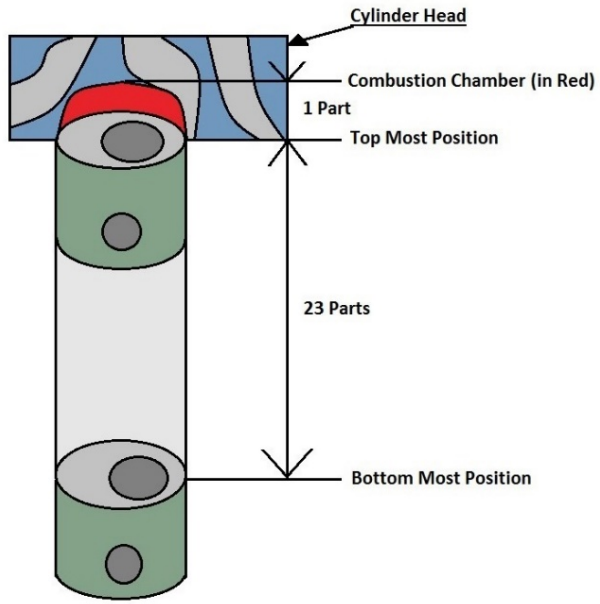
친환경자동차 시스템 공학
(6510128)

정규원

개 요

https://carbiketech.com/compression-ratio/

Compression ratio (압축비)



the ratio of the volume of the combustion chamber from its largest capacity to its smallest capacity.

The petrol engine
compresses the air & fuel with 10:1 to 14:1 ratio.

Diesel engines
the compression-ratio; from 18:1 to 23:1

Higher the compression-ratio,
better is the thermal efficiency of the engine.

개 요

Air-Fuel ratio in Carburetor Engine

the upper and lower limits of combustion

The lower limit; 7:1 – 10:1 – rich mixture
which is barely enough for the engine to idle
The upper limit; 19-20 parts of air by weight to 1 part of fuel
(20:1 - lean mixture).
An average 'cruising' operation needs an ideal air fuel ratio of 15:1 to 17:1.

- **maximum power and quick speeding/overtaking**;
the engine needs 'rich' mixture.
about 12-13 parts air by weight to 1 part of fuel (12-13:1 air fuel ratio)

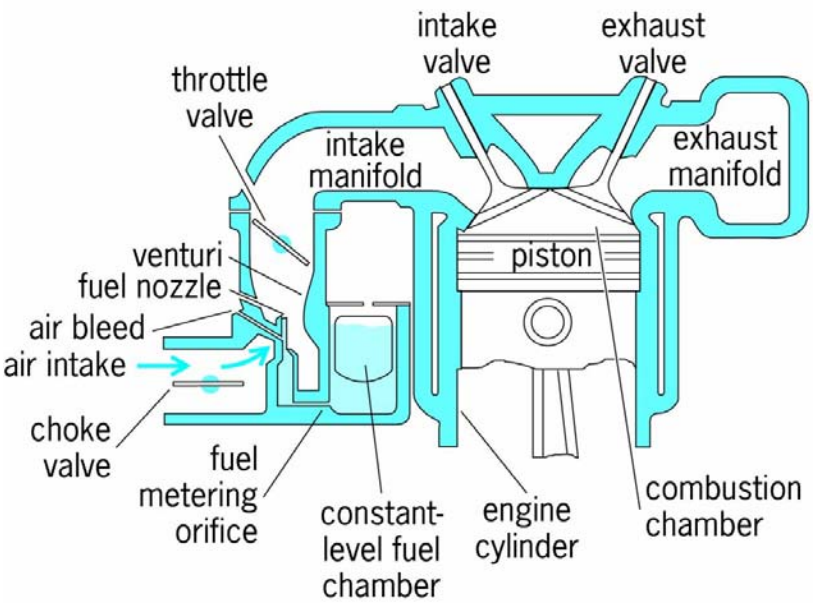
- **starting a cold engine**;
needs the rich mixture which the 'choke' provides.

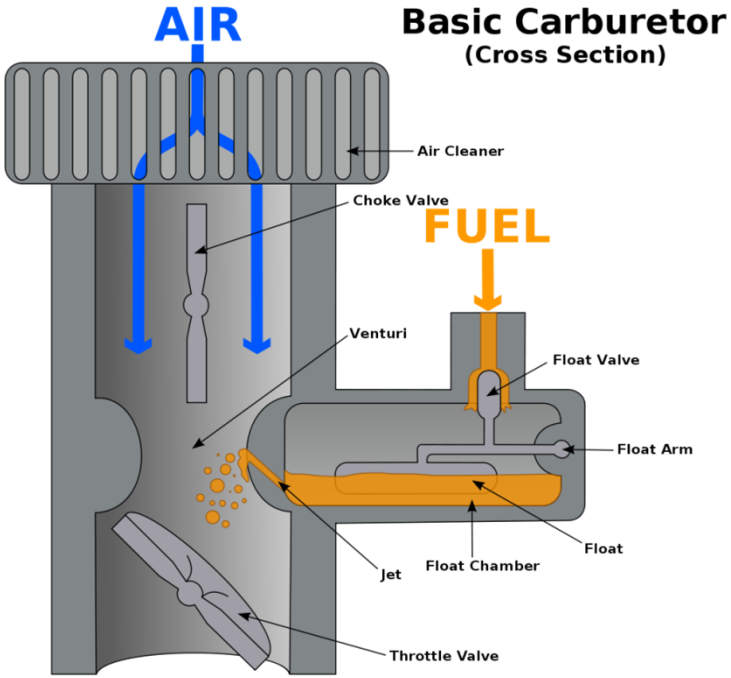
- **maximum fuel economy**;
needs a leaner air-fuel ratio of 16:1 to 17: 1.

