MOBILITY INDUSTRY INSIDER

Bulletin – Dec 2020

48V Systems

Players introduce 48V tech to accelerate the two-wheeler segment's electrification

What's inside ?

- Highlights in December >>

- Spotlight on: Mild-Hybridization strategy of Volvo Cars >>

- Player of the month >>

FutureBridge

01 | Industrial Tracker

THEMES AND KEY TAKEAWAYS IN December Bulletin

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Themes covered in this scope

Top highlights in December

Mild-hybridization of the product line-up continues at a slower pace

- Forsee Power to supply 48V battery systems to Kubota
- 7-Seater MG Hector Plus to be launched next month in India

Tier-1 players introduce 48V electric drives to accelerate the electrification of three-wheelers and two-wheelers

- Husqvarna India to launch 'E-Pilen' with 48V electric powertrain
- Valeo adapts its 48V motors to e-bikes

Spotlight

- Mild-Hybridization strategy of Volvo Cars

OEM of the month

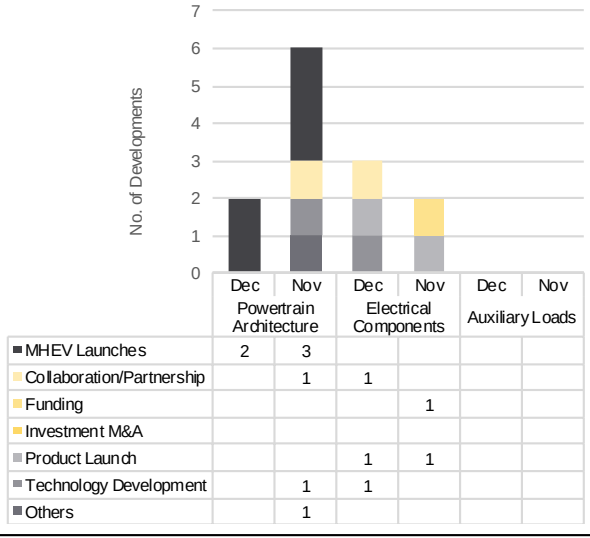
- Volvo Cars

Key Takeaways

- Market activities were comparatively low in December
- 48V systems have relatively low market penetration in off-highway and commercial segments. Players such as Kubota and Eaton are working on introducing cost-effective 48V solutions for these segments
- Cost advantage compared to purely electric or plug-in hybrid vehicles, the lower development effort and the immediate CO2 reduction potential for the vehicle fleet are the major driving factors for 48V system adoption in off-highway and commercial vehicle segments
- Cost benefits over high-voltage systems drive OEMs and tier-1s to select 48V systems as a viable option for electrification of two-wheeler and three-wheeler segments
- The voltage of a battery is a significant differentiator in the two-wheeler segment as it impacts range, speed, mileage, price, and weight. 48V batteries with suitable current capacity are considered as one of the most reasonable combinations in terms of range and safety
- In October 2019, Volvo cars announced that they are combining the engine development and manufacturing assets with Geely and are planning to hybridize half of their fleet and electrify the other half
- Following the announcement, there have been a considerable reduction in pure ICE launches and an intensive mild-hybridization of its portfolio. Mild-hybrid powertrain options are now available on every Volvo model
- Our spotlight discusses the powertrain mix of Volvo Cars and their mild-hybrid technology

Industry Development activities in December 2020

Players introduce 48V tech to accelerate the two-wheeler segment's electrification

