20-21June 2013
BITEC, Bangkok -Thailand

AUTOMOTIVE SUMMIT 2013

"Moving Towards Global Green Automotive Industry"

Technology Trend in Automotive Part's Production

by

Mr. Terutaka Taira/Thai Summit Group

Co-organized by:

Thai Summit Group

THAILAND AUTOMOTIVE INSTITUTE สถาบันยานยนต์

Reed Tradex

Technology Trend in Automotive Part's Production

Agenda

1. Thai Summit Group
2. Background for Innovation
3. Technology for weight reduction
4. Hot Forming
5. Laser Welding
6. Innovative Press Machines
7. Plastic
8. CAE

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Brief History of the Company

Dr. Somporn Juangroongruangkit

PRESIDENT

Established: March 16, 1977

Annual Sales (Year 2011): 59,433 Million THB (1,914.7 Mil USD)

Types of business: Automotive Parts, Motorcycle Parts, Agricultural Engine Parts, Electrical Appliances Parts, and Special Business.

Manpower: 25,207

Our Customer

Automotive

PROTON, Ford, Auto Alliance Thailand, Mazda, Mitsubishi Motors, Isuzu, GM, Toyota, Honda, Daihatsu, Chrysler, Nissan, UD, Volvo, Mercedes-Benz, Hino

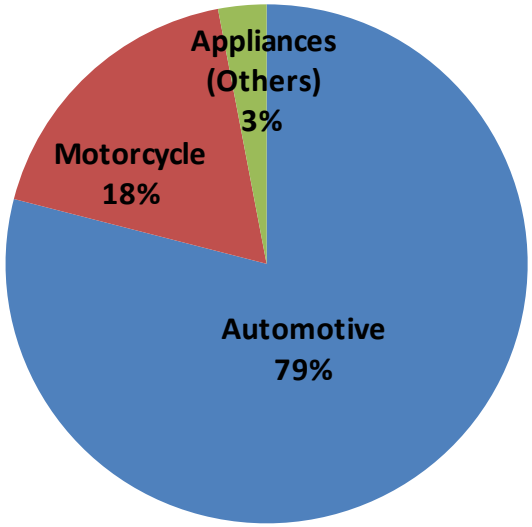
Motorcycle

Honda, Yamaha, Tiger motorcycle, Jepco, Triumph, Kawasaki, Suzuki

Appliances & Others

Trane, Mitsuba, JVC, Toshiba, Sharp, LG, Mitsubishi, Daikin, Toshiba, Sanden, Samsung Digital, Hitachi, Sony, JVC, Yanmar, Siam Kubota

TSG Business portfolio



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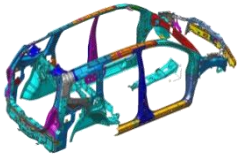
Product Structure

HQ

Division 1	Division 2	Division 3	Division 4	Division 5	Division 6	Division 7	Division 8
Interior & Exterior	Steel Motorcycle	Steel Automobile	Die Casting& Machining	Wiring & Harness	Chassis	CARIO	OGI







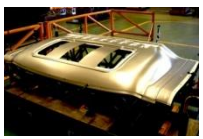








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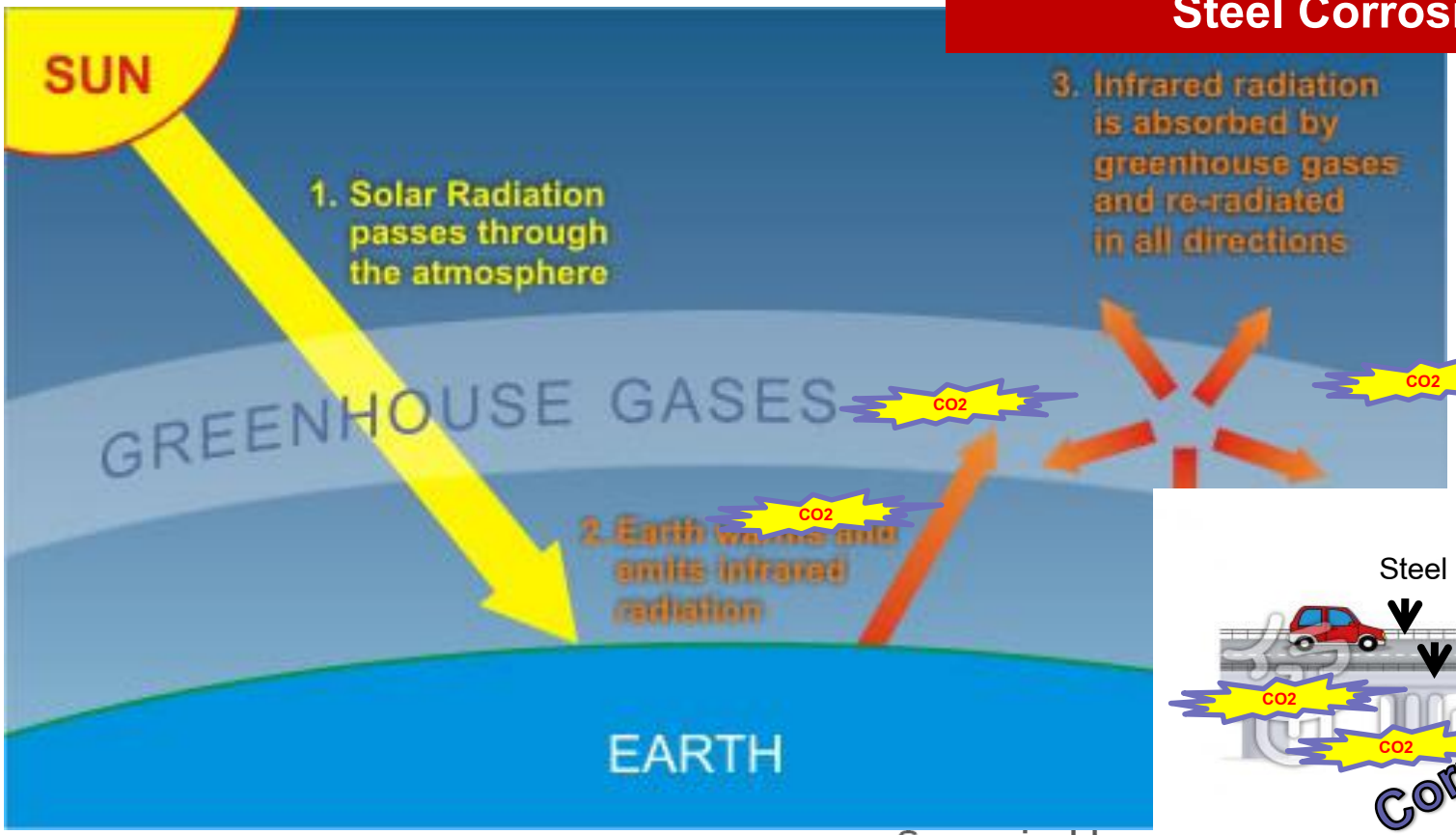
CO2 (Carbon Dioxide)