개 요

Carburetor Engine

https://en.wikipedia.org/wiki/Carburetor





개 요

Carburetor Engine

https://carbiketech.com/compression-ratio/

Advantages of a Carburetor:

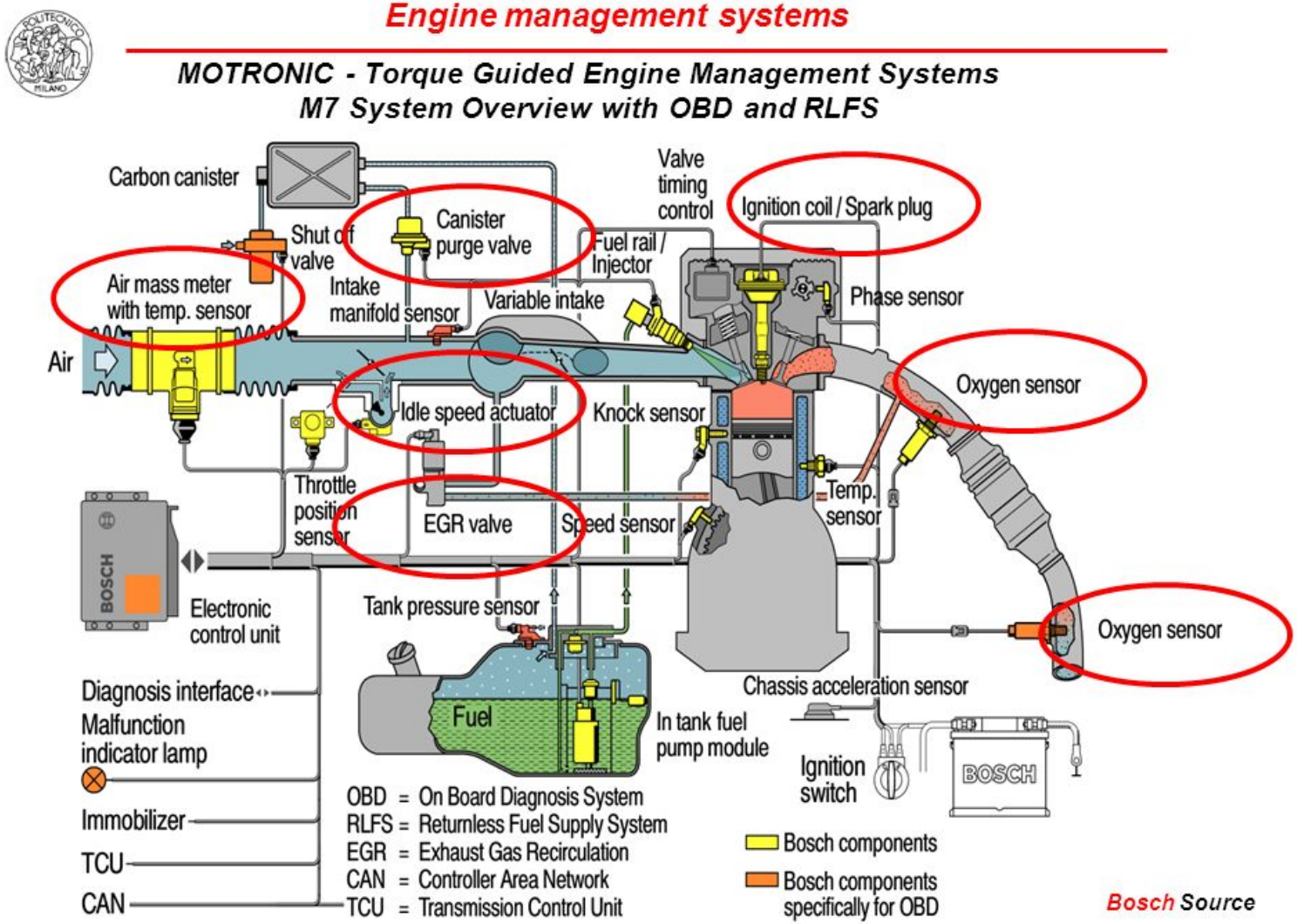
1.Simple design
2.Economical to manufacture
3.Easy to service
4.Spares are affordable
5.A local mechanic can fix its problems.

Disadvantages of Carburetor:

1.Cannot provide a perfect air-fuel ratio consistently.
2.Cannot control the wastage of fuel effectively.
3.More number of parts in some complex designs which makes diagnosis difficult.
4.Some designs develop the problem of vapor lock resulting in engine stalling.
5.Delivers lower mileage & power as compared to fuel-injected systems.

