



## New products generation

2018, February 9<sup>th</sup>

# Our History

More than 110 years of innovation and 4,500 employees globally

**1905**

Founded as Dayton Rubber Manufacturing Co.



**1950s**

Developed cold rubber materials



**1993**



Acquired Pirelli belt business

**2001**

Introduced DI2000 timing belt structure timing belt with a proven service of 240k km



**2016**



First BSG (48V) with belt tensioner and decoupler



First to launch automotive Timing Belt-in-Oil (TBIO) system

**2007**



First raw edge v-belt developed

**1920s**



Launched the first accessory drive belt application

**1970s**

Introduced "No Slack" automatic belt tensioner, Aftermarket kits



**1990s**

Launched System Design approach



**2005**



First BSG (12V) application in production (belt and tensioner)

**2011**

First partnership for full system 48V – all functions integrated

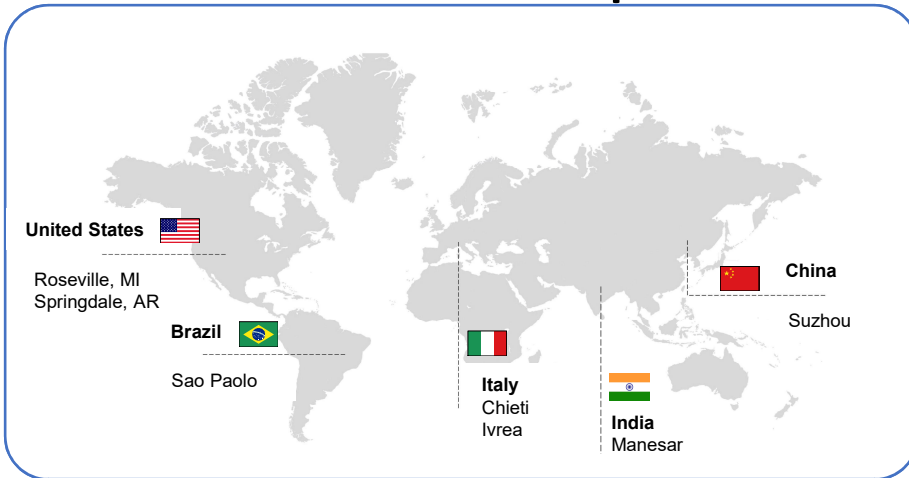


**2017**



# Research and Development Overview

## Global RD&E Footprint



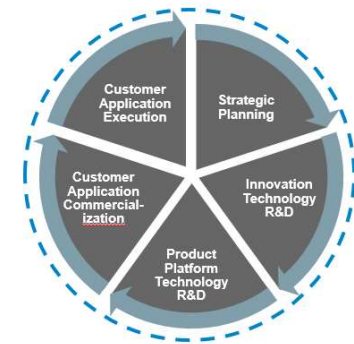
## Innovative solution & processes

### Technology Platforms Based On:

- Strong intellectual property
- Customer recognized value
- Sustainable competitive advantage
- Focused and aligned resources
- Standardized product platforms to accelerate replication globally

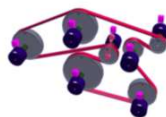
MORE THAN  
**260**  
PATENTED INVENTIONS

### Technology Lifecycle:



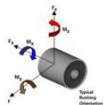
## Full suite of analytical and product validation tools

### Rolling Road Test Bench:



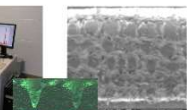
### MTS Rotating Torsional Simulator:

Enabling full characterization of drive products across full engine speed



### State-of-the-Art Materials Laboratories:

Key to product development and validation



# Focusing on Industry Megatrends

Products that improve fuel economy, durability and NVH

## Automotive/Light Duty: Fuel Economy

- ACTIVAC™ Vacuum Generation System
  - Weight savings: 1.1-5.5 lbs.
  - Approx. 0.3% better fuel economy
- DDOS, Damping/Decoupling Overrunning System
  - Can be used on belt start-stop drive

