Reduce BIW weight

F



Environment Friendly

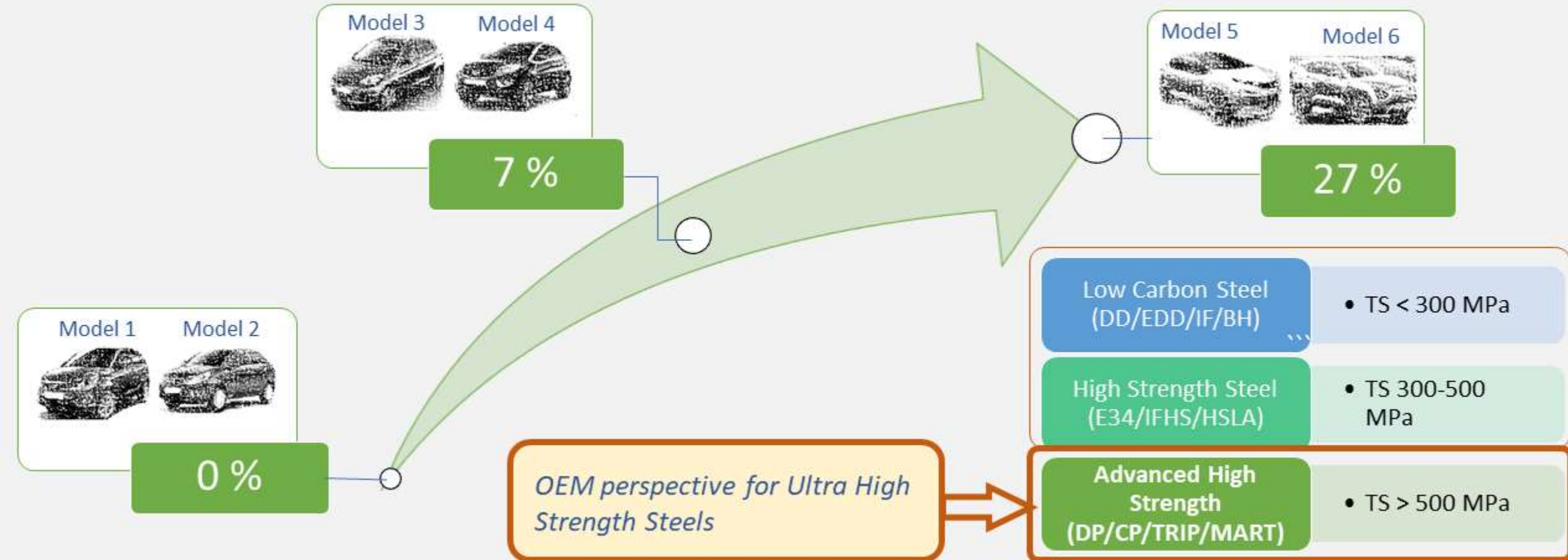
- Reduce Co₂ Emission

E

AHSS parts are essential contents of BIW Stamping Being

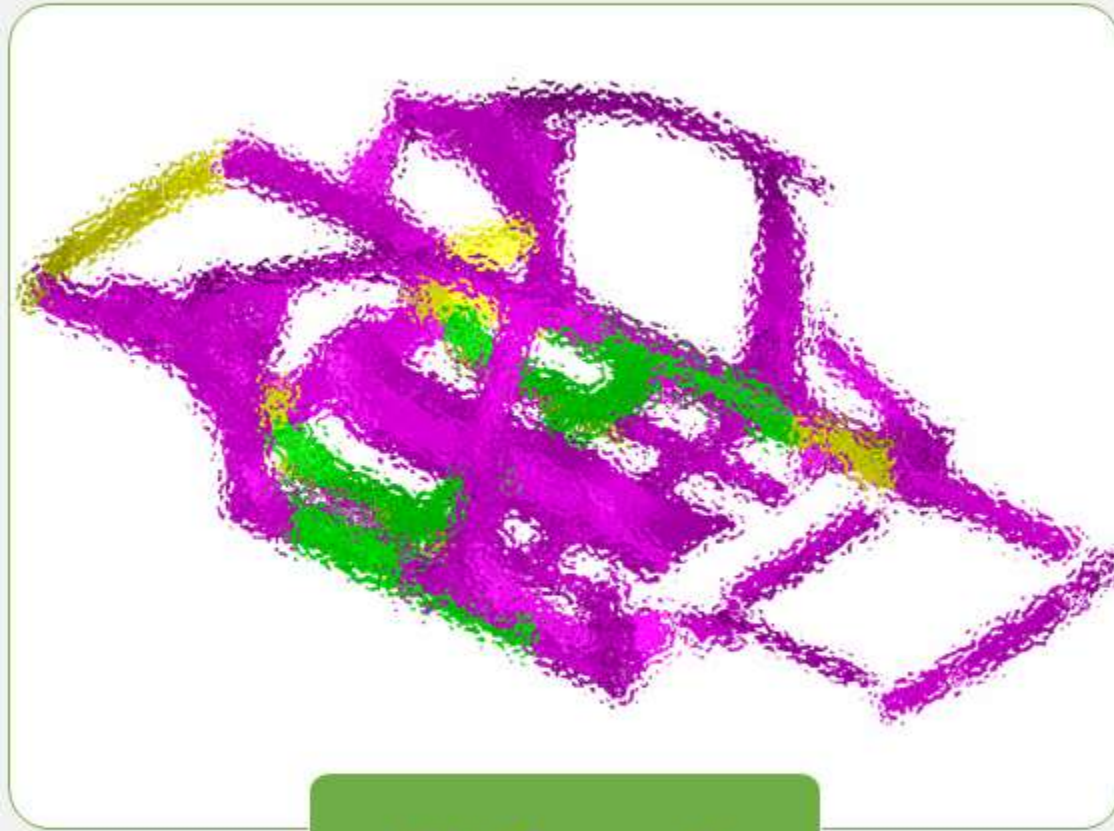
- ✓ Lighter
- ✓ Stronger
- ✓ Durable

AHSS Contents in New platforms : OEM Case study






AHSS & UHSS Exposure is must to remain competitive

AHSS Contents in New platforms : BIW structure



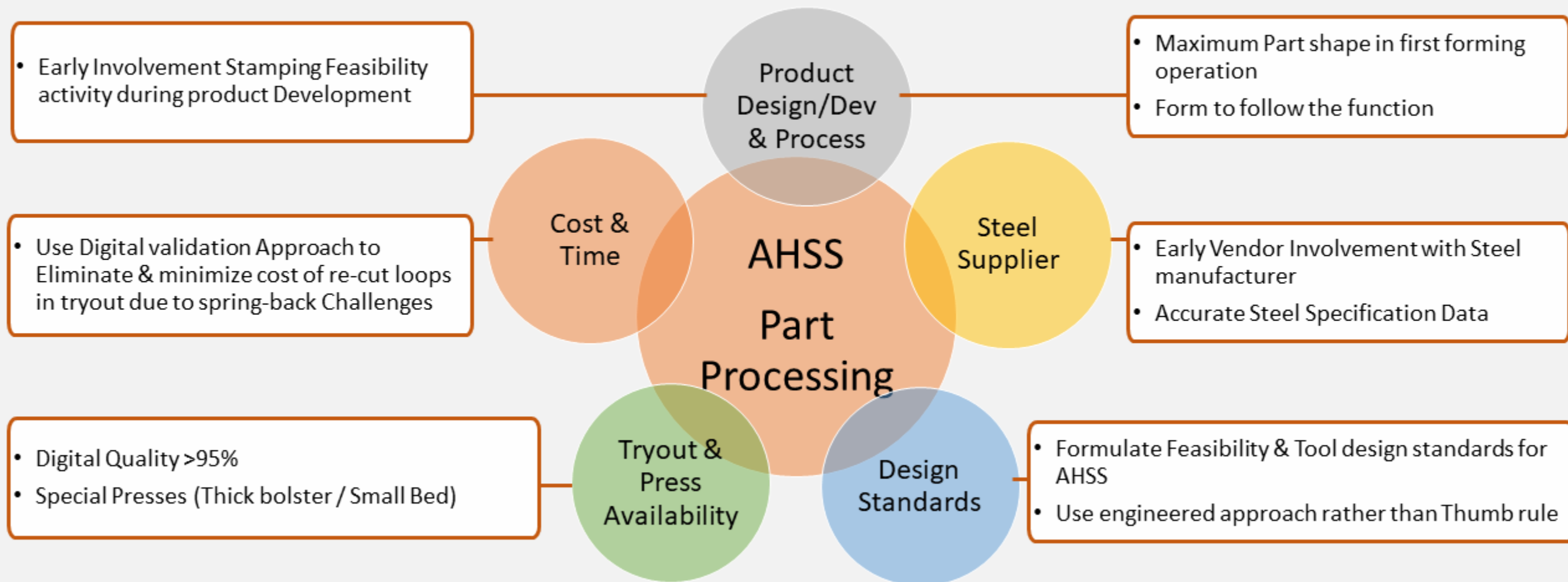
Platform 1

	DP590
	DP780