개 요

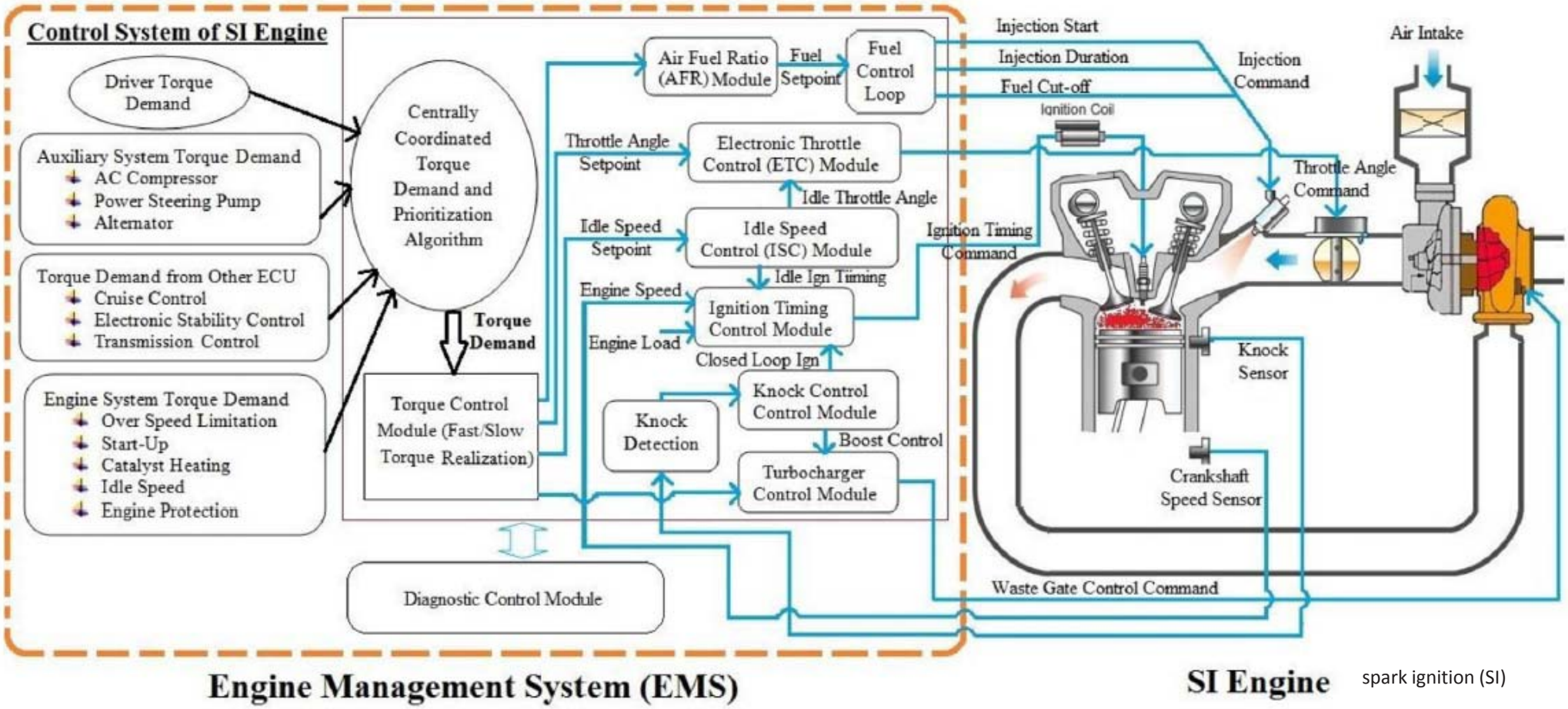
fuel Injection Engine



Scuola di Dottorato di Ricerca 2010 - Road vehicle and engine engineering science

개 요

fuel Injection Engine



spark ignition (SI)

A review on control system architecture of a SI engine management system
B. Ashok ∗, S. Denis Ashok, C. Ramesh Kumar
School of Mechanical Engineering (SMEC), VIT University, Vellore 632014, India
Annual Reviews in Control 41 (2016) 94–118, Elsevier