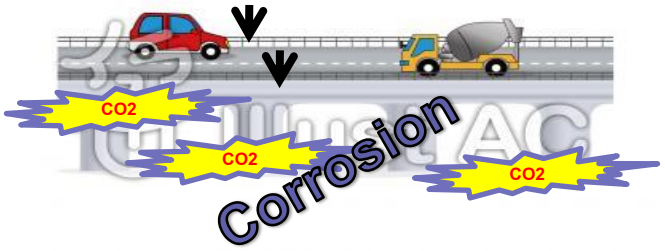
Influence

Green House Effect

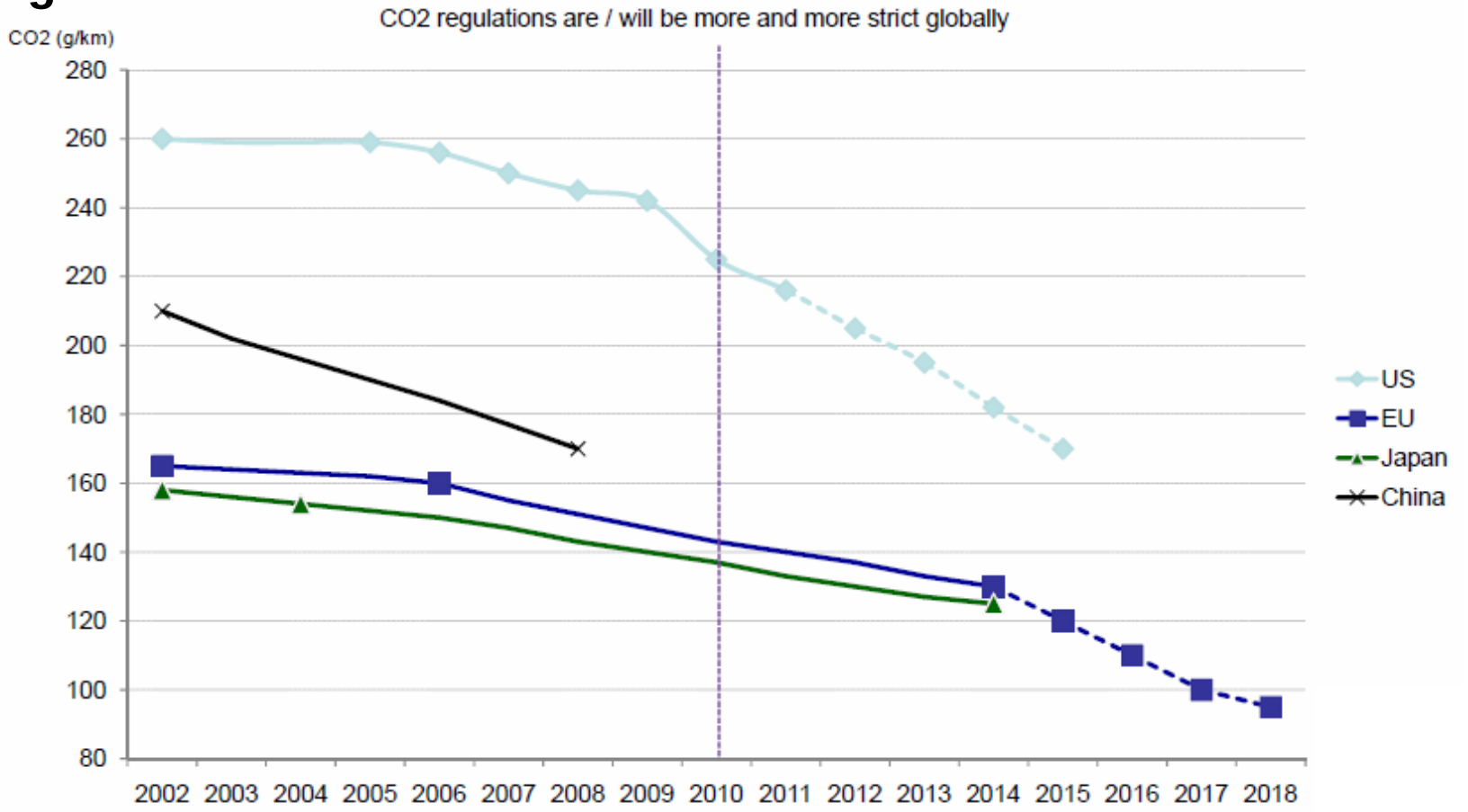
Steel Corrosion



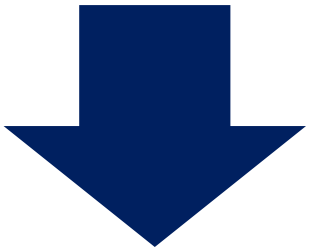
Steel Reinforced Concrete



CO2 Regulation Overview

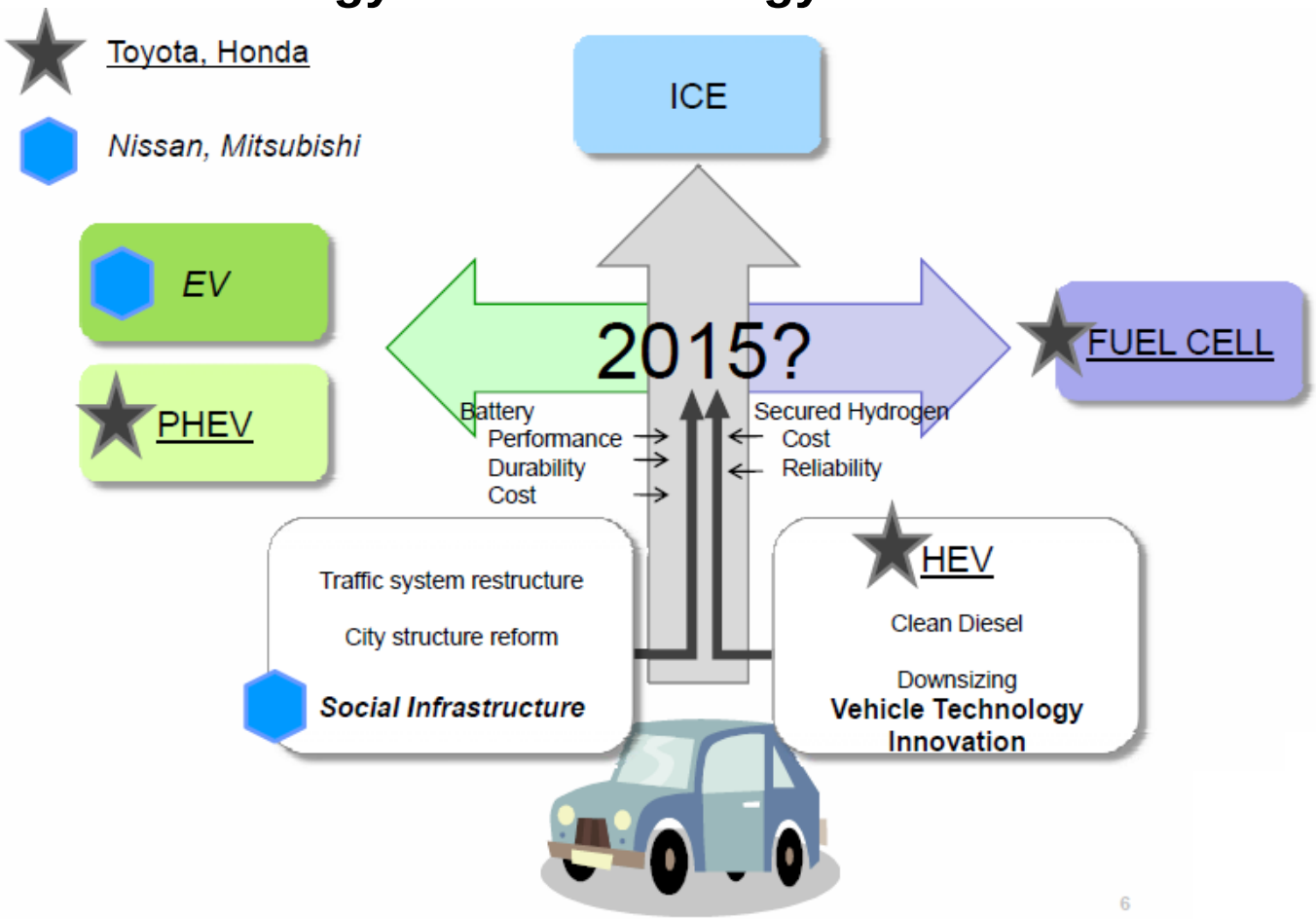


Key for Environmental Requirement



Develop Clean and Environmental Friendly Vehicles.

Japanese OEMs Strategy for Clean Energy



Weak Point of Clean Vehicle

		Prius PHEV プラグインハイブリッド	Prius プリウス
			
Battery type	電池の種類	Liイオン2次電池 Li-Ion	Ni水素2次電池 NiMH
EV range	EV走行距離	23.4km	約2km
Battery capacity	電池容量	5.2kWh	1.3kWh
Battery V	電池電圧	345.6V(3.6V×96個)	201.6V(1.2V×168個)
Battery Current	電流容量	約15Ah	6.5Ah
Battery Cell V	セル電圧	3.6V	1.2V
No. of battery cell	セル数	288個(96×3)	168個
Operating SOC of battery	セルで使用するSOC(充電状態)の範囲	30～80%	40～60%
Cell type	セルの形状	角型	角型
Battery module description	電池の構成	96個のセルを直列接続し、これを3並列構成とした	168個のセルを直列に接続した
E-motor voltage	モータ駆動電圧	650V (345.6Vを昇圧コンバータで650Vに)	(201.6Vを昇圧コンバータで650Vに)
Battery weight	電池の質量	約160kg	約40kg
Hybrid Fuel consumption	プラグインハイブリッド燃費(JC08モード)	57.0km/L	—
Fuel consumption	ハイブリッド燃費(JC08モード)	30.6km/L	30.4km/L
Charging time	充電時間	180分(100V)、100分(200V)	—

10 times

Battery capacity & power becomes bigger.

