

GWM - TOD (Torque On Demand)



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II . Operating Principle of TOD

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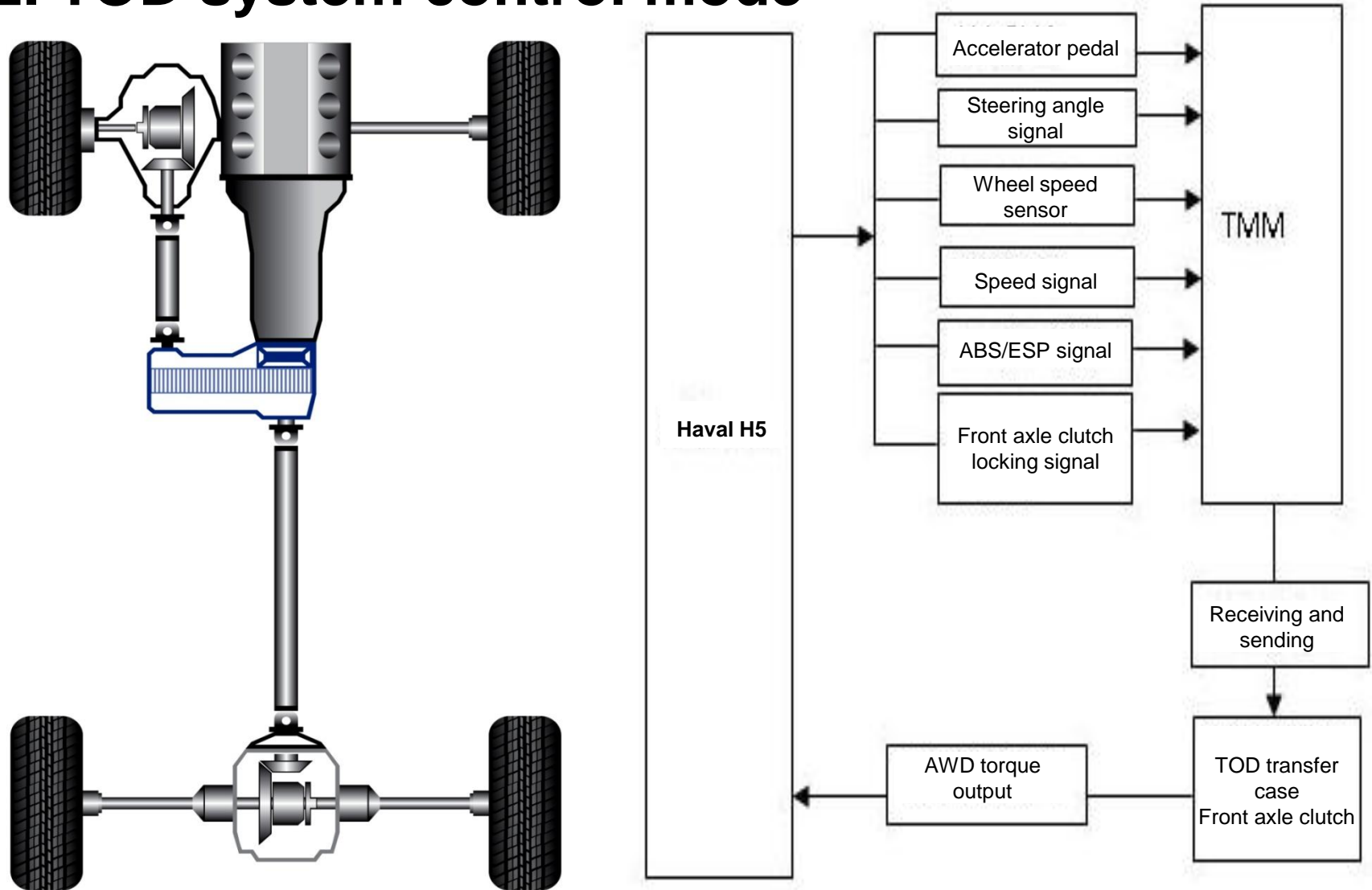
I . Overview of TOD System

1. Overview of TOD system
2. TOD system control mode
3. External structure of TOD system
4. Composition of TOD system structure

Overview of TOD AWD

TOD is the abbreviation of Torque On Demand, indicating the Instant automatic full-time AWD. It can acquire the desired power according to the climate and road conditions. Under general driving conditions, TOD adopts rear wheel driving; if the road condition changes, it will transmit the torque to the front wheels to supply sufficient grip ability as required.