개 요

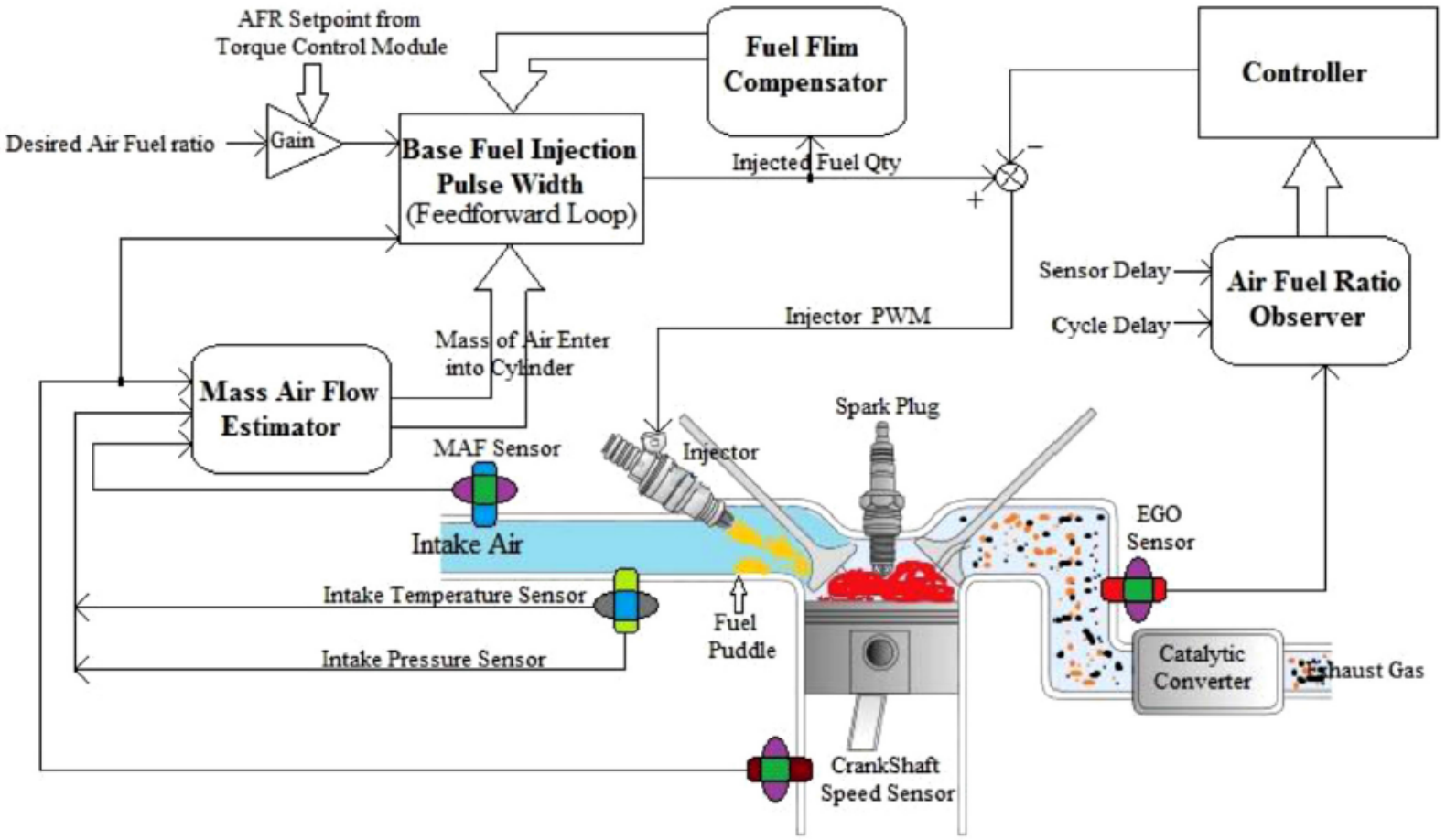


Fig. 5. Air fuel ratio control module of a SI engine.

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개 요

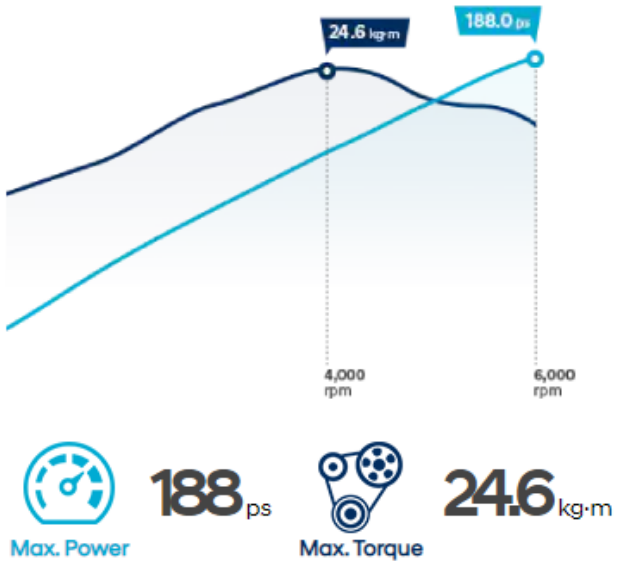
Santa Fe

2.4 GDi

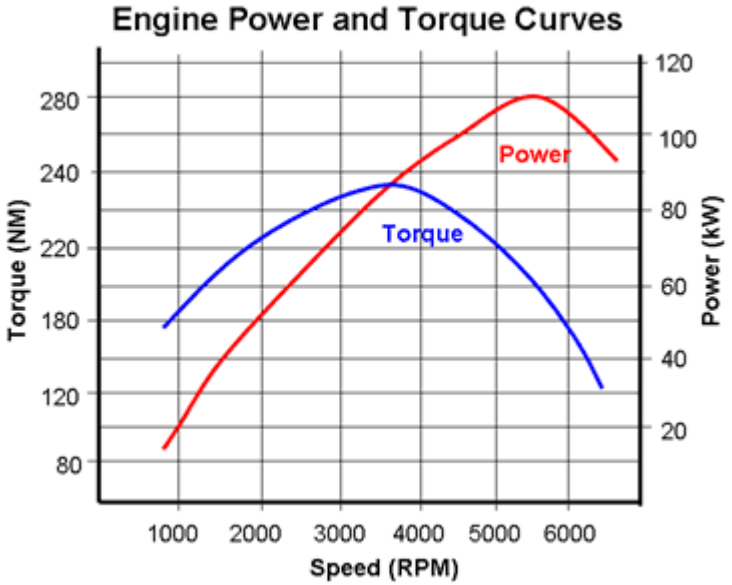
Gasoline engine

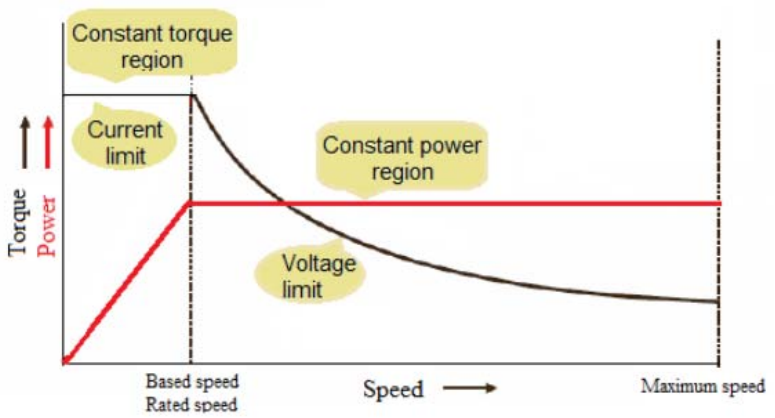
A maximum power of 188ps at 6,000 rpm

and a maximum torque of 24.6kgf·m at 4,000rpm.