	DP980



Platform 2

AHSS Part Processing : Top level Focus Areas & Approach



“Prevention is better than cure”

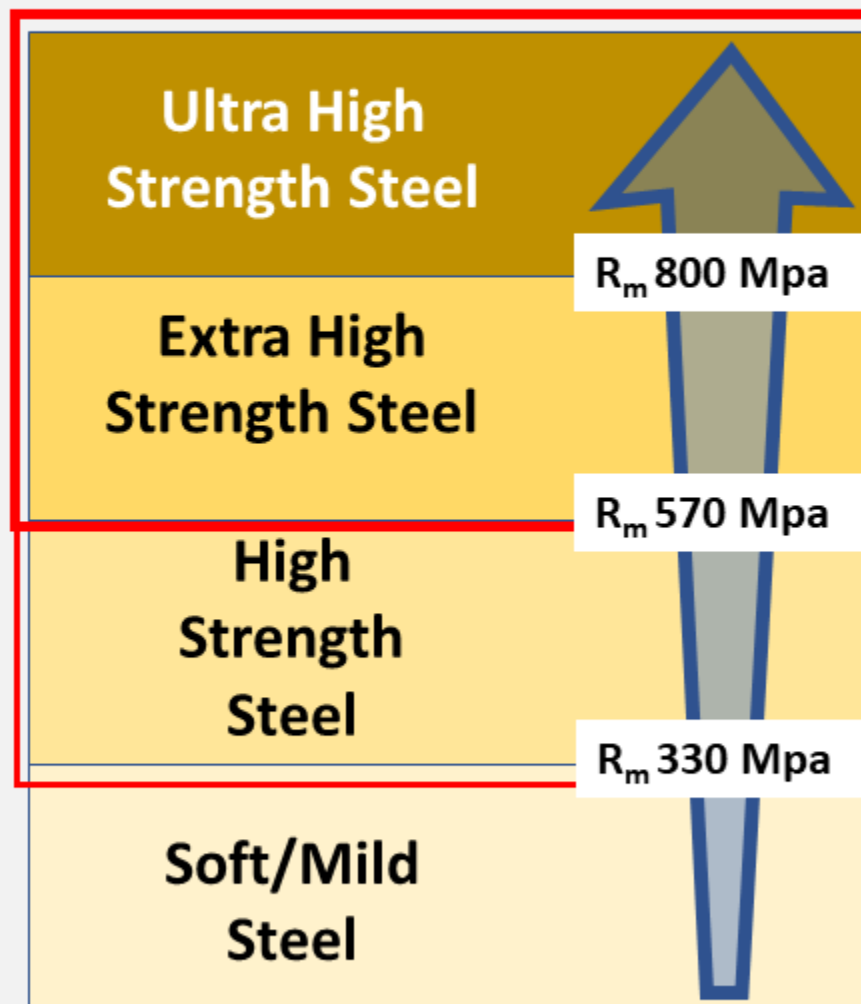
AHSS Part Processing : Influence of increased Strength

Cutting Tools

- Increased tool Steel Abrasive Wear
- Increased tool steel chipping tendency
- Reduced burr height

Forming Tools

- Increased tool Steel Adhesive Wear
- Increased tool steel galling tendency
- Increased Spring Back
- Increased Wrinkle problem