## Industrial/Heavy Duty: Durability

- Industrial Tensioners
- Dayco TFL, Tensioner-for-Life
- Accessory Drive Belts
  - Low slippage, reduced NVH

## Dayco's Solutions for Vehicle Electrification



**BSG 48V Mild Hybrids**  
Dayco Accessory Drive & Aramid  
Cord Belts, Dual-art Tensioners,  
DDCS Crankshaft Decouplers



**Electric Power Steering**  
Dayco EPS Belts

# Why the new mobility generation?

# Demographic trend

## World Population (2018 and historical)

[View the complete population historical table](#)

Year (July 1)	Population	Yearly % Change	Yearly Change	Median Age	Fertility Rate	Density (P/Km <sup>2</sup> )	Urban Pop %	Urban Population
2018	7,632,819,325	1.09 %	82,557,224	29.9	2.51	76	54.9 %	4,186,975,665
2017	7,550,262,101	1.12 %	83,297,821	29.9	2.51	76	54.4 %	4,110,778,369
2016	7,466,964,280	1.14 %	83,955,460	29.9	2.51	75	54.0 %	4,034,193,153
2015	7,383,008,820	1.19 %	84,967,932	30	2.52	74	53.6 %	3,957,285,013
2010	6,958,169,159	1.24 %	83,201,955	29	2.57	70	51.3 %	3,571,272,167
2005	6,542,159,383	1.26 %	79,430,479	27	2.63	65	48.9 %	3,199,013,076
2000	6,145,006,989	1.33 %	78,706,515	26	2.75	61	46.5 %	2,856,131,072
1995	5,751,474,416	1.53 %	84,106,191	25	3.02	58	44.7 %	2,568,062,984
1990	5,330,943,460	1.81 %	91,432,333	24	3.44	53	42.9 %	2,285,030,904
1985	4,873,781,796	1.80 %	83,074,052	23	3.60	49	41.1 %	2,003,049,795
1980	4,458,411,534	1.79 %	75,864,867	23	3.87	45	39.2 %	1,749,539,272
1975	4,079,087,198	1.97 %	75,701,910	22	4.46	41	37.6 %	1,534,721,238
1970	3,700,577,650	2.07 %	72,196,992	22	4.92	37	36.5 %	1,350,280,789