https://www.hyundai.com/worldwide/en/suv/newsantafe/performance

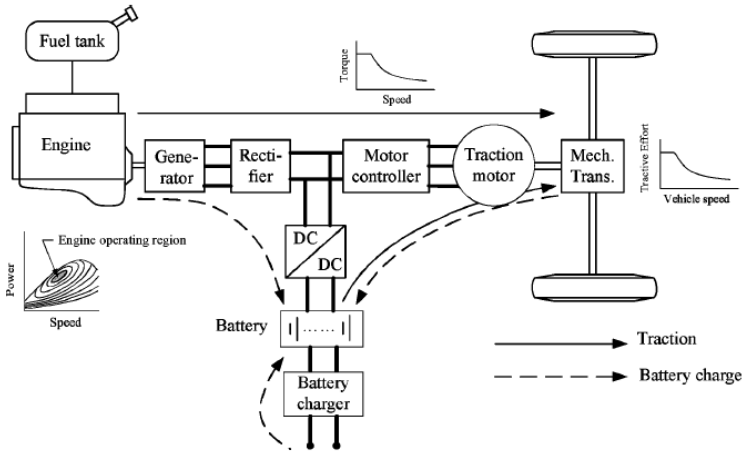




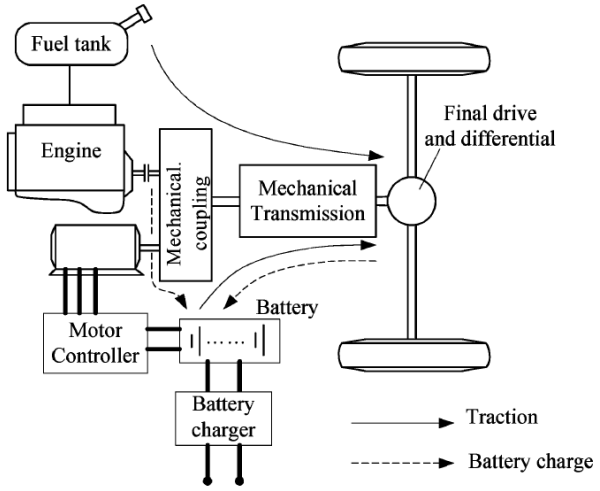
Ideal Output characteristics of traction motor drive