4 times heavier

Heavy Battery Weight

EV Car is heavy.

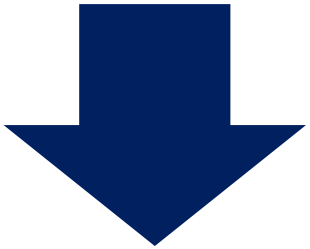
EV走行の最高速度 100km／h
EV driving max. speed

電動航続距離を伸ばすために、バッテリーを大型化したが、重量とコストが増加した。

Concern

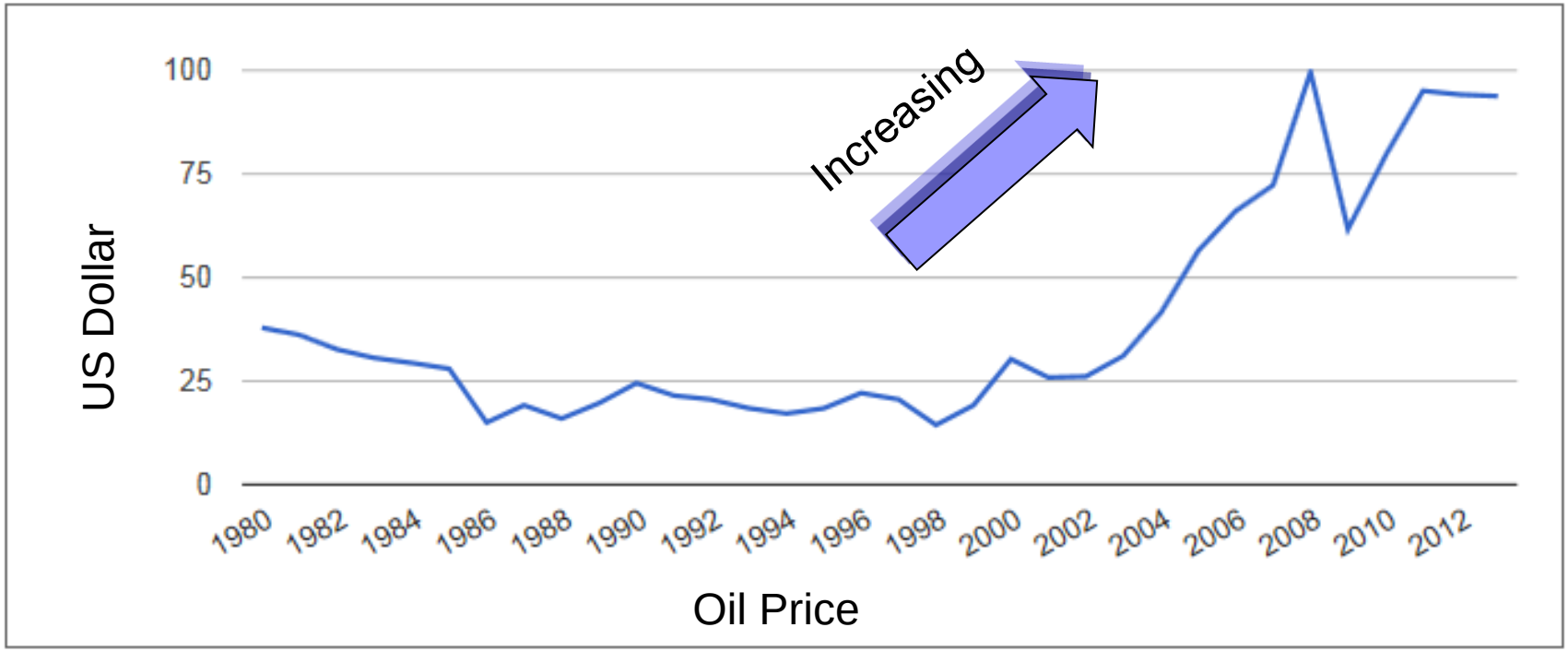
CONCERN

Natural Resources Shortage



OIL Cost Increase Rapidly

Oil Price Hike



Concern

CONCERN

EV Car is heavy

Oil price hike

But---

Like to drive longer

Then---

Like to Save Fuel