# Demographic trend

## World Population Forecast (2020-2050)

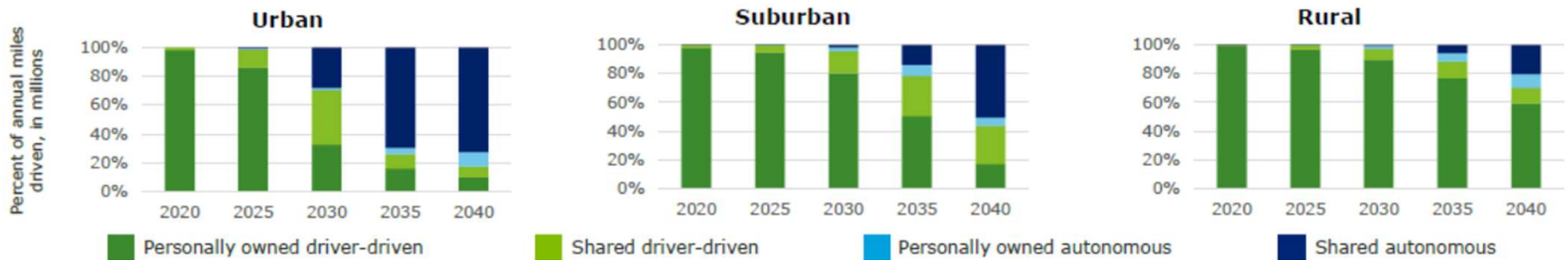
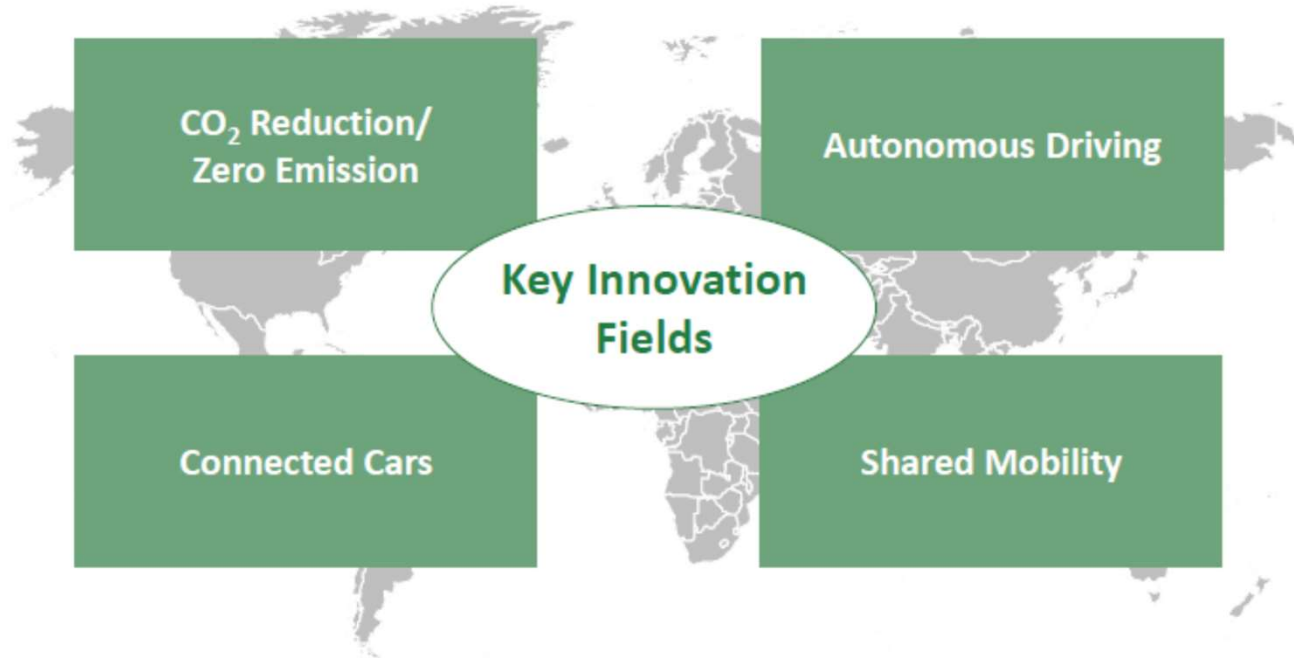
View population projections for all years (up to 2100)

Year (July 1)	Population	Yearly % Change	Yearly Change	Median Age	Fertility Rate	Density (P/Km <sup>2</sup> )	Urban Pop %	Urban Population
2020	7,795,482,309	1.09 %	82,494,698	31	2.47	78	55.6 %	4,338,014,924
2025	8,185,613,757	0.98 %	78,026,290	32	2.43	82	57.5 %	4,705,773,576
2030	8,551,198,644	0.88 %	73,116,977	33	2.39	86	59.2 %	5,058,158,460
2035	8,892,701,940	0.79 %	68,300,659	34	2.35	89	60.7 %	5,394,234,712
2040	9,210,337,004	0.70 %	63,527,013	35	2.31	92	62.1 %	5,715,413,029
2045	9,504,209,572	0.63 %	58,774,514	35	2.27	95	63.5 %	6,030,924,065
2050	9,771,822,753	0.56 %	53,522,636	36	2.24	98	64.9 %	6,338,611,492