Hybrid Electric Vehicle

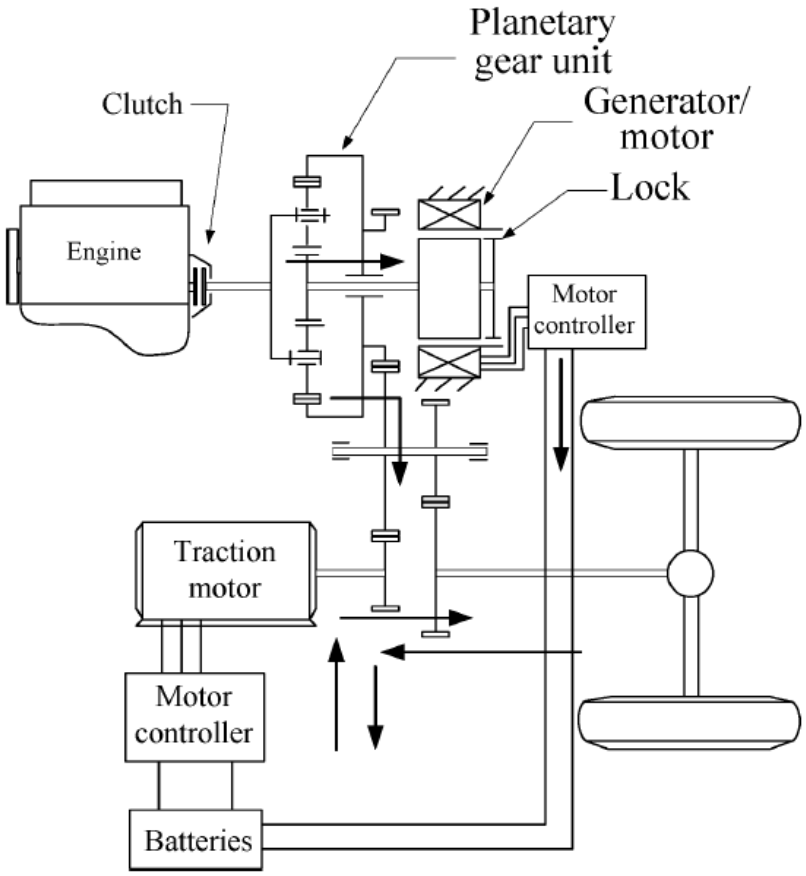
Series type



Parallel type

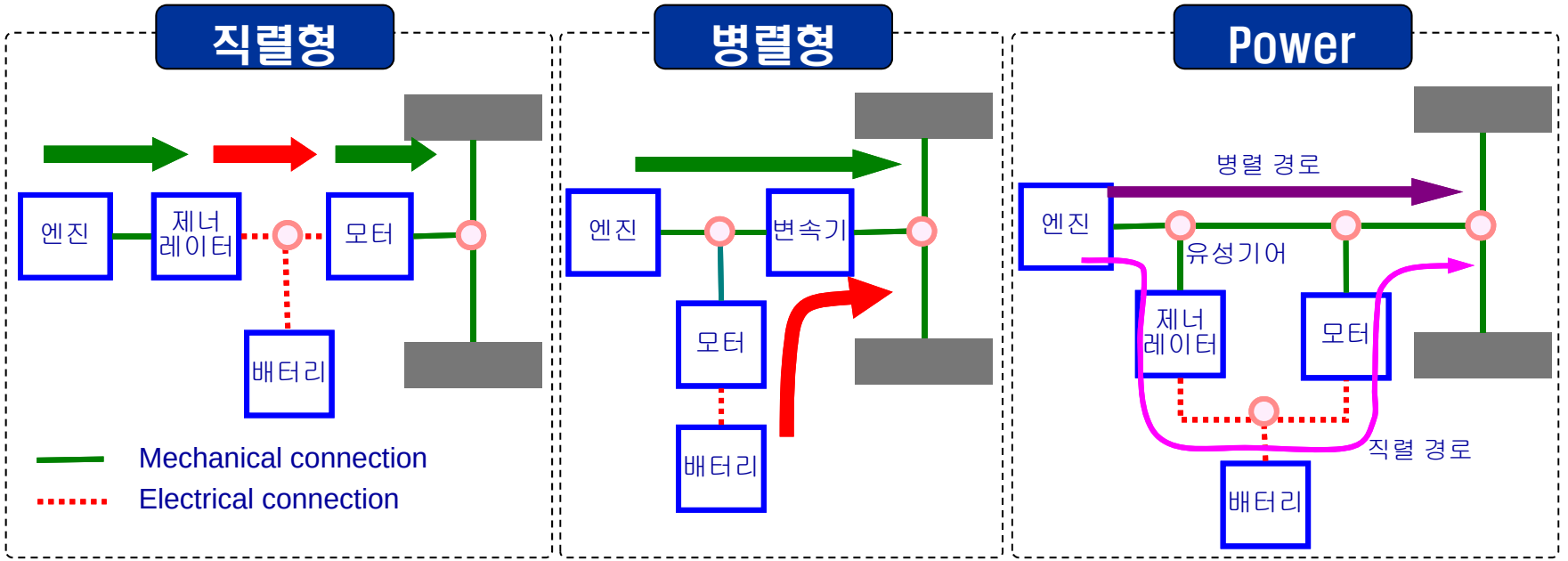


Series/Parallel (Planetary Gear) type



Hybrid Electric Vehicle

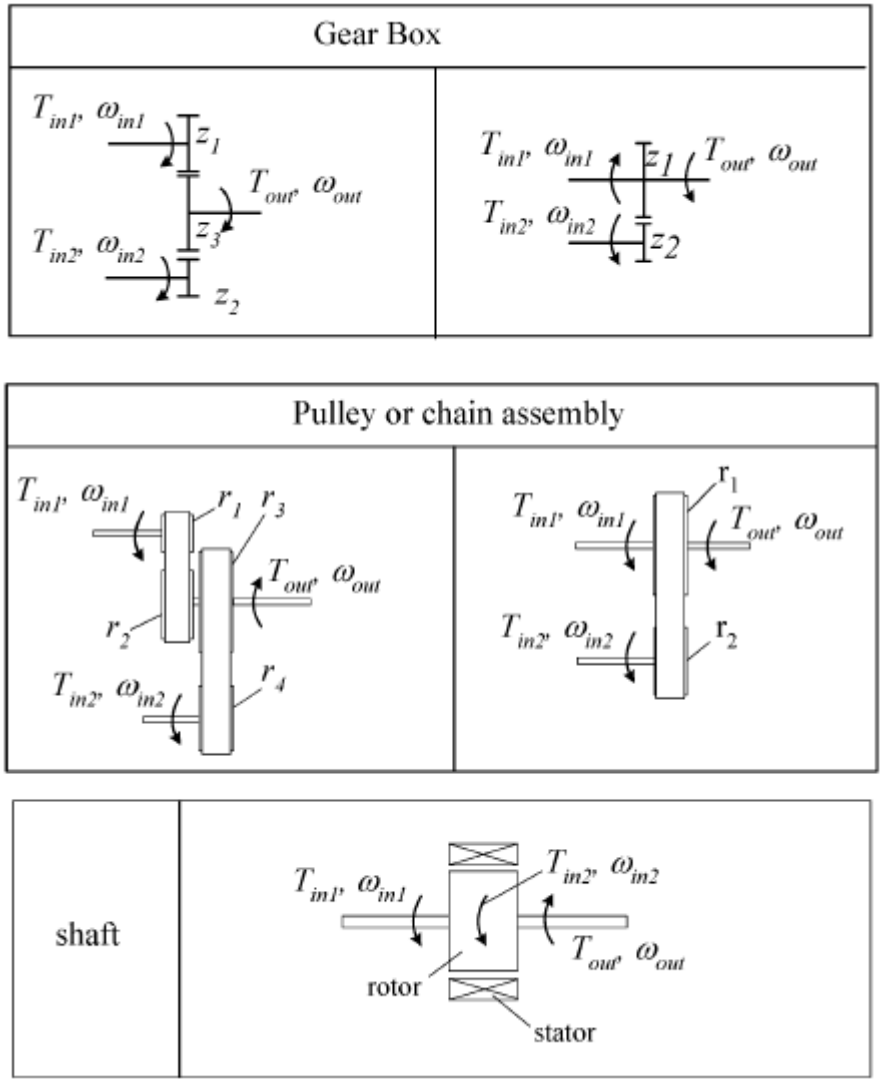
구조상의 분류

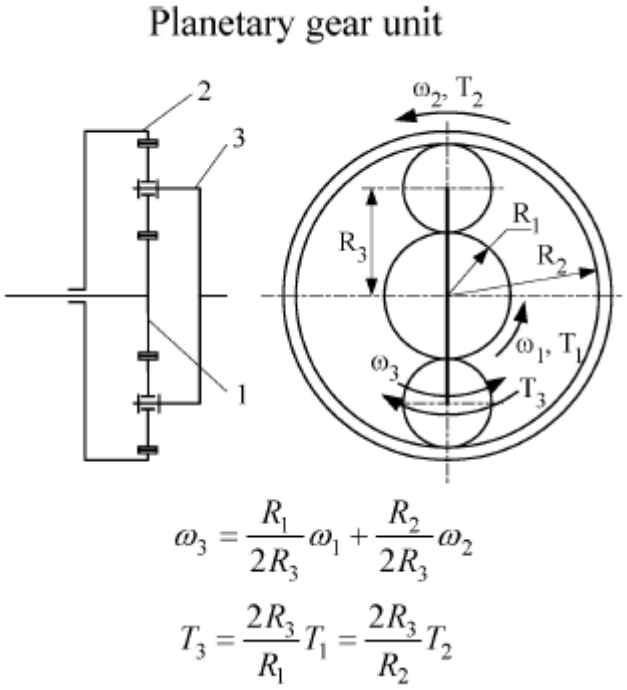


Type	장점	단점
직렬형	▪ 엔진과 구동축이 기계적으로 분리 ▪ 차량 운전 조건 관계없이 엔진 최적화 운전	▪ 에너지 변환손실이 큼 ▪ 충분히 큰 Motor-Generator 가 요구됨
병렬형	▪ 에너지 변환손실이 작음	▪ 엔진과 구동축이 기계적으로 연결됨 ▪ 변속기가 필요함
Power split	▪ 별도의 변속기 필요 없음	▪ 고속 운전시 효율 저하

Hybrid Electric Vehicle

Commonly used mechanical torque coupling devices