Weight Reduction is Must Item

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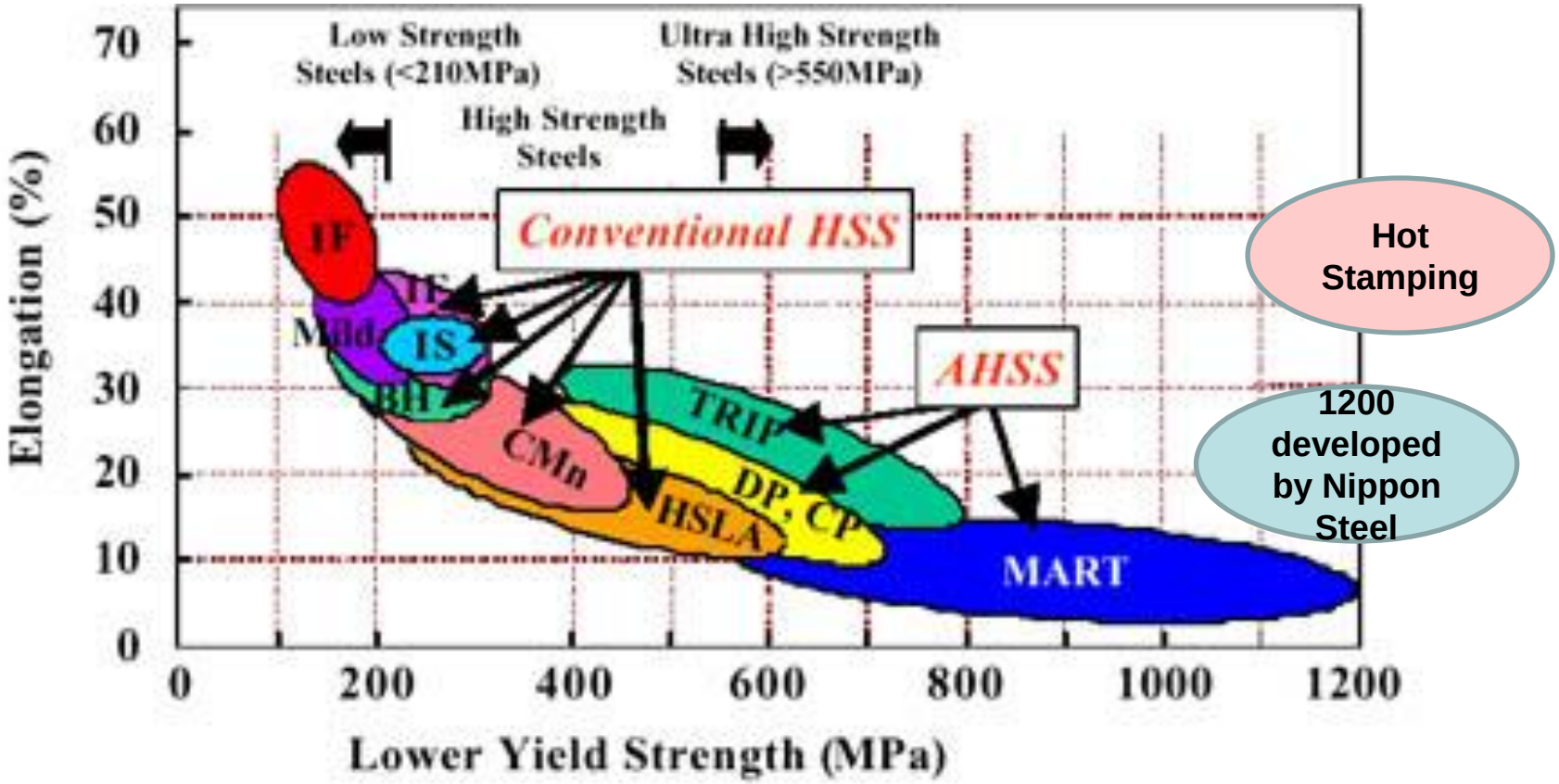
Technology for weight reduction

How to reduce weight of Body

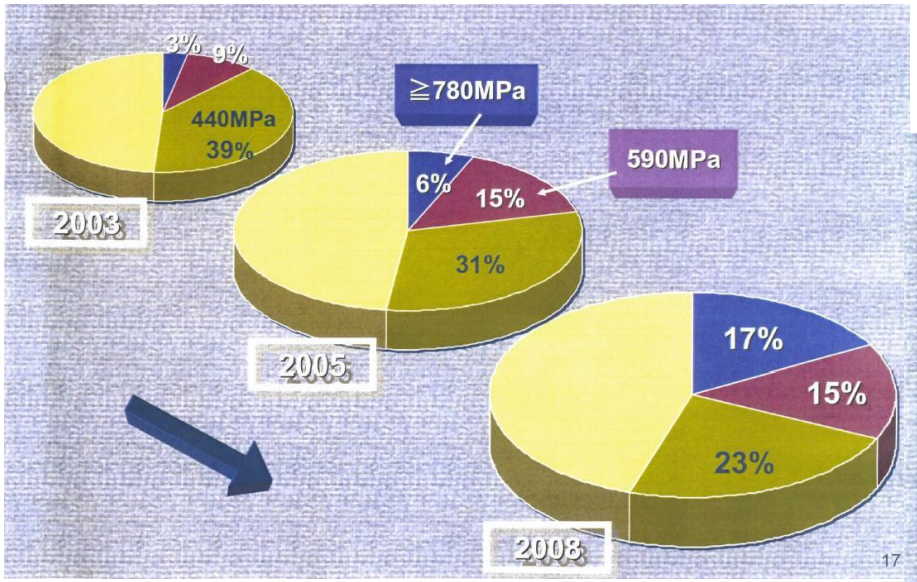
* Use High Strength Steel; 980MPa, Hot stamping
* Apply Laser Welding
* Use Innovative Press Machine
* Apply Plastic Parts with new Technology
* Optimize Body Structure by CAE