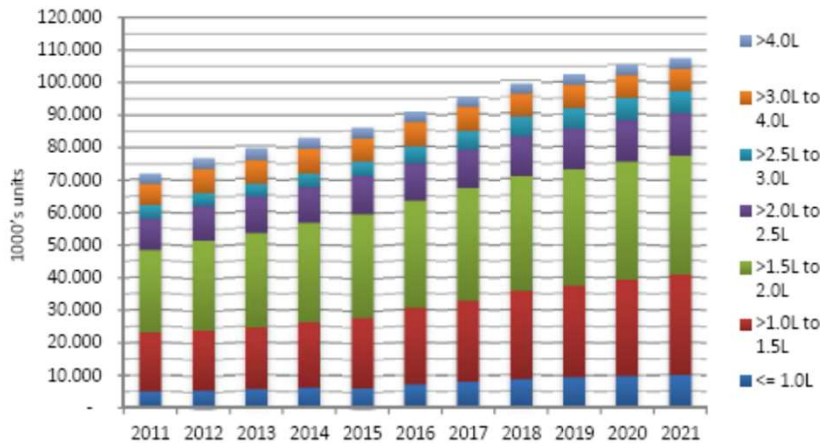
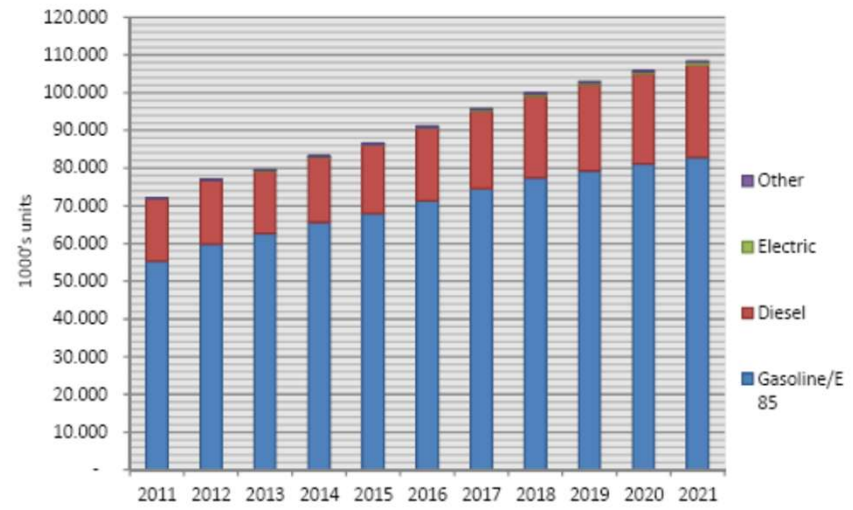
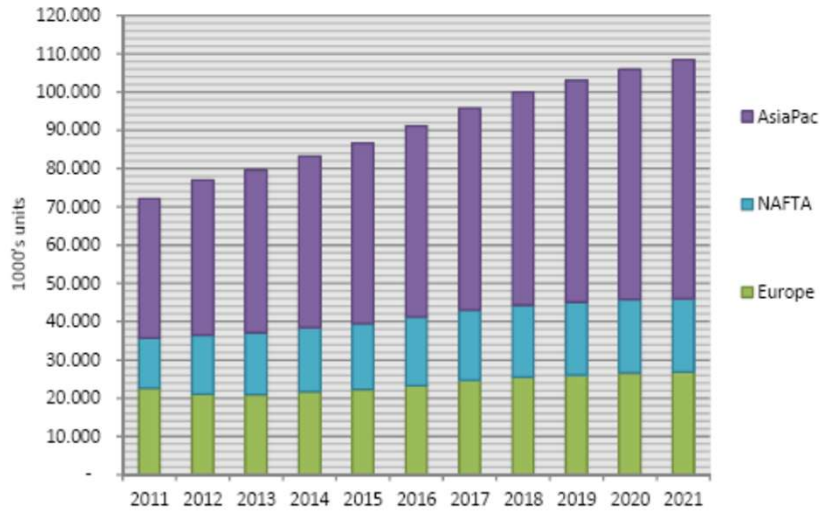