AHSS Part Processing : Digital Approach for spring-back challenge

Without Digital Compensation

More tryout recut loops

High Level expert workforce

Difficulties to achieve results in stipulated time

Failure in product launch time

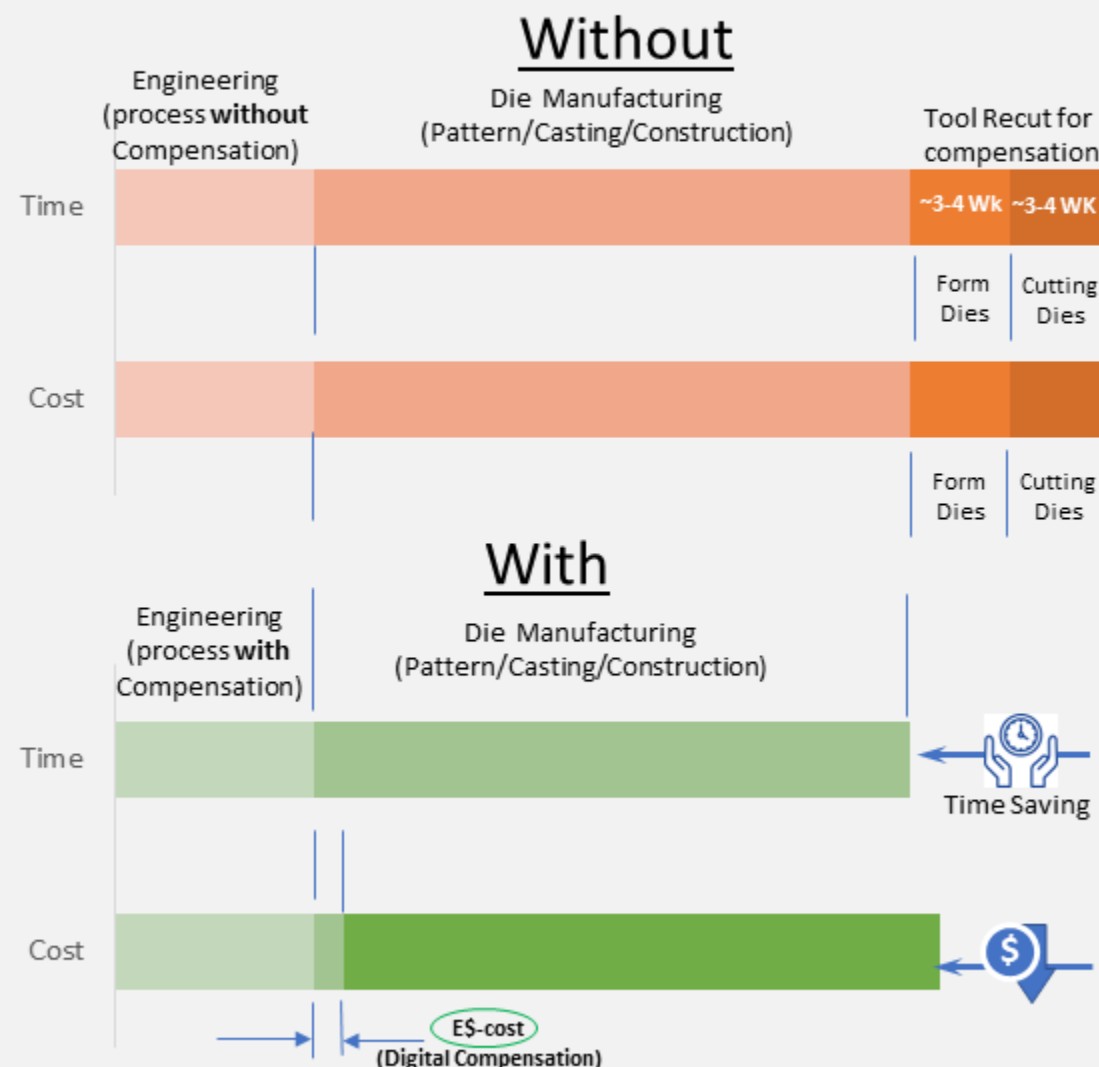
With Digital Compensation

Early Involvement (in Prod Dev) for Process design

Engineer Process to elimination of spring-back

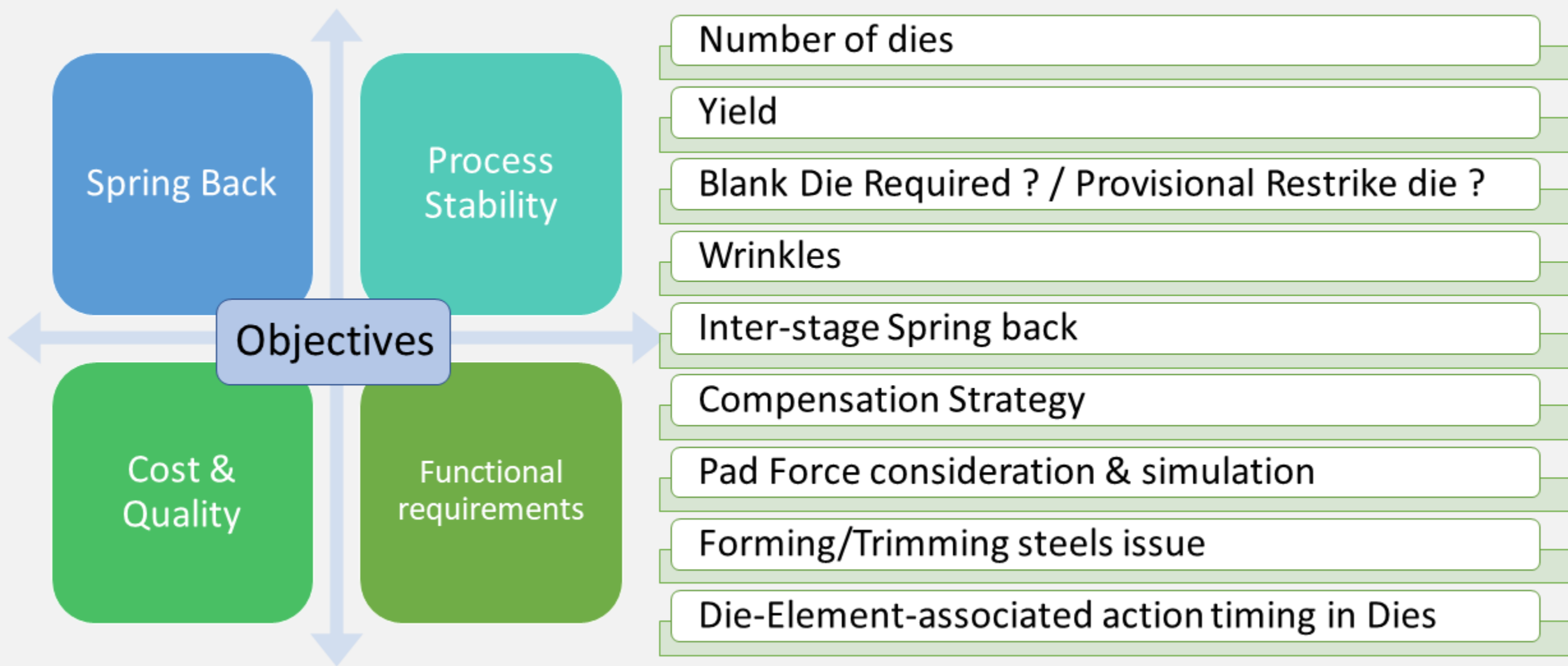
Apply compensation techniques over full process cycle