2. TOD system control mode



1. 2WD mode

2. Automatic mode

3. Locking mode (AWD)

4. Front axle disengagement and engagement control

5. Towing control

6. Dynamic torque distribution

7. Dynamic control of vehicle (optional)

8. Brake system interface

9. Clutch control

10. Clutch torque restriction

11. Hand brake mode

12. Tyre diameter compatibility

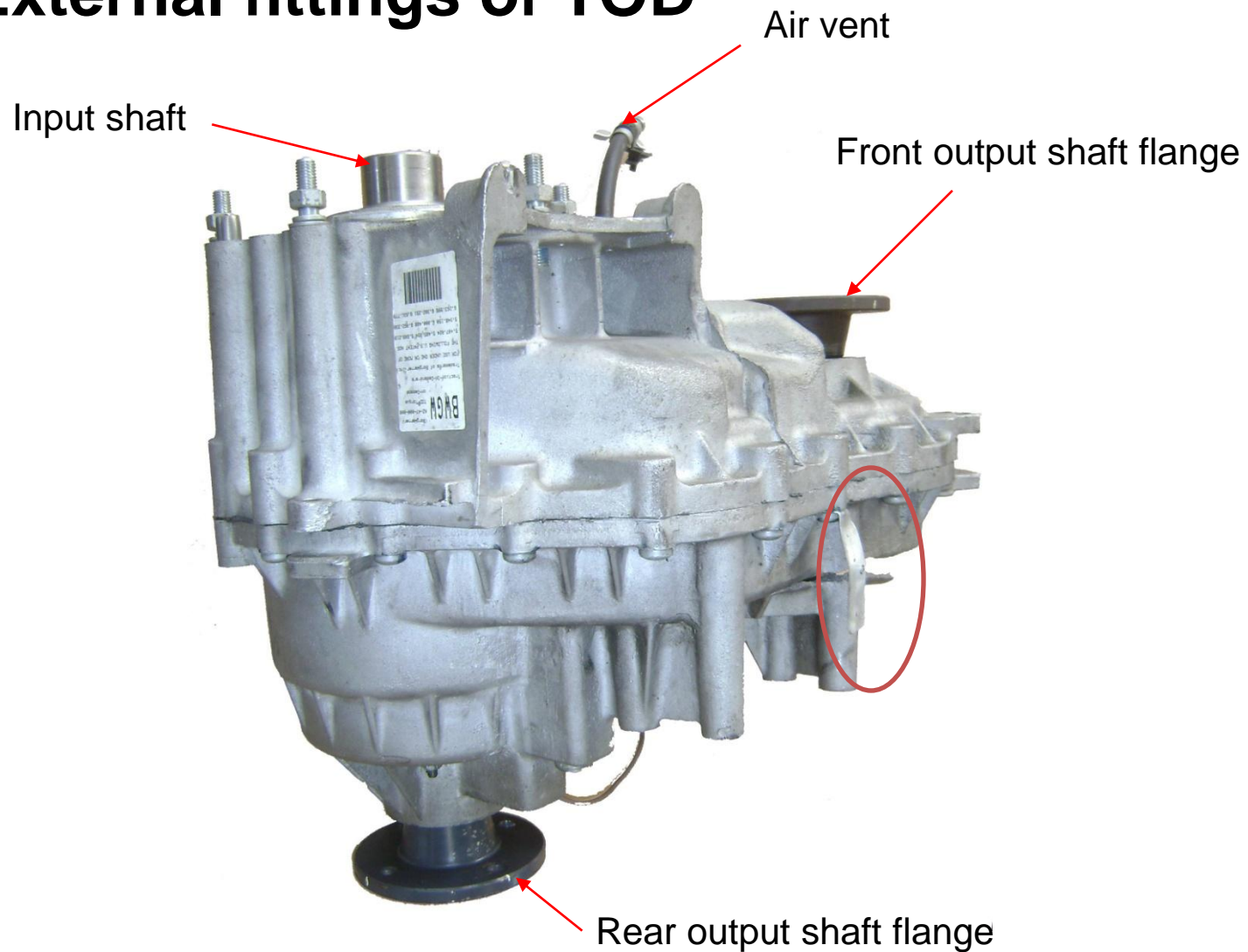
13. Power train protection

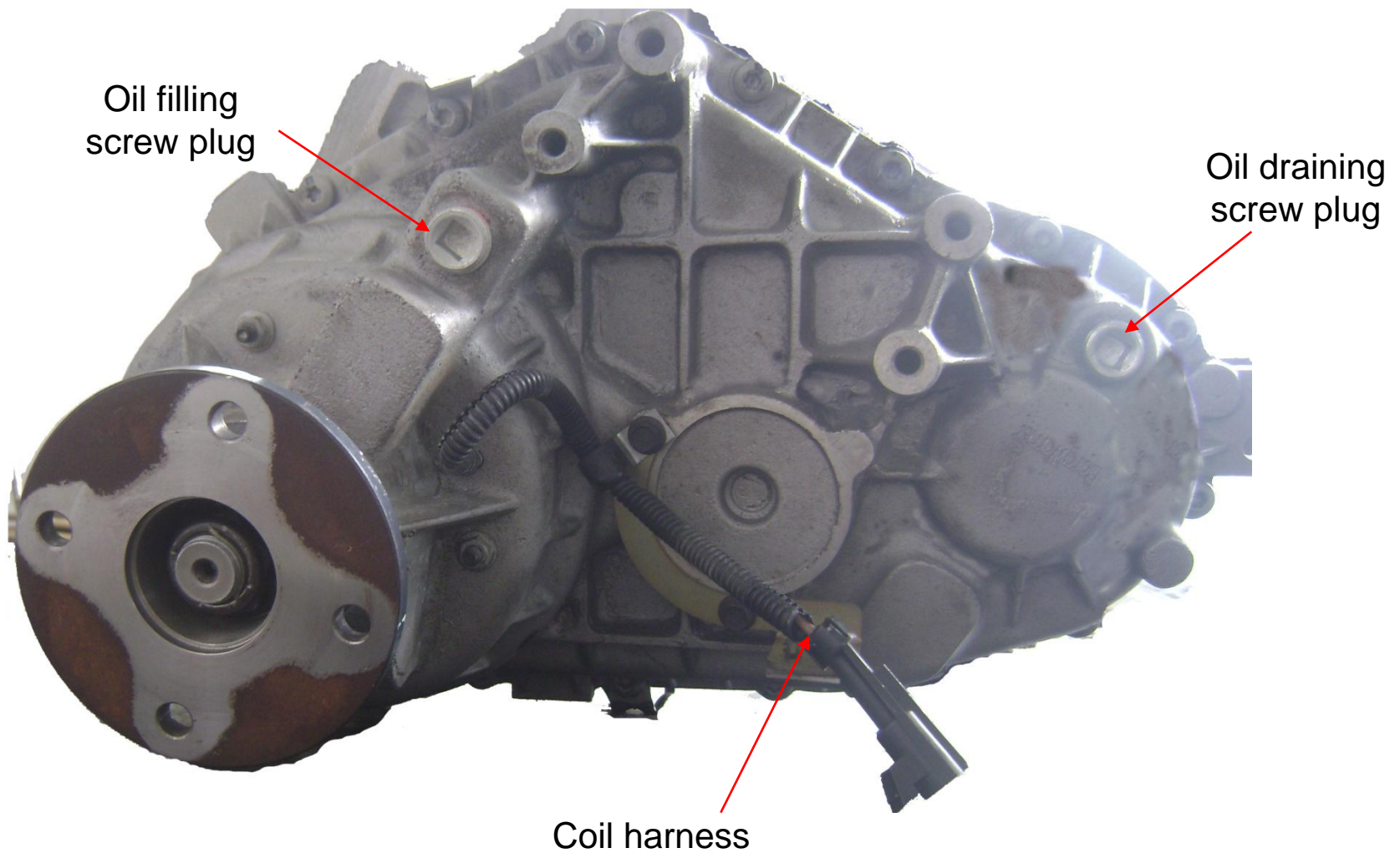
14. Steering angle

15. Thermal protection

16. Engine restriction

3. External fittings of TOD





Distinguish front and rear flange

The diameter of front output shaft flange and rear output shaft flange is different.