# How the automotive will change?

# Automotive Megatrend



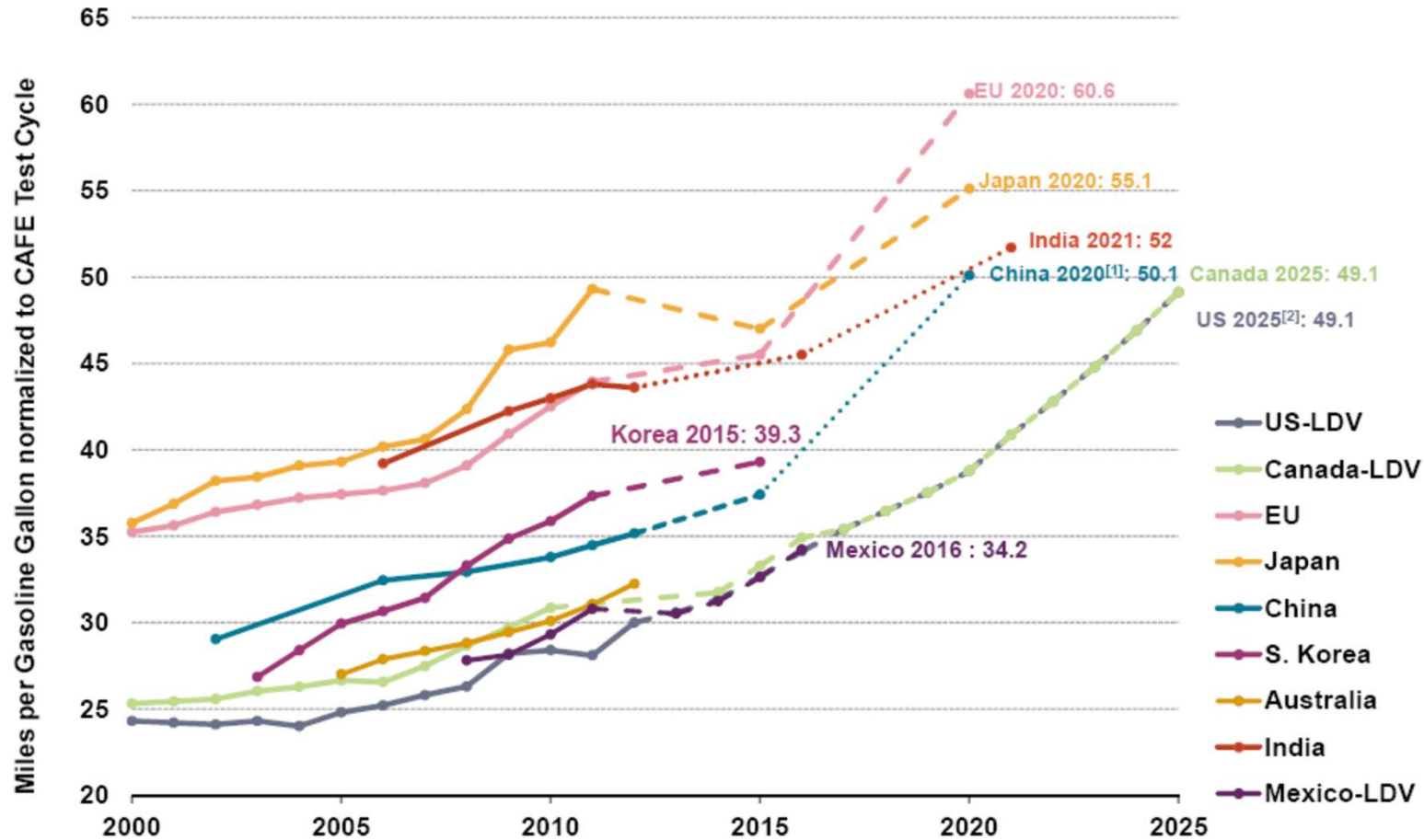
# Automotive Trend



- Primary growth in AsiaPac; China.
- Gasoline still dominates as turbocharging becomes all but standard.
- Engine downsizing continues with Turbo trend
- Larger engines still present in higher end vehicles, but minimal growth is expected.