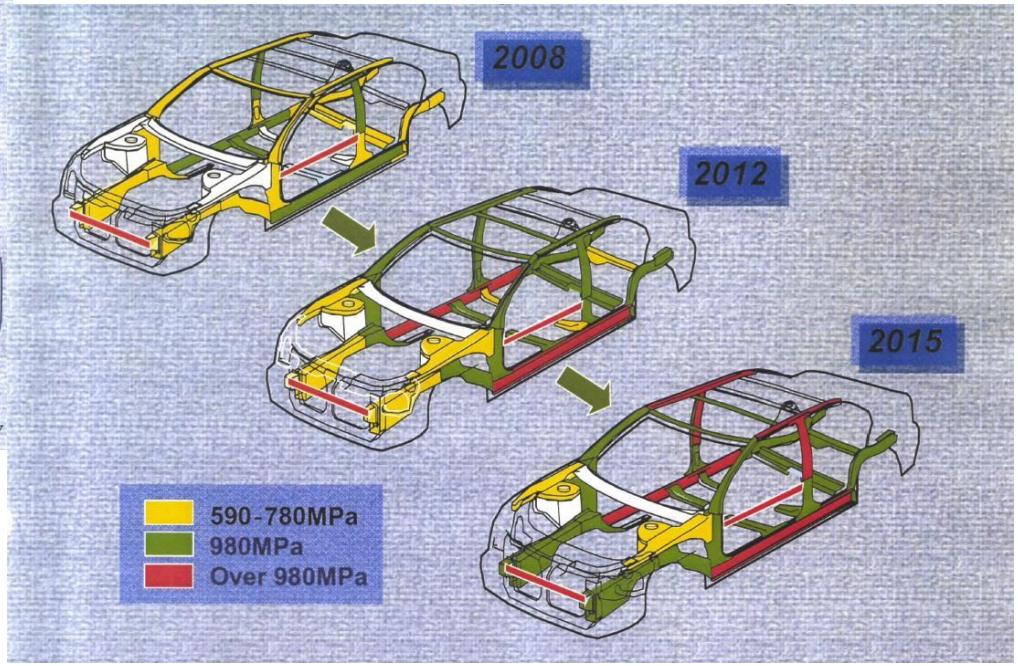
HSS (High Strength Steel)



HSS History

Over 980MPa material increases after 2012 drastically.
Main area are zones to meet Side Impact and Roof crash and Fr/Rr Impact requirements.





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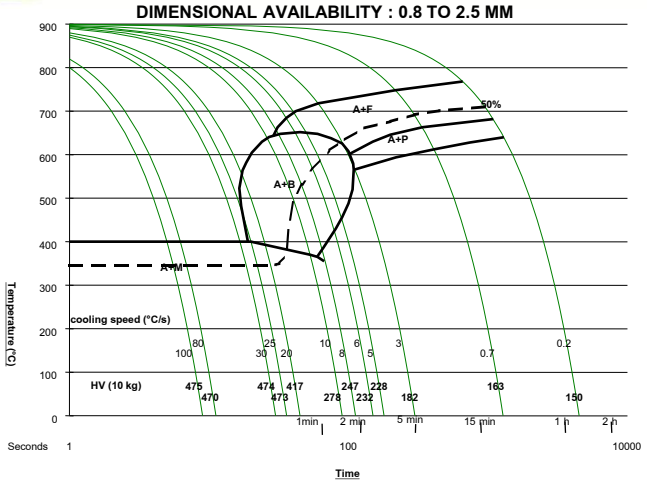
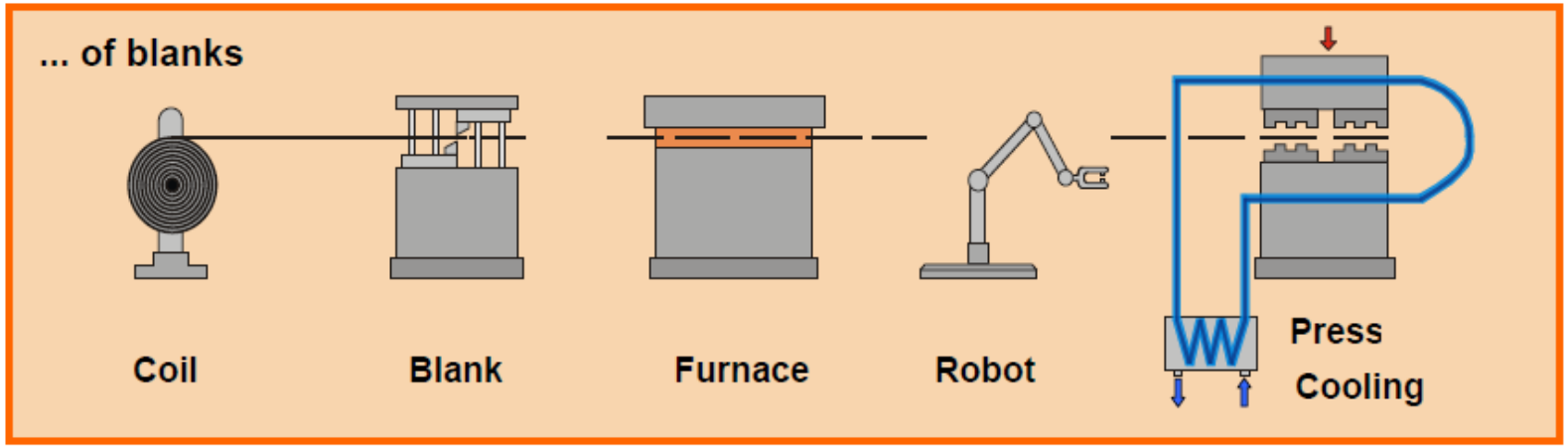
Hot Forming Process