Major Cost & time saving can be achieved

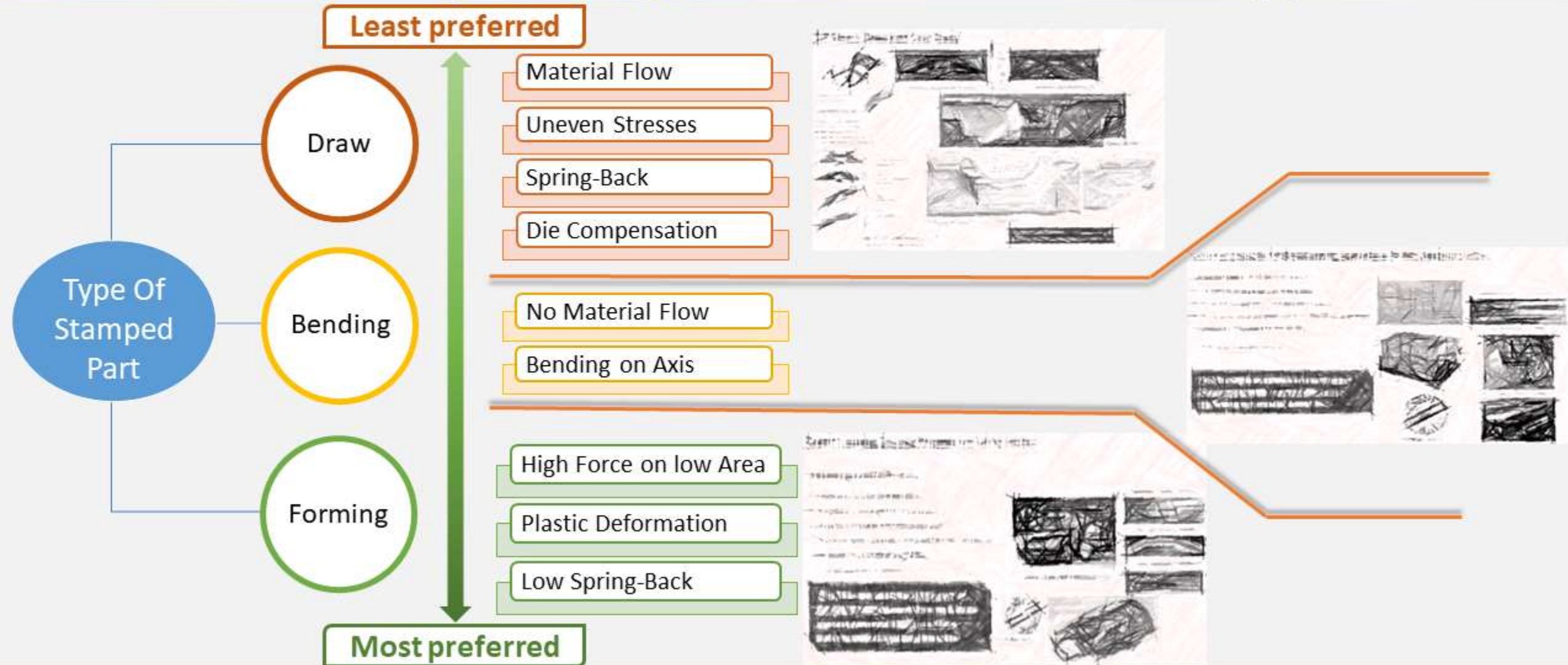


AHSS part : Process, Formability Overview

AHSS Parts : Effective Part processing matrix for complex shape parts