$$\omega_3 = \frac{R_1}{2R_3}\omega_1 + \frac{R_2}{2R_3}\omega_2$$

$$T_3 = \frac{2R_3}{R_1}T_1 = \frac{2R_3}{R_2}T_2$$

Hybrid Electric Vehicles: Architecture and Motor Drives
Vol.95, No. 4, April 2007, Proceedings of the IEEE, pp.719-728

Hybrid Electric Vehicle

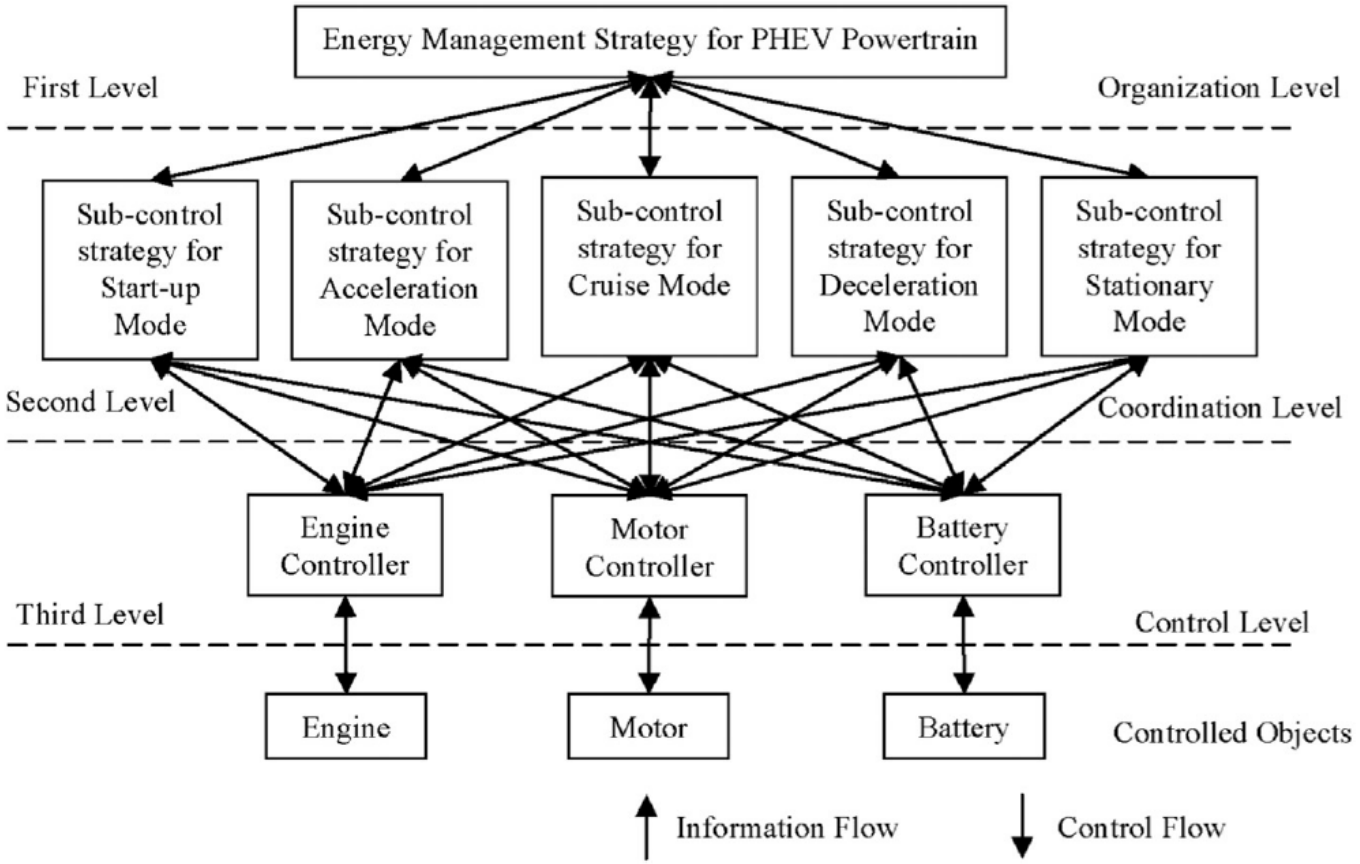
1. Micro HEVs: In micro HEVs, the electric motor, in the form of a small integrated alternator/starter, is used to shut down the engine when the vehicle comes to a complete stop, and start it up when the driver releases the brake pedal. Once in motion, the vehicle is propelled by the internal combustion engine (ICE).