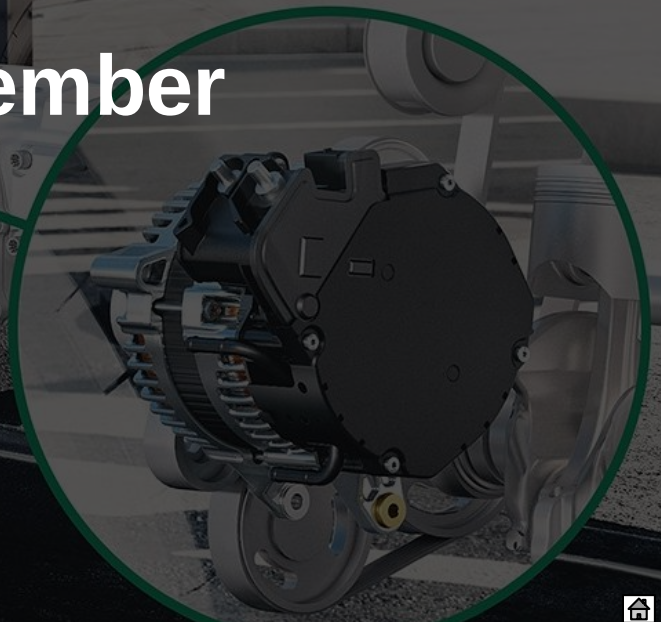


Category	Sub category	Type of development	Important developments in December
Powertrain Architectures	P0 – Belt-Starter Generator	MHEV Launch/Announcement	7-Seater MG Hector Plus to be launched next month in India with mild-hybrid variant >>
		MHEV Launch/Announcement	Volvo announces a full range of electrified powertrains for the XC60 SUV >>
Electrical Components	Electric Drives	Product Launch	Valeo adapts its 48V motors to e-bikes >>
		Technology Development	Husqvarna India to launch 'E-Pilen' with 48V electric powertrain >>
	Battery Technologies	Collaboration/Partnership	Forsee Power has announced that Japanese manufacturer Kubota selected it as a partner for the battery development to equip their 48V micro-hybrid engines for light construction and agriculture vehicles >>

Key Takeaways

- In December, the market witnessed motorcycle OEMs and tier-1s introducing 48V electric drives in selected geographies to accelerate the two-wheeler segment's electrification. Valeo has adapted its 48V motors to bikes to accelerate its expansion in the emerging markets for new zero-emission mobility such as electric bikes and scooters.
- Swedish-origin Austrian company Husqvarna Motorcycles announced that it would be launching its pure electric motorcycle 'E-Pilen' with a 48V electric powertrain. The company confirmed that a 48V powertrain was selected due to its cost benefits compared to high-voltage systems
- Morris Garages (MG) Motor has confirmed that a seven-seat version of the Hector Plus will be launched in the Indian market in January 2021 with a mild-hybrid variant. In a heavily contested utility segment, dimensional advantages (the longest SUV in its segment) and better powertrain options helped MG for higher market penetration
- Volvo Cars completes electrification of XC60 range with mild-hybrid and plug-in hybrid powertrains. Volvo's mild-hybrid technology pairs a turbocharged petrol engine to a 48-volt battery and an integrated starter-generator (ISG) unit – a compact electric motor replacing a car's traditional starter motor and alternator. Our spotlight showcases the powertrain mix and mild-hybridization strategy of Volvo Cars

02 | Highlights in December



Mild-hybridization of the product line-up continues at a slower pace

"*We are very excited to work along with Kubota, one of the global leaders in the off-highway vehicles market. This is an important step forward for us in this promising market, and also the first development project for a Japanese client, who is known to manufacture very high-quality products. It's a big achievement, and our team is extremely motivated to go beyond Kubota's expectations*" - **Sébastien Rembauville-Nicolle, General Manager of Business Development for Forsee Power**

09-Dec-2020

Forsee Power to supply 48V battery systems to Kubota

- France-based Forsee Power has announced that Japanese manufacturer Kubota selected it as a partner for the battery development to equip their 48V micro-hybrid engines for light construction and agriculture vehicles. This is the first significant deal for Forsee Power on the off-highway market. Forsee Power engineers developed a new high-power Forsee Pulse solution integrating lithium titanate oxide (LTO) cells known for their long lifespan and very high-power characteristics, ideal for hybrid applications.