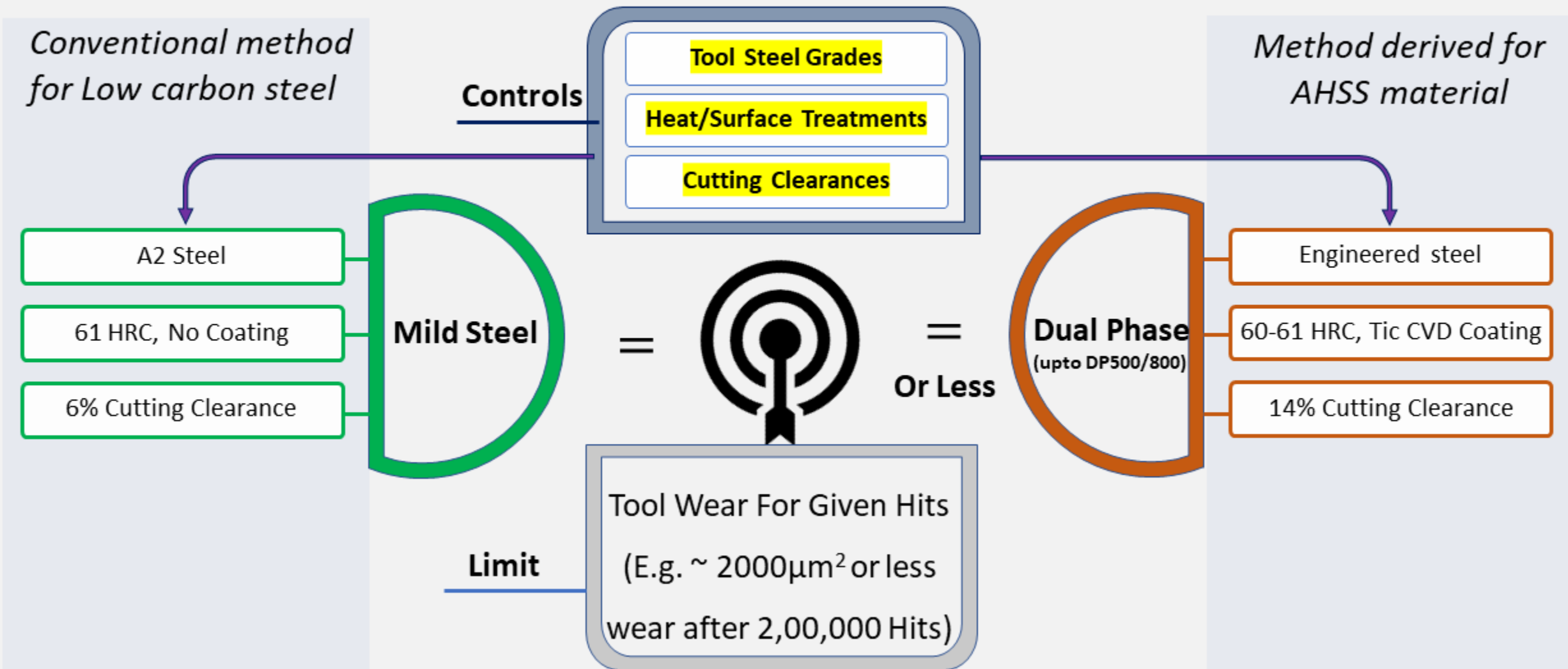


AHSS Part Processing : Starting point – Preferred Process approach

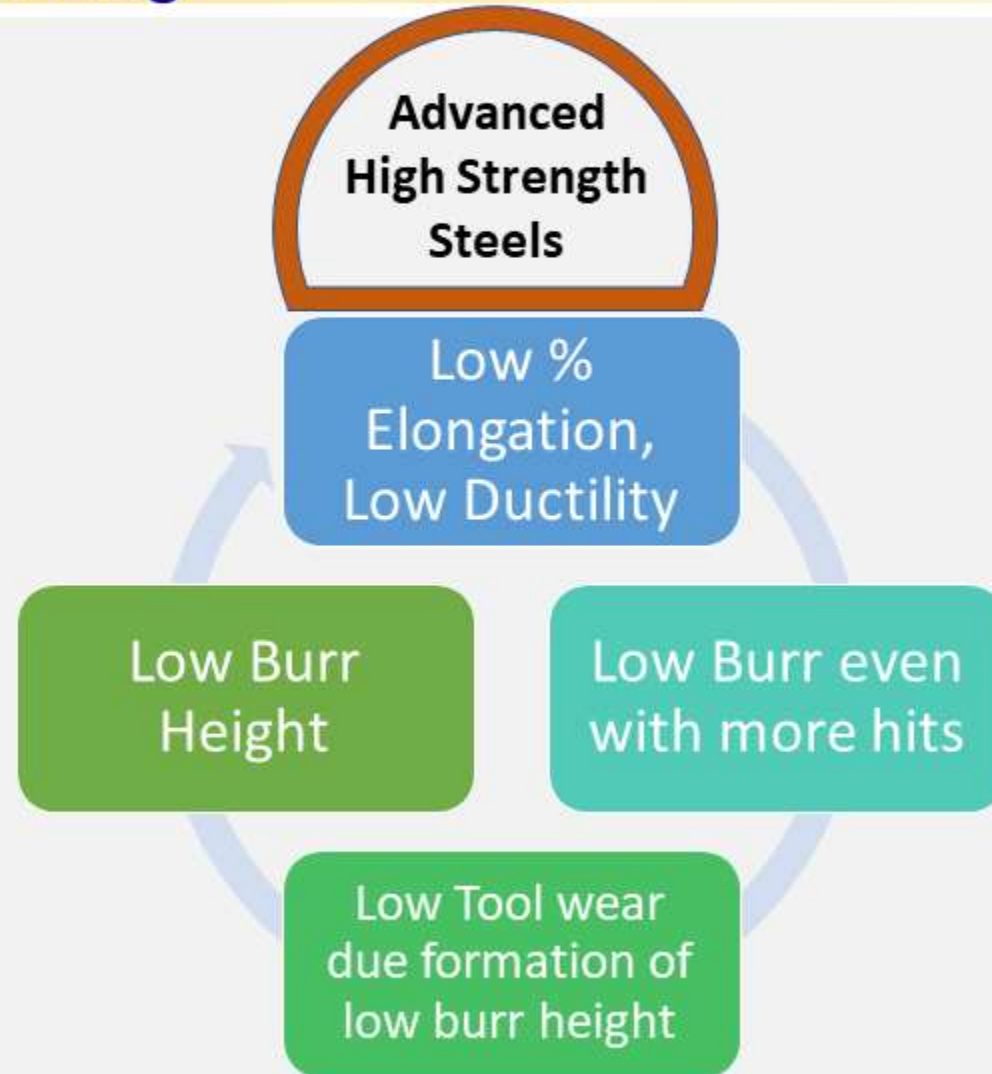
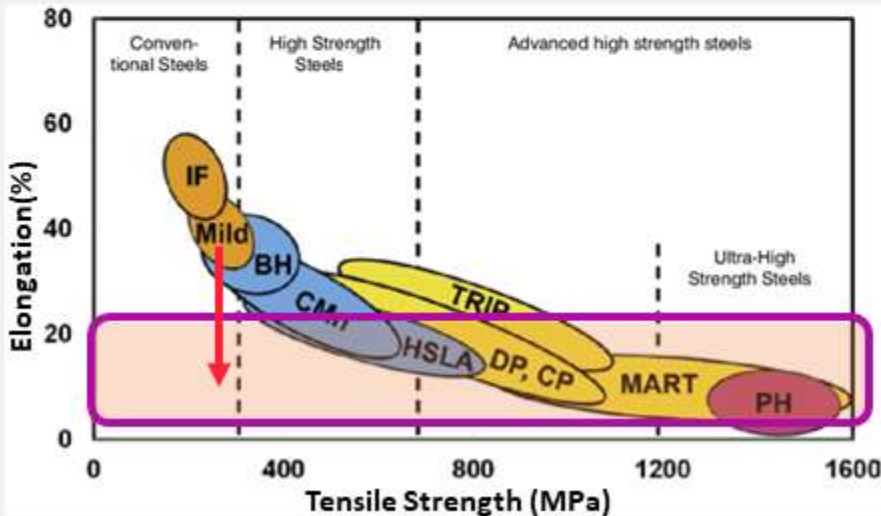
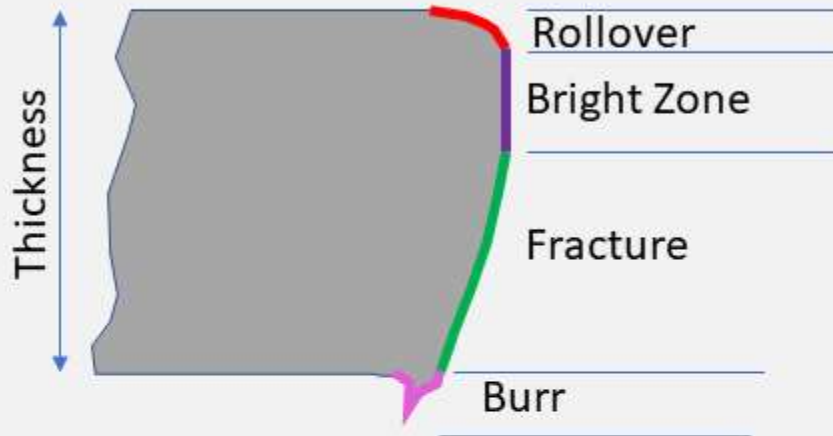