Source: LMC Q3 - 2014

# Fuel Economy Targets - LDV

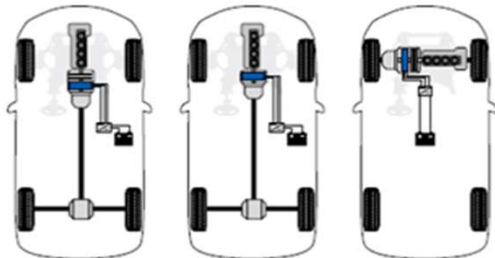


Source: ICCT

# Vision of New Technologies

## OVERVIEW OF ELECTRIFIED DRIVE CONFIGURATIONS

### HEV - HYBRID ELECTRIC VEHICLES

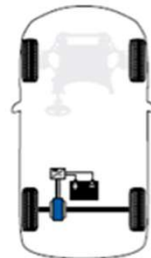


Full hybrid, parallel rear-wheel drive

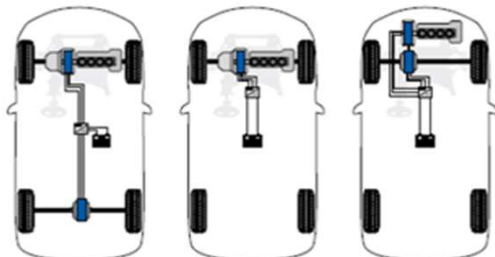
Mild hybrid, parallel rear-wheel drive 48 V or high voltage

Full hybrid, parallel front-transverse drive

### EV - ELECTRIC VEHICLES



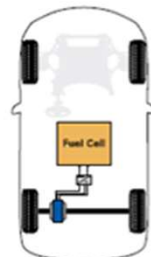
Battery electric vehicle



Full hybrid front-transverse drive with electric motor electric 4-wheel drive

Mild hybrid, parallel front-transverse drive 48 V or high voltage

Serial hybrid or range extender



Fuel-cell (electric) vehicle

## OVERVIEW OF HYBRID CATEGORIES

Hybrid categories	Micro	Mild 48V	Full (HEV)	Plug-in (PHEV)
Main functions	Start/stop (Boost mode) (Recuperation)	Start/stop Boost mode Recuperation (Electric maneuvering)	Start/stop Boost mode Recuperation Limited electric driving Sailing	Start/stop Boost mode Recuperation Electric driving Sailing
Max. performance level	3-5 kW	10-15 kW	20-50 kW	75-120 kW

## How the engine will change

- Downsizing of engine
- Overperformances of engine
- Diesel -> Gasoline
- Turbocharged

## How the e-mode coming

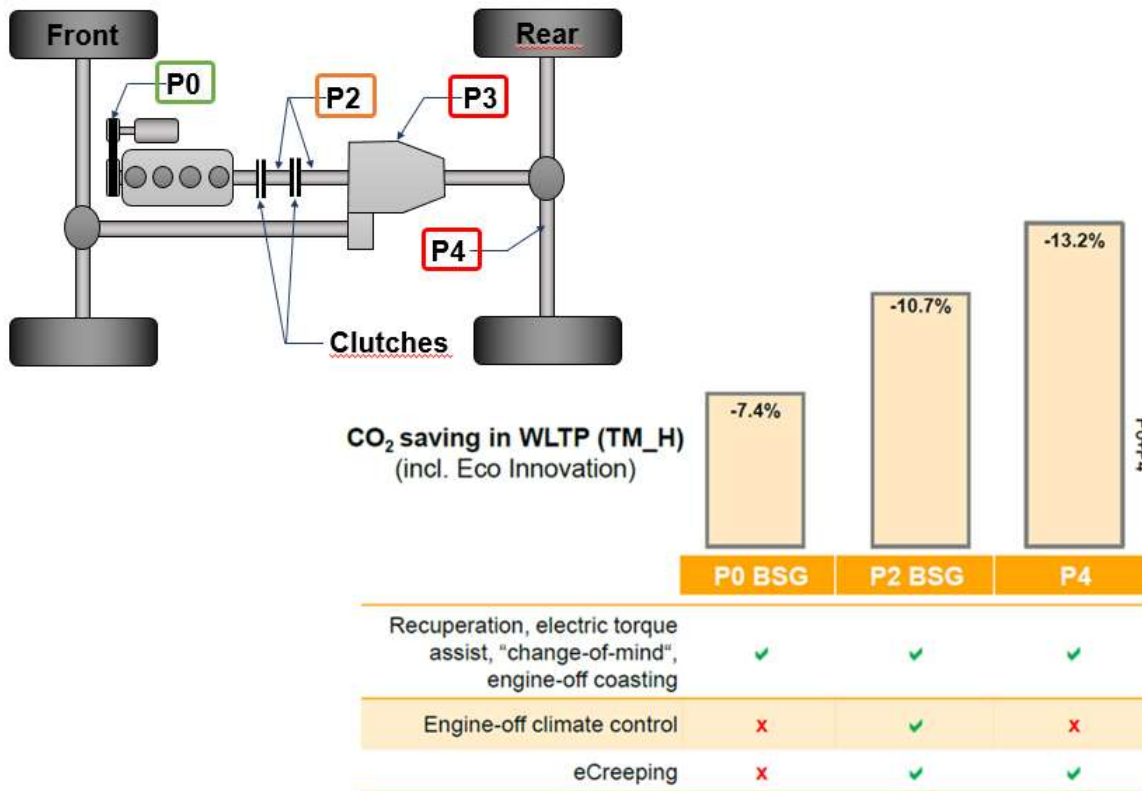
- Electrification of the engine
  - BSG technology
  - Electrification of gearbox
- Electrification of the car
  - Electrification of the axles