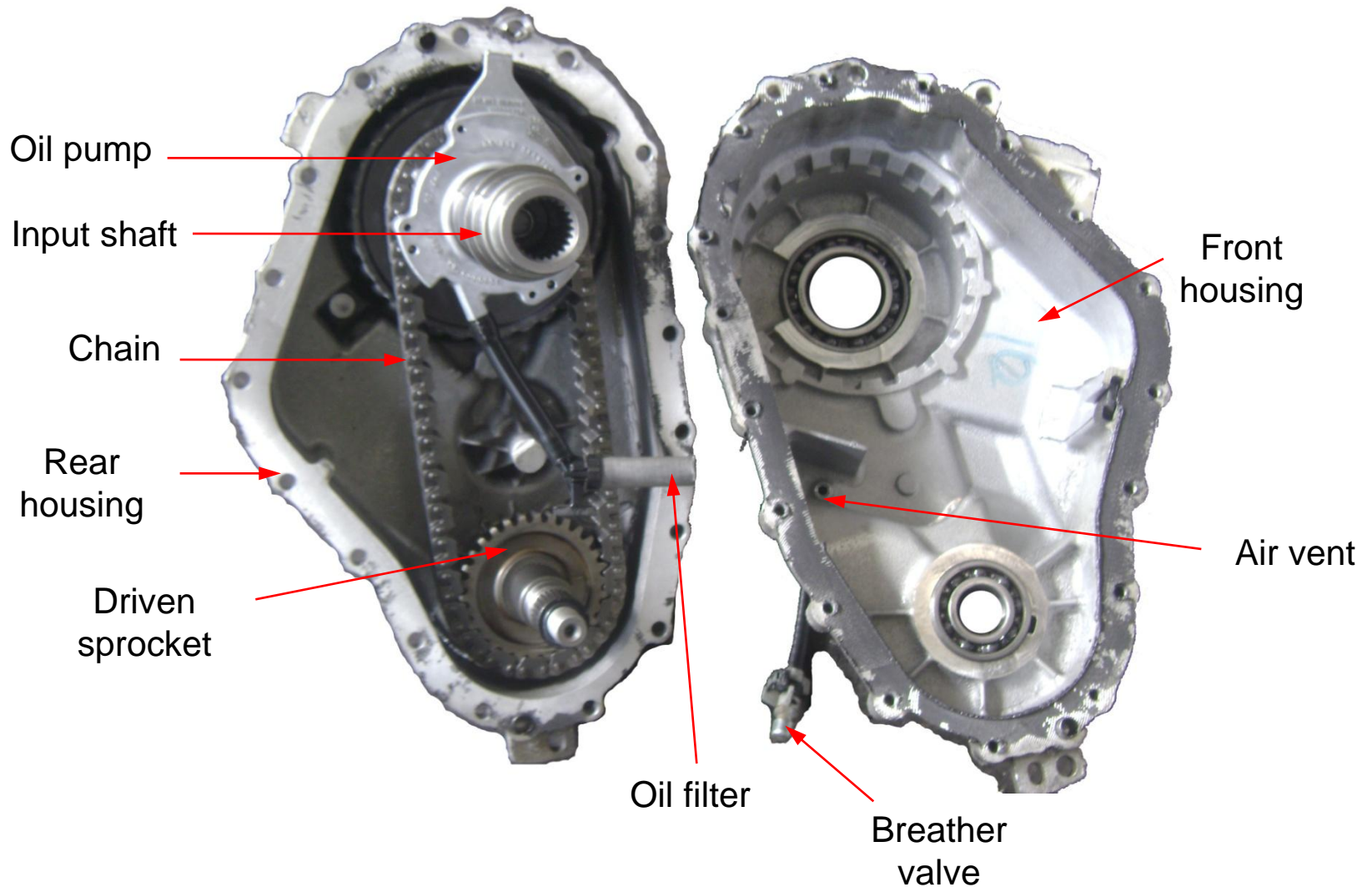


Rear output shaft flange