AHSS part : Tooling Overview

Cutting Steel Wear Challenge



Burr Height in AHSS Part cutting



Advantages

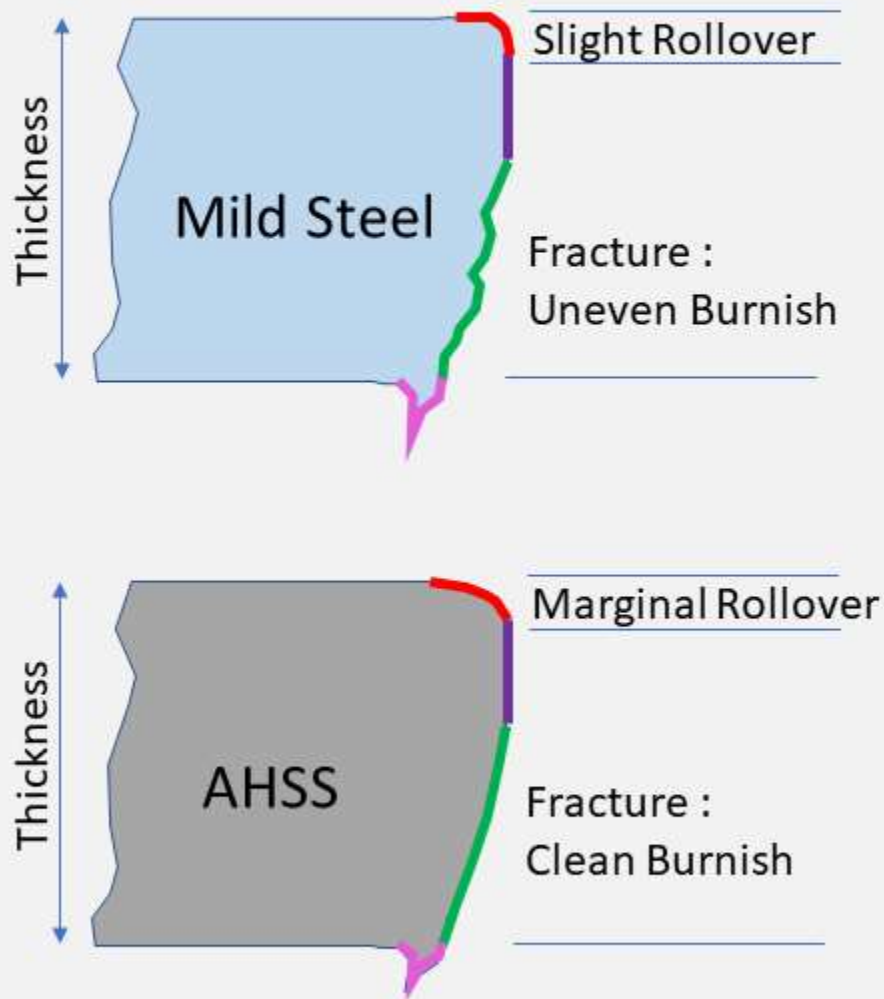
Extended Tool Regrinding Interval

Less Tool Wear due to Burr

Outcome

No Burr Height related issues

Cutting Clearance : Associated Challenge



Cutting clearances

DP Grades :
590 -780 TS & 780-420 YS

7% to 15%
of Metal Thk

Ultra HSS Grades :
Like MS grades TS above
780 to 1500

Edge condition

For Mild Steel



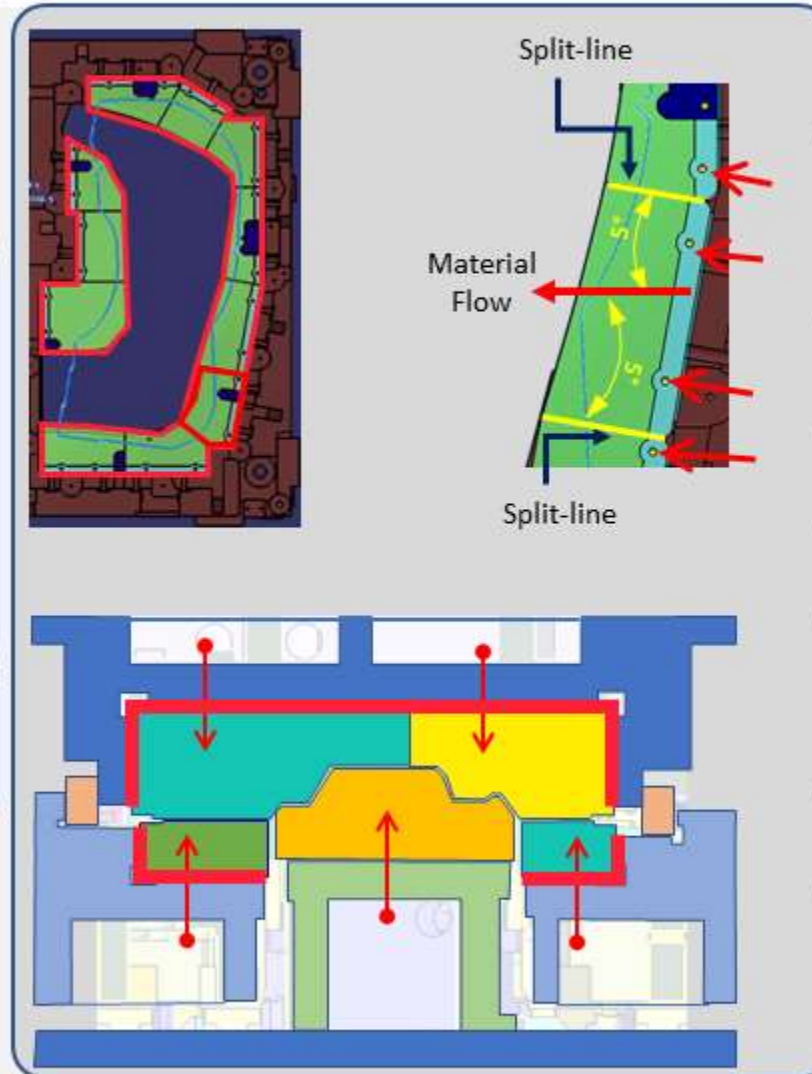
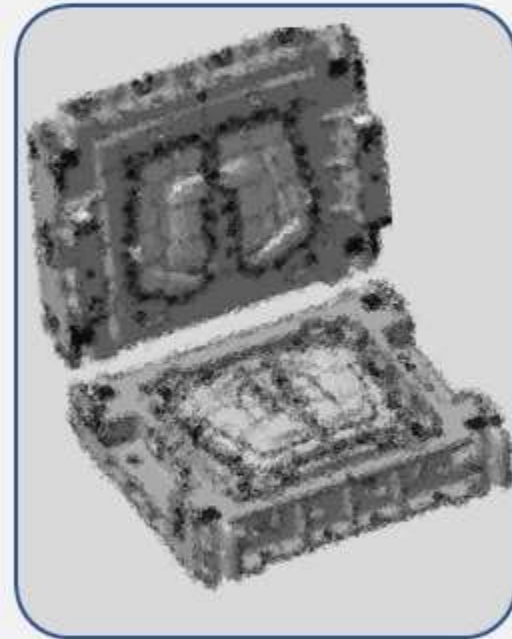
Sharp edge, R=0

For AHSS
Stoning upper
punch cutting edge



Radius edge,
R= ~0.05 to 0.1mm

Draw/Forming dies : Best Practices



- ✓ Upper, Lower & Binder needs to be inserted fully
- ✓ Insert sizes should be minimum & appropriate considering machining constraints, handling weight, coating cost etc.
- ✓ Avoid insert split lines in flow direction.
- ✓ Insert should completely locate with Keys & Pockets.
- ✓ Fasten steels with screws from backside
- ✓ Steel handling holes must be out of blank area, to avoid possible blank material gathering during draw
- ✓ It is good to have interlock provision in UPR & LWR-binder
- ✓ Always use maximum tensile strength value, if required for any engineering calculation

About :

Stamping Engineering at Tata Technologies

Services Overview

January 2024



Tata Technologies – Engagement Overview

Strategic Partnership

- ✓ Repeat businesses: 95% of Customers
- ✓ > 20 Years Engagement → 95% of Customers

Focused Industries

- ✓ Automobile OEM's & Tier-1
- ✓ Tool Rooms & Design Houses

170+
GLOBAL OEM PROGRAMS

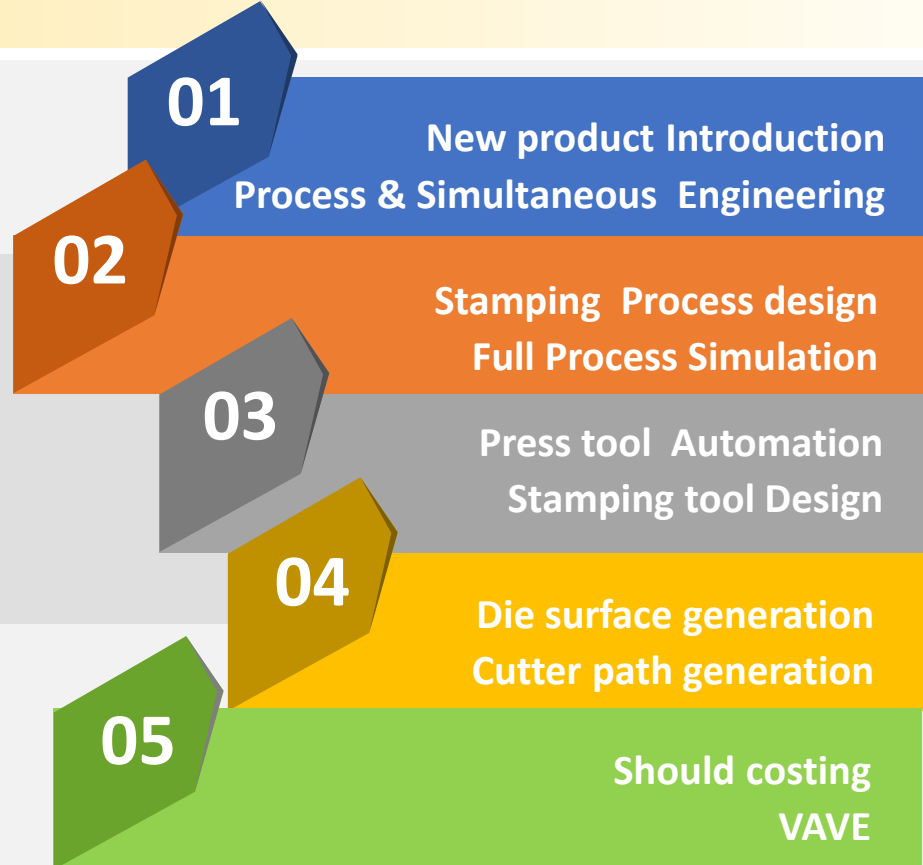
1Mn+
HOURS WORK : STAMPING
PROCESS & TOOL DESIGN

6+
DIRECT OEM'S
COLLABORATION

5+
TOOL ROOMS
DIRECT COLLABORATION

160+
DEDICATED
RESOURCES

16+
OEM'S DOMAIN
EXPERTIES



Expertise area

- ✓ Part Material : Aluminium & High strength
- ✓ Press lines : Tandem, Tri-Axis , Cross Bar
Transfer Press lines