## How Dayco will change

- FEAD
  - BSG System
  - Decoupling system
- Primary
  - New Belt in Oil technologies

# Electrification Steps at 48Volts

## Different Hybrid vehicles architectures



- **P0 Configuration:**
  - BSG on front end Belt drive
  - Torque limited
  - Low cost integration



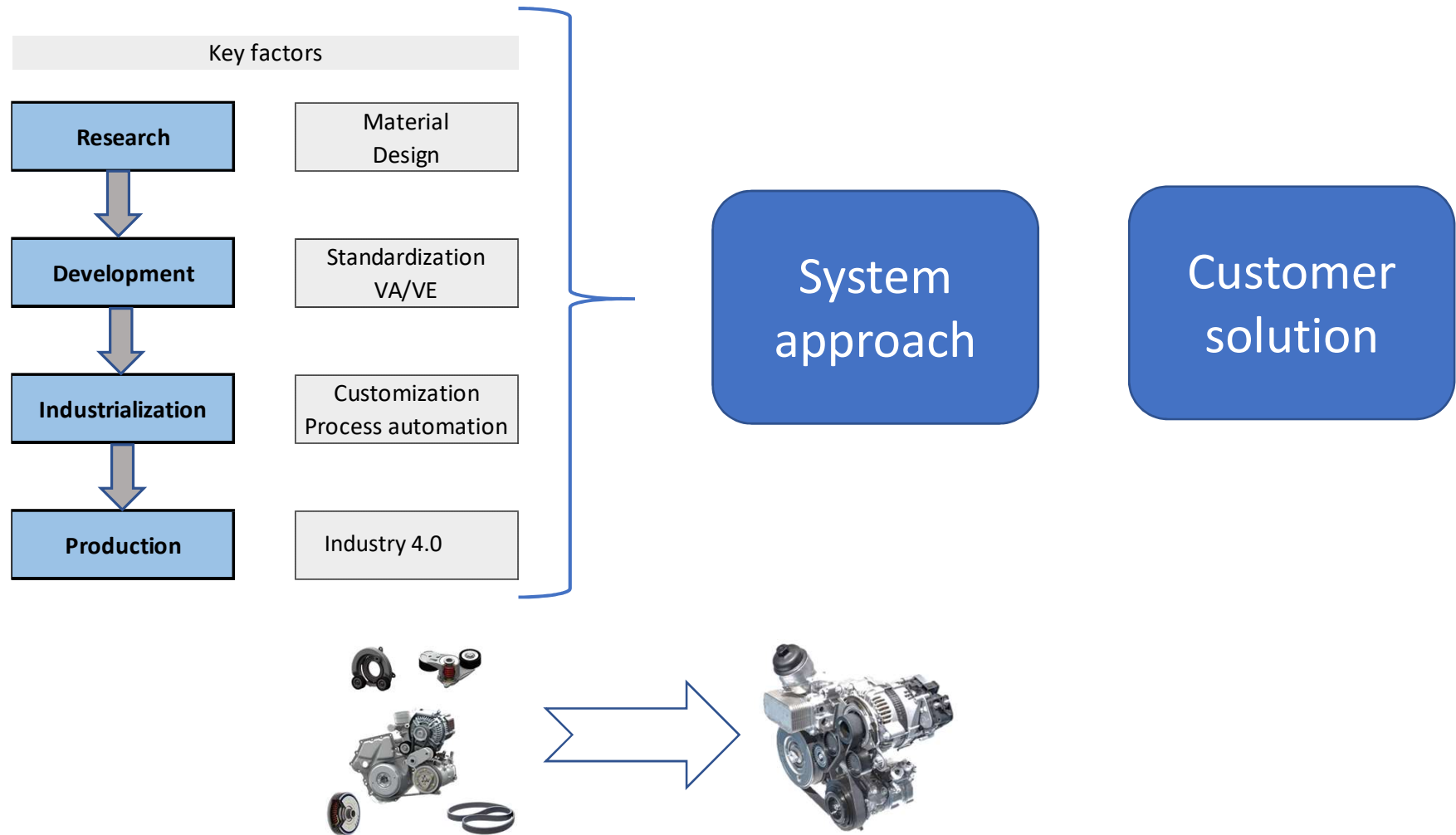
- **P2 Configuration:**
  - Side attached BSG or ISG
  - Additional hybrid functions
  - Eliminate engine drag loss
  - Higher cost and architectural changes