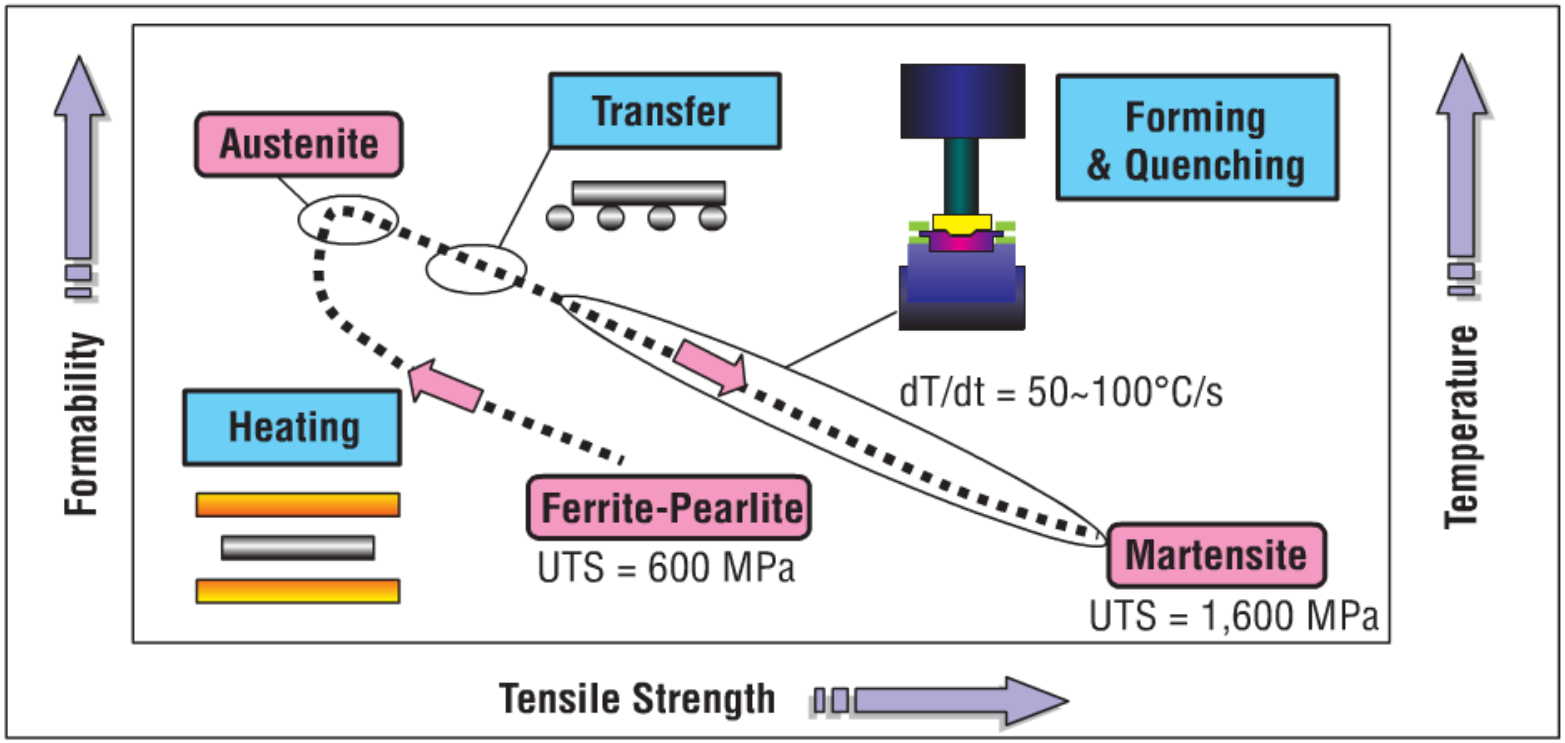


Material; Boron Steel with Carbon rich

Heat original 600MPa steel to 950 degree.
Quickly press.
Quenching in the die, speed >27 degree/second.



Hot Forming Process



Tensile strength and microstructure change during hot stamping.

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Laser Welding

- Decrease Part Weight
  - Minimize cross sections and hat sections
  - Smaller weld flanges
- Increase Weld Strength
  - Laser weld is 40% stronger than spot weld
- Shorter Cycle Times
  - Laser weld up to 10 times faster than traditional spot weld
- Reduced Capital and Overhead Costs
  - Less robots, welding jigs, operators, floor space
  - Reduce utilities – Uses 94% less electricity to produce weld compared to traditional spot weld
  - Low maintenance - No weld tip change down time or consumables
  - Single sided access – Typical weld gun access not required

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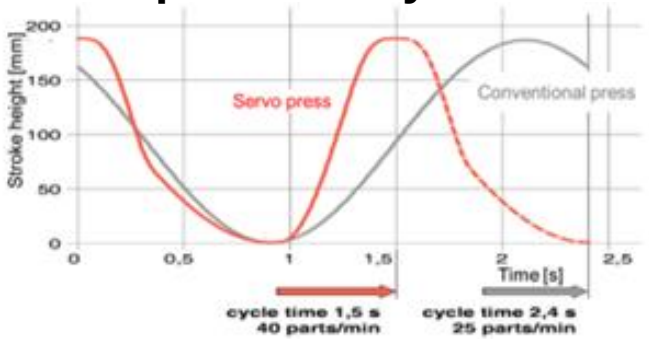
Innovative Press Machines

SERVO PRESS, TRANSFER PRESS

- Increase productivity



- Improve spring-back

T.S 590 Mpa 1.6t

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Apply Plastic Parts with new Technology

Plastic Application for Weight Reduction
Plus
Added-value Technology developed
for one rank up Quality