Analyst Comment

- In April, Kubota announced the debut of its micro-hybrid system to the North American market. The Kubota engine's micro-hybrid system pairs a 48V motor generator with an engine to offer a 10kW power boost. The off-highway market and commercial vehicle segment are yet to witness the proliferation of 48V mild-hybrid systems. A study conducted by FEV shows that 48V powertrain electrification, including e-turbo and electrified auxiliaries, offers the best cost efficiency among the technology packages available for heavy-duty commercial vehicles. Cost advantage compared to purely electric or plug-in hybrid vehicles, the lower development effort, and the immediate CO2 reduction potential for the vehicle fleet are the major driving factors for 48V system adoption in off-highway and commercial vehicle segments.

Read this story

18-Dec-2020

7-Seater MG Hector Plus to be launched next month in India

- Morris Garages (MG) Motor has confirmed that a seven-seat version of the Hector Plus will be launched in the Indian market in January 2021
- The Hector was MG's first product in the Indian market, and the SUV quickly gained popularity in the country, due to its extensive feature list including a 48V mild-hybrid powertrain
- Hector Plus is expected to carry forward the existing engines - a 143hp, 1.5-litre turbo-petrol and turbo-petrol mild-hybrid (Hector Plus Petrol Hybrid Sharp MT - INR 17.39 lakh), and a 170hp, 2.0-litre diesel. Gearbox options will include a standard six-speed manual and the option of a six-speed dual-clutch automatic with the non-hybrid turbo-petrol engine

Analyst Comment

- MG entered the Indian automobile market in 2019 with Hector. Hector is a 5-seater mid-sized SUV. MG decided to enter this segment because this segment has seen the most amount of growth recently. MG has sold 8746 units in the first half of 2020 and seems to have gained an almost perfect V-Curve, swiftly catching up with the volumes. In a heavily contested utility segment, dimensional advantages (the longest SUV in its segment) and better powertrain options helped MG for higher market penetration.

Read this story

Tier-1 players introduce 48V electric drives to accelerate the electrification of two-wheelers

"One of Valeo's key strategic focuses is accelerating its expansion in the emerging markets for new "zero-emissions" mobility, including electric small city vehicles, electric motorcycles and scooters, last-mile autonomous delivery droids and electric bikes. To do this, we are leveraging and adapting the technological platforms that we developed for the automotive industry – both those dedicated to ADAS (advanced driver assistance systems) and to low-voltage electrification (48V)." - **Jacques Aschenbroich, Valeo's Chairman and Chief Executive Officer**

21-Dec-2020

Husqvarna India to launch 'E-Pilen' with 48V electric powertrain

- In September, Husqvarna confirmed that it is planning to build an electric motorcycle, named the 'E-Pilen'
- The manufacturing of this upcoming e-bike will be handled by Bajaj Auto, at its Chakan plant, and it is expected to debut by 2022. Now new information regarding the motorcycle's specifications has been revealed
- In an interview, Stefan Pierer, CEO, Pierer Industrie AG (Husqvarna's parent company), stated that KTM and Bajaj have jointly developed 4 kW and 8/10 kW (both 48V) electric motors, for use in their electric two-wheelers
- The 4 kW motor is already being used in the Bajaj Chetak, and could also be seen on the upcoming KTM/Husqvarna electric scooter
- For the 'E-Pilen', the companies have decided to use a 48V 15kW 'powerpack' setup instead. The company confirmed that a 48V powertrain was selected due to its cost benefits compared to high-voltage systems

Analyst Comment

- The use of simple mild steel in the disc-like rotor with permanent magnets attached helps reduce cost, as does the modular construction, which lends itself to a high level of automated assembly
- 48V electric vehicles are yet to see the market proliferation in countries like India
- Low cost 48V electric drives could help to accelerate the electrification of two-wheelers

Read this story

15-Dec-2020

Valeo adapts its 48V motors to e-bikes

- Valeo has adapted its 48V motors to bikes. The Valeo technology developed in partnership with Effigear comprises a 48V electric motor and a seven-speed automatic, adaptive gearbox in a single unit located in the pedal assembly, providing the electric assistance. Rather than build bikes, Valeo aims to equip them with its 48V electric assistance solution.
- Valeo has developed three prototypes to show how its solution can be adapted to all types of models: a city bike, a mountain bike, and a cargo bike for transporting loads