- **P3 and P4 Configurations**
  - P3: eMotor torque on gear output
  - P4: eMotor torque directly on axle drive
  - Highest recuperation potential

# What we need to do?

# High value added -> System Supplier Approach





# Two roles -> one mission

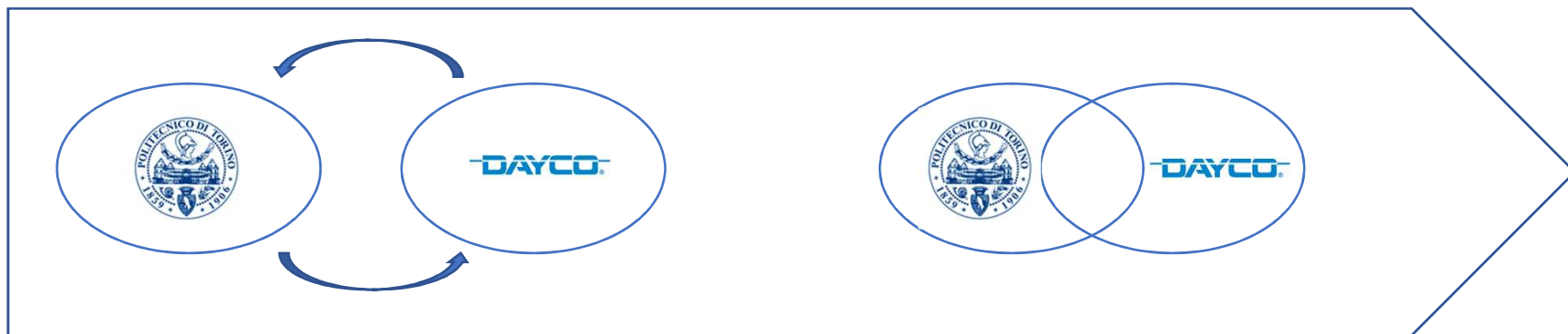


Researching new material and design

Translating new idea to product portfolio

Testing new solutions and applications

Creating new solution for the market



*“Coming together is a  
beginning  
Keeping together is  
progress  
Working together is  
success”*

*Henry Ford*



*MOVE FORWARD. ALWAYS.™*

**Thank you**

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