Software Proficiency

- ✓ Catia V5, Siemens NX
- ✓ Autoform, Pamstamp

26+
Years of Rich
Experience

Successfully executed >170+ Global Programs with customer rating index of 4.8 / 5



We engineer because we believe in a greener future

Corporate Overview

January 2024



We're part of Tata Group – one of India's most respected organizations



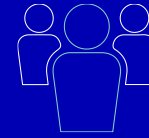
**Tata Group:
Founded in 1868**

More than 150 years of commitment to Business Excellence & Business Ethics



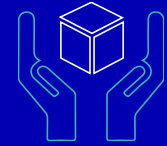
**Group Revenue
US\$ 128 Billion**

68% of which is generated in geographies outside India



**Employment
935,000 employees**

Spanning more than 100 operating companies in 150 countries



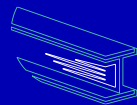
**Brand Value
India's best brand**

with a brand value of US\$ 26.4 billion

Business Verticals



**Information
Technology**



Steel



Automotive



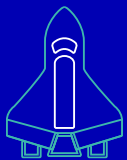
Infrastructure



**Financial
Services**



**Consumer &
Retail**



**Aerospace &
Defence**



Tourism



Aviation



**Telecom &
Media**



**Trading &
Investment**



**New
Businesses**

Our founder



Tata Technologies is a young company in a very exciting line of business. A line of business that not only has its place in India, but all over the world. We decided that this company would not be all things to all people but would focus itself in the niche area of providing solutions to manufacturing companies. I would like to see Tata Technologies being acclaimed as one of the most innovative and successful design companies in the world. Your participation will be seen in the world over as a leader in the field we start.

Mr. Ratan Naval Tata
Chairman Emeritus of the Tata Group



Our globally diverse leadership



Tata Technologies empowers customers to make their product development dreams a reality. Our position is to complement the customer with services differentiated by our ability to deliver uniquely well.

Warren Harris
Chief Executive Officer & Managing Director



PAWAN BHAGERIA
President – Global HR, IT, Admin and Education



SAVITHA BALACHANDRAN
Chief Financial Officer



ALOKE PALSIKAR
EVP and Head – Aerospace and Industrial Heavy Machinery Sales



PRAHALADA RAO
President and Client Partner – Tata Motors



NACHIKET PARANJAPE
President – Automotive Sales



SRIRAM LAKSHMINARAYANAN
President and Chief Technical Officer



SANTOSH SINGH
EVP and Global Head – Marketing and Business Excellence



ANJALI BALAGOPAL
General Counsel



SHAILESH SARAPH
EVP and Global Head ER&D Delivery



GEENA BINOY
EVP and Global Head DES Delivery

We are building better businesses

Tata Technologies ([BSE: 544028](#), [NSE: TATATECH](#))

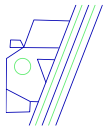
US\$546.9 million sales revenue FY23

12,000+ innovative professionals

3 active regions around the world

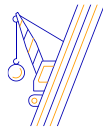
11 legal entities international operations

Making a difference. That's better.



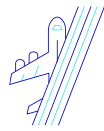
37

Leading automotive OEMs



19

Leading industrial heavy machinery OEMs



20

Leading aerospace OEMs



19

Prominent tier 1 suppliers

17


Prominent New Age OEMs



We're engineering a better world

 **Vision** To engineer a better world




 **Safer and greener products** for our environment

 **Better learning and growth opportunities** for our talent

 **Better returns** for our shareholders

 **Better value** for our customers

 **Better community service and upliftment**

 **Mission** Help the world to drive, fly, build, and farm by enabling our customers to realize better products



 **Values** We live by our core values :

/ A global mindset



/ One team with customers



/ A can-do attitude



A full spectrum coverage of our value proposition

Tata Technologies is a strategic engineering partner businesses turn to when they aspire to be better. Businesses rely on our people, our services, and technology solutions to help them conceptualize, develop, and realize better products and experiences



Engineering, Research & Development Services

We provide engineering solutions to help our customers conceptualize, design, and develop better products for a sustainable future.



Education Services

We engage in academia and industry collaboration to help the engineers of the future gain new skills. That boosts their employability and delivers better outcomes for businesses, customers and the industry.



Digital Enterprise Solution Services

We help our customers solve industry problems with our next-generation digital solutions. By employing the latest technologies, we implement best-fit solutions that deliver better.



Software Products

We help our customers transform their products through our service offerings. We help them identify and deploy product development software offered by our partners to manufacture, service, and realize better products.

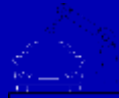


Our offerings across the manufacturing value chain

Business challenges



Engineering
Faster and effectively



Manufacturing
Reducing operational cost & enhancing visibility



After Sales & Customer Experience
Managing customer journeys from pre-sales to after-sales



Turnkey vehicle development & electrification, ICE & ePowertrain



Product concept, definition, design, validation, control systems, production readiness, etc.



Airframe design, wiring harness, avionics, simulation, MBSE, light weighting, cabin interiors



Digital Twin & thread, telematics, product engineering (PLM + ALM + KBE + MBSE)



ADAS /// Systems engineering /// Application software development /// Basic software dev (AUTOSAR) /// System & software validation (HIL) /// SDV

Simulation (process, robotic, human, & factory layout), A.M.E.

Process & manufacturing engineering, factory automation, end-of-line services

Process design, simulation, jigs, productivity improvement, first article inspection

Industry 4.0, factory automation, digital mfg., autonomous vehicles

e-Commerce, CRM, sales, dealer mgmt., aftersales, workshop mgmt., tracking, analytics

e-commerce, CRM, sales, dealer mgmt., aftersales, workshop mgmt., tracking, analytics

MRO, non-conformity review, tool design, technical publications, repair, P2F

Connected product & services, cyber-security, customer service & experience

Accelerators



PULSE: Agile Project Management (NPI)



eVMP™: Electric Vehicle Modular Platform.



Rightweighting



Factory Magix: Manufacturing Execution System



Manufacturing IoT Platform



CHIP: Scalable platform PLM-ERP-MES



Visimatic - Suite of Machine Learning solutions



Digital CX Suite:

Power of 8 – sCRM, sSales, sDealer, sRelations, sTrack, sWorkshop, sCommerce, sIntelligence Solutions



TRACE: Connected & Mobility Framework

Engineering the whole product and customer journey

Our Automotive offerings



Automotive

Helping automakers design, engineer and validate products for a greener, safer and more sustainable world.

Our product engineering and digital design solutions help our customers to innovate and create greener, safer, more sustainable automotive products

Engineering



- / Turnkey full vehicle development solutions
- / Embedded solutions
- / software – defined vehicles
- / Connected cars
- / HIL testing & validation solutions
- / Product benchmarking solutions

Manufacturing



- / Process engineering
- / Process simulation/ digital process validation
- / Tooling & automation
- / Robotics simulation
- / Ergonomics simulation
- / Plant simulation
- / Factory design & validation

After sales



- / e-commerce
- / CRM
- / Sales
- / Dealer mgmt.
- / Workshop Mgmt.
- / Vehicle tracking
- / Data analytics

Engineering breakthroughs

Our Industrial Heavy Machinery offerings

Our best-in-class, competitive solutions enable manufacturers of Industrial Heavy Machinery (IHM) to overcome industry challenges



Industrial Heavy Machinery

Helping manufacturers to realize more productive, competitive and profitable industrial heavy machinery products.