Analyst Comment

- We have observed an ongoing trend of Tier-1 48V systems suppliers introducing 48V integrated electric drives to accelerate the electrification of three-wheelers and two-wheelers
- In January, Mahle announced the start of local production of 48V PMSM motors and controllers in its Coimbatore plant
- Valeo's Special Vehicle Application team in France along with the team in India is already working with key local players to introduce 48V electric drive technology in the market

Read this story

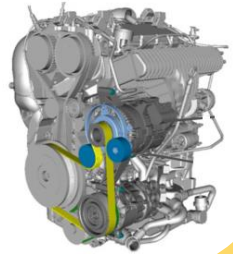
03 | Spotlight

SPOTLIGHT

Analyst Comment

- This announcement indicates that Volvo is planning to discontinue its pure ICE models.
- In February, Volvo Cars announced that its 48-volt mild-hybrid powertrain options are available on every Volvo model.
- Volvo is one of the first OEMs to bring a mild-hybrid option across its entire portfolio. The 48V system does not require OEMs to overhaul its existing setup as it is a complementary technology, and thus the cost impact is low
- Volvo Cars' mild hybrids offer drivers up to 15% fuel savings and emission reductions in real-world driving
- In October 2019, Volvo cars announced that they are combining the engine development and manufacturing assets with Geely and are planning to hybridize half of their fleet and electrify the other half
- Earlier this year, Geely was in preliminary talks with Volvo cars regarding a possible restructuring to create a strong global brand and to respond better to the cost of switching to electric vehicles, stricter emission rules, and autonomous driving
- Volvo CEO, Hakan Samuelsson confirmed that the negotiations to combine with Geely, which was delayed due to the pandemic, to resume in the first quarter of 2021

48V Systems
Mild-Hybridization strategy of Volvo Cars

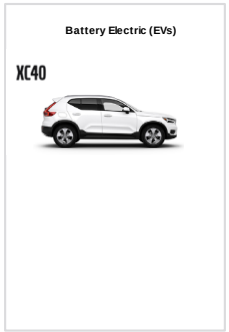


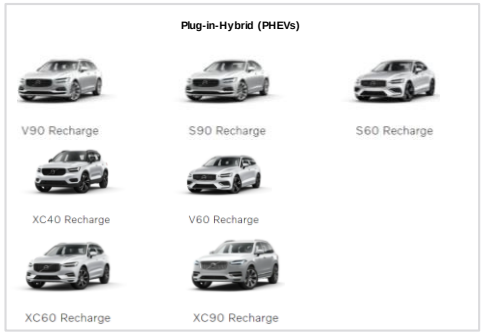
- Volvo announces a full range of electrified powertrains for the XC60 SUV >>
- Mild-hybrid (P0 – BiSG) petrol and diesel XC60s combine a 2.0-litre engine with a 48-volt battery and kinetic energy recovery system for optimum efficiency

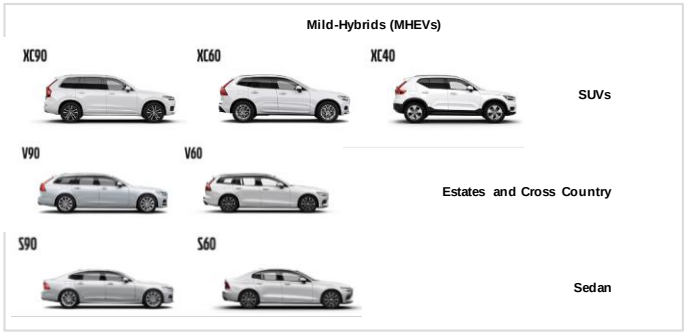
- The rollout of Volvo Cars' electrification strategy continued with the introduction of the new 'B' badged mild hybrid powertrain which couples an advanced brake energy recovery system with a new generation of internal combustion engines