CERA MAT

Double Injection

IMD

グラデーションが施された抽象柄

カップホルダーカバー（抽象柄部と中央・銀色無地のプッシュマークは一体化した一つの成形品）

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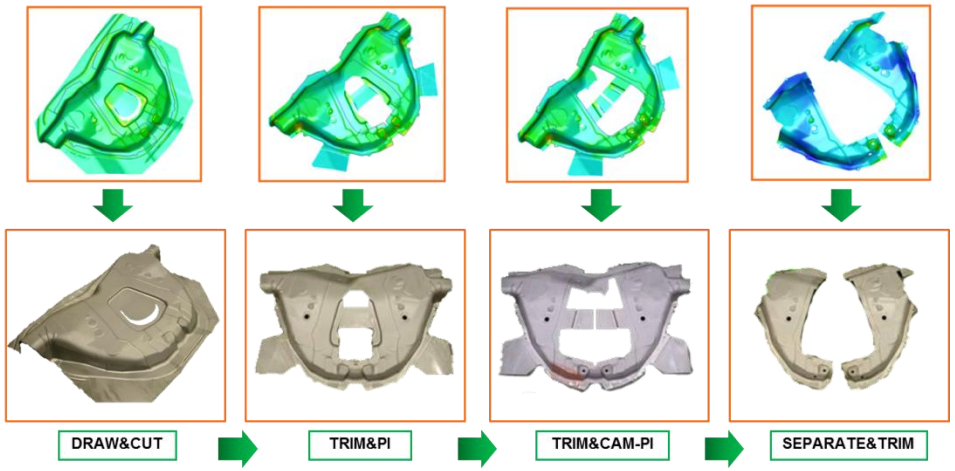
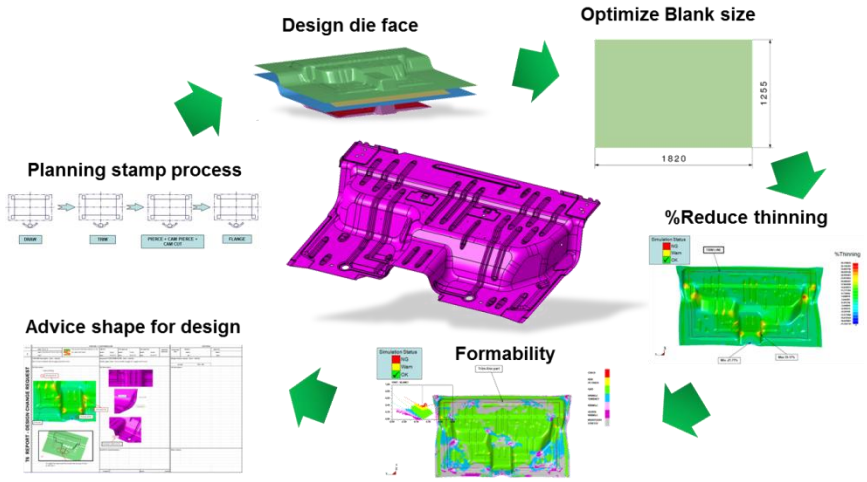
CAE for stamping process

Parts are simulated in feasibility stage of stamping process.
The objective is to reduce problems which may occur during mass production.
Develop in stamping process is to get the best quality of finishing parts.



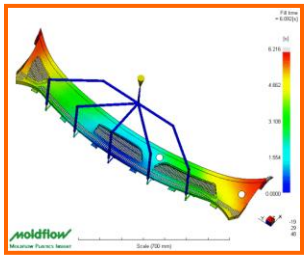


CAE for Injection Process (Plastic)

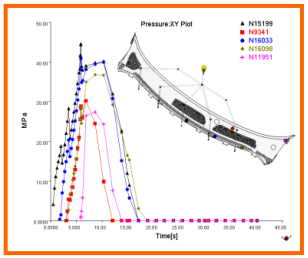
Before mass production, all parts need to be simulated in order to ensure conditions of injection machine and quality of finished part.

Condition for setup mold and Quality

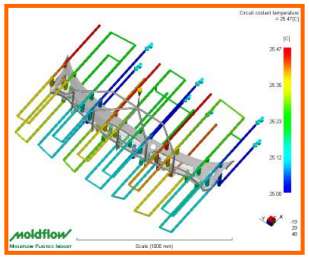
Fill time



Pressure

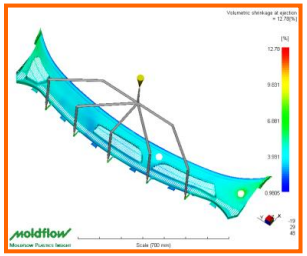


Circuit coolant temperature

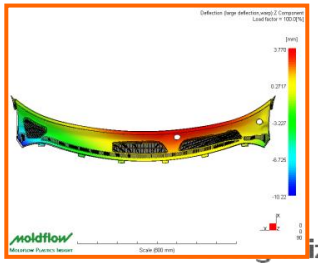


Weld lines

Shrinkage

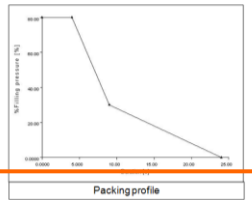


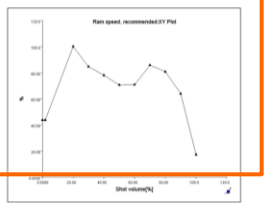
Deflection



Condition

Item	Value	Item	Value
Mold surface temperature	40 C	Cooling time	11 sec
Melt temperature	245 C	Coolant inlet Cavity	25 C
Filling control by injection time	5 sec	Coolant inlet Core	25 C
Switch-over by volume fill	98 %	Mold open time	5 sec
Packing by %filling pressure & time	24 sec	Cycle time	45 sec





Quality before production

GRILLE COWL

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Thank You

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