Engineering



- / Turnkey full vehicle development solutions
- / Embedded solutions
- / Connected vehicle
- / HIL testing & Validation solutions
- / Product benchmarking solutions

Manufacturing



- / Process engineering
- / Process simulation/ digital process validation
- / Tooling & automation
- / Robotics simulation
- / Ergonomics simulation
- / Plant simulation
- / Factory design & validation

After sales



- / Sustenance engineering
- / Digital customer experience Solutions
- / Fleet solutions
- / Data analytics & predictive maintenance
- / Telematic solutions

Engineering a smooth landing

Our Aerospace offerings

Our aerospace solutions help our customers to engineer, manufacture, and realize better products, from components to interiors to MRO



Aerospace

Helping aerospace businesses to realize their vision, providing solutions and resources to get them from where they are today to where they need to be tomorrow.

Engineering



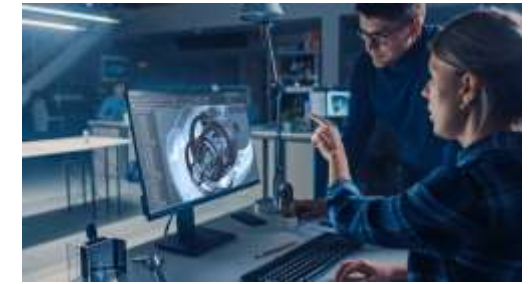
- / Airframe design
- / Cabin interiors
- / Passenger-to-freighter
- / Avionics
- / MBSE
- / Simulation
- / Light weighting

Manufacturing



- / Process design
- / Process simulation
- / Jigs, tools and fixtures
- / Productivity improvement
- / First article inspection

Customer Service



- / MRO engineering services
- / Engineering concessions, repair solutions for landing gears & structures
- / Obsolescence mgmt..
- / Technical publications
- / Aircraft asset life tracing

Our global collaboration model

Our Global Delivery Execution Model (GDEM) is designed around the 'follow the sun' workflow. Project teams collaborate across off-shore and on-site locations worldwide, integrating seamlessly to deliver maximum progress and efficiency for every project



Off-shore

Off-shore teams can develop or directly connect with existing company-wide systems to engineer products, execute manufacturing and manage resources



On-site





On-site team members liaise between the customer and off-shore teams, assign resources, manage people supply chain, review projects and report on KPIs

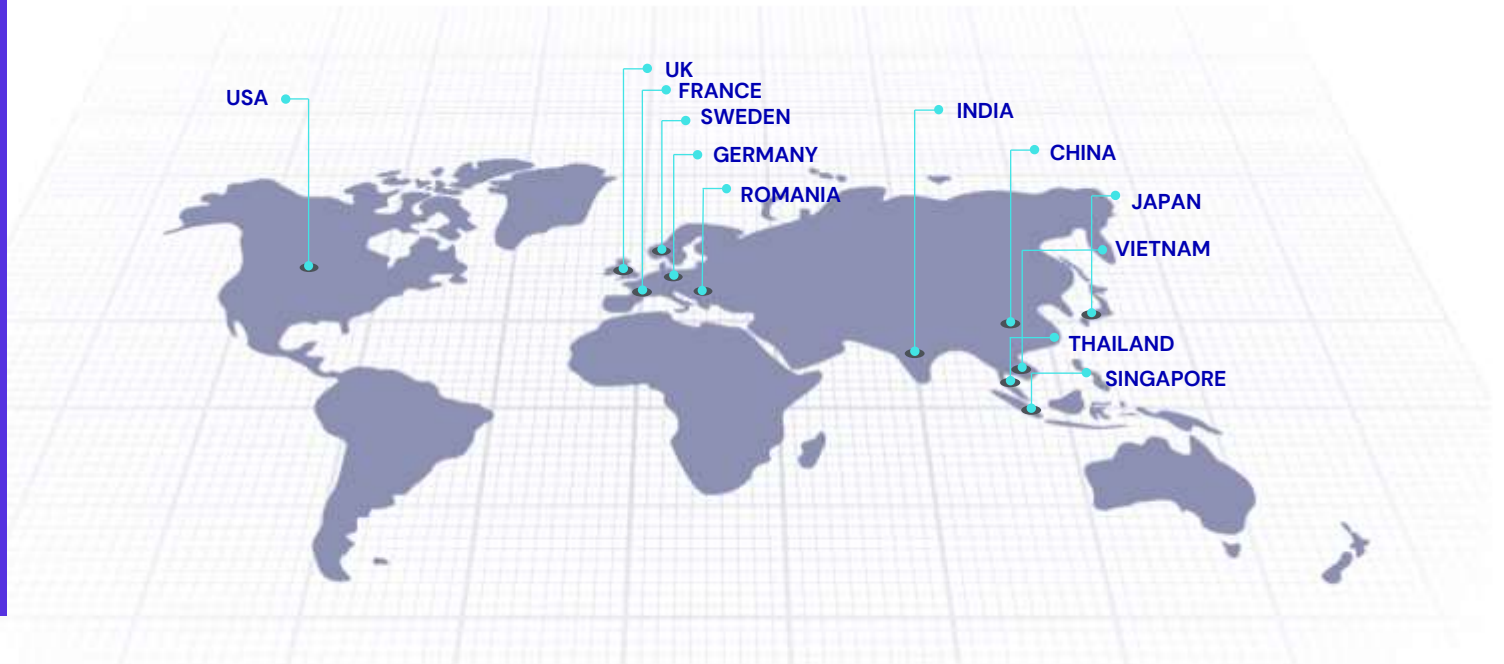
When a Swedish automotive business collaborated with us for their first plug-in hybrid sports car, we leveraged our off-shore team in India to support the team in Sweden and UK while engineering this carbon fiber-based award-winning product for global markets



Our global footprint

We are a global, connected organization

 12,000+ innovators form our global, diverse workforce	 3 continents. Our global delivery model spans Asia-Pacific, Europe, and North America
 20 global delivery centers	 27 countries... and counting. We work with clients across the world



70%+ business ex-India	70% local nationals in every delivery center
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USA – Troy, Detroit and others | **Europe** – Warwick (UK), Gothenburg (Sweden), Brasov, Craiova & Iasi (Romania), Gaimersheim (Germany), Hamburg (Germany), Toulouse (France) and others | **India** – New Delhi, Blue Ridge & Hinjawadi – Pune, Bengaluru, Thane, Coimbatore and others | **China** – Shanghai (China) | **SEA** – Tokyo (Japan), Bangkok (Thailand), Singapore, Vietnam (Hanoi)

Why Tata Technologies?



For the sixth consecutive year, we were recognized as a Global Leader in ER&D Services Automotive Ratings 2022 and positioned 1st among all India-based Global ER&D Electrification & Automotive specialists



We were awarded Company of the Year 2020 by Frost & Sullivan for helping global manufacturers and suppliers remain competitive and engineer and realize better products faster in the aftermath of the pandemic.

Industries Served



Automotive



Aerospace



Industrial Heavy Machinery

Better Partnership

We work with an extensive ecosystem of partners, using our shared expertise to solve our customers' business challenges



ASIA PACIFIC

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Hinjawadi, Pune
India
411057
Tel: +91 20 6652 9090

EUROPE

The European Innovation
and Development Centre (EIDC)
Olympus Avenue
Tachbrook Park
Warwick, UK
CV34 6RJ
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