- CO_2 improvement (WLTP) ~7 g CO_2
- ~8hp mechanical boost for petrol engine max power
- ~10hp mechanical boost for petrol engine max power

Electrification status: 1 BEV, 7 PHEVs and 7 MHEVs>>







Source: [1], [2], [3]

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04 | OEM of the month

Player Profile- Volvo Cars

Introduction

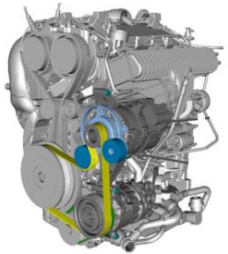
- Volvo Car Group (Volvo Cars) is owned by Zhejiang Geely Holding (Geely Holding) of China. Volvo Cars formed part of the Swedish Volvo Group until 1999, when Ford Motor Company bought the company. In 2010, Geely Holding acquired Volvo Cars
- Volvo Cars head office, product development, marketing and administration functions are mainly located in Gothenburg, Sweden
- The company's main car production plants are located in Gothenburg (Sweden), Ghent (Belgium), South Carolina (US), Chengdu and Daqing (China), while engines are manufactured in Skövde (Sweden) and Zhangjiakou (China) and body components in Olofström (Sweden)
- The main function of Volvo Car's mild hybrid system – and the inspiration for the 'B' badging – is that the vehicle's kinetic energy is recovered during braking and fed back to the 48-volt battery

Player Type	OEM
HQ Country	Sweden
Revenue	The company revenue fell by 14.1 per cent in H1 to $ 11.47 billion (H1 2019: $13,340 billion) >>
Website	http://www.volvocars.com/
Major Application Segment	Passenger Vehicles

Source : Volvo Cars

MHEVs and Technologies

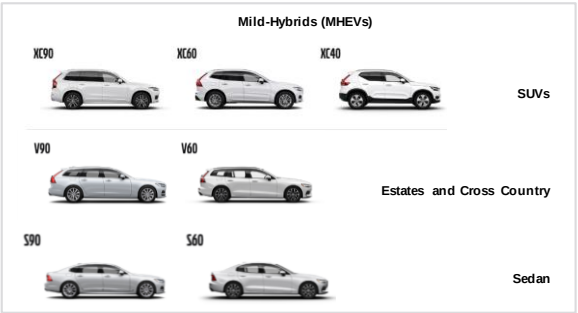
MHEV P0 – 48V FEAD KERS



- The 48V battery and integrated starter/generator recover brake energy and support the engine for reduced emissions and an even more comfortable drive

- ~10kW E-Machine
- ~8hp mechanical boost for petrol engine max power
- ~10hp mechanical boost for petrol engine max power
- CO2 improvement(WLTP): ~7gCO2

Electrification status: 1 BEV, 7 PHEVs and 7 MHEVs >>



ACTIVITIES

Developments/Collaborations/Agreements

Dec 20: Volvo announces a full range of electrified powertrains for the XC60 SUV >>

Feb 20: Volvo updates S90 and V90 models with 48V mild-hybrid tech >>

Feb 20: Geely and Volvo cars are considering combining their business to create a strong global group >>

Jan 20: Volvo Cars and China Unicom collaborate on 5G V2X tech in China >>

Competitors

VOLKSWAGEN AKTIENGESELLSCHAFT

Audi

BMW

Commentary

"A combination of the two companies would result in a strong global group. We look forward to working with Håkan Samuelsson, president and CEO of Volvo Cars, to further investigate this opportunity with the goal to strengthen the synergies within the Group while maintaining the competitive advantage and the integrity of each individual brand."

- Li Shufu, chairman of Geely Holding Group >>

COMING UP
On Insider Platform

48V Systems Q4 Pulse

22nd January 2021

H1 2020 Deep Dive – 48V Systems

H1 2020 Executive Lens covers various aspects of 48V systems such as state of the trend, strength and limitations of current powertrain architectures, challenges and solutions etc. Executive Lens reveals market trends in automotive 48V systems driven by emission regulations. The document also features the proliferation of 48V systems for commercial vehicles and off-highway vehicles

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