2. Mild HEVs: The mild HEV is very similar to a micro HEV, but with an increased size of the integrated alternator/starter motor and a battery which permits power assist during vehicle propulsion. Typical fuel efficiency increase for mild HEVs are around 20–25% for real-world driving compared to a non-hybrid.

3. Full HEVs: In full HEVs, the electric motor and batteries are significantly bigger than that of the micro HEVs and mild HEVs. As such, depending on the vehicle power demand, the electric motor
can be used as the sole power source. Compared to micro HEVs and mild HEVs, full HEVs have much smaller engines and require more sophisticated energy management systems. Typical fuel efficiency increase for full HEVs are around 40–45% for real-world driving compared to a non-hybrid

4. Plug-in HEVs (PHEVs): PHEVs essentially possess the same configuration as full HEVs but with the addition of an external electric grid charging plug, much bigger electrical components (electric motor and battery) and a downsized engine. Owing to the high capacity electrical components, PHEVs are able to run on electric power for long periods of time.

Hybrid Electric Vehicle

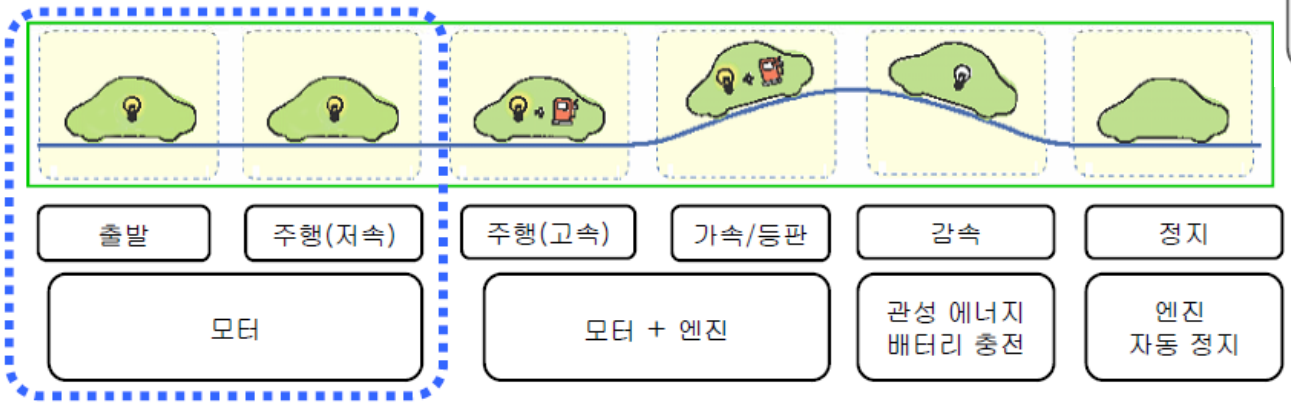


Modelling and control of hybrid electric vehicles (A comprehensive review),
http://dx.doi.org/10.1016/j.rser.2017.01.075

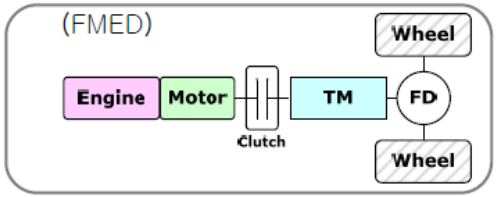
Hybrid Electric Vehicle

Soft type

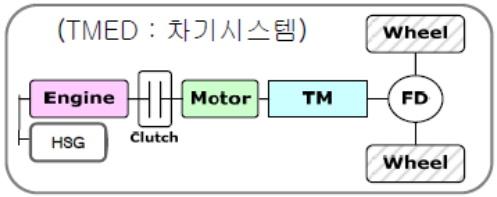
Hard type



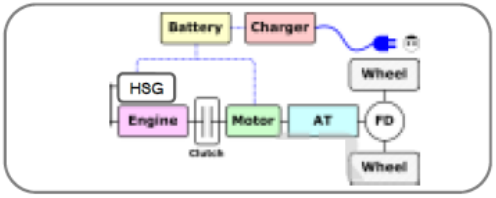
Soft Type



Hard Type



플러그인



Hybrid Electric Vehicle

Operation modes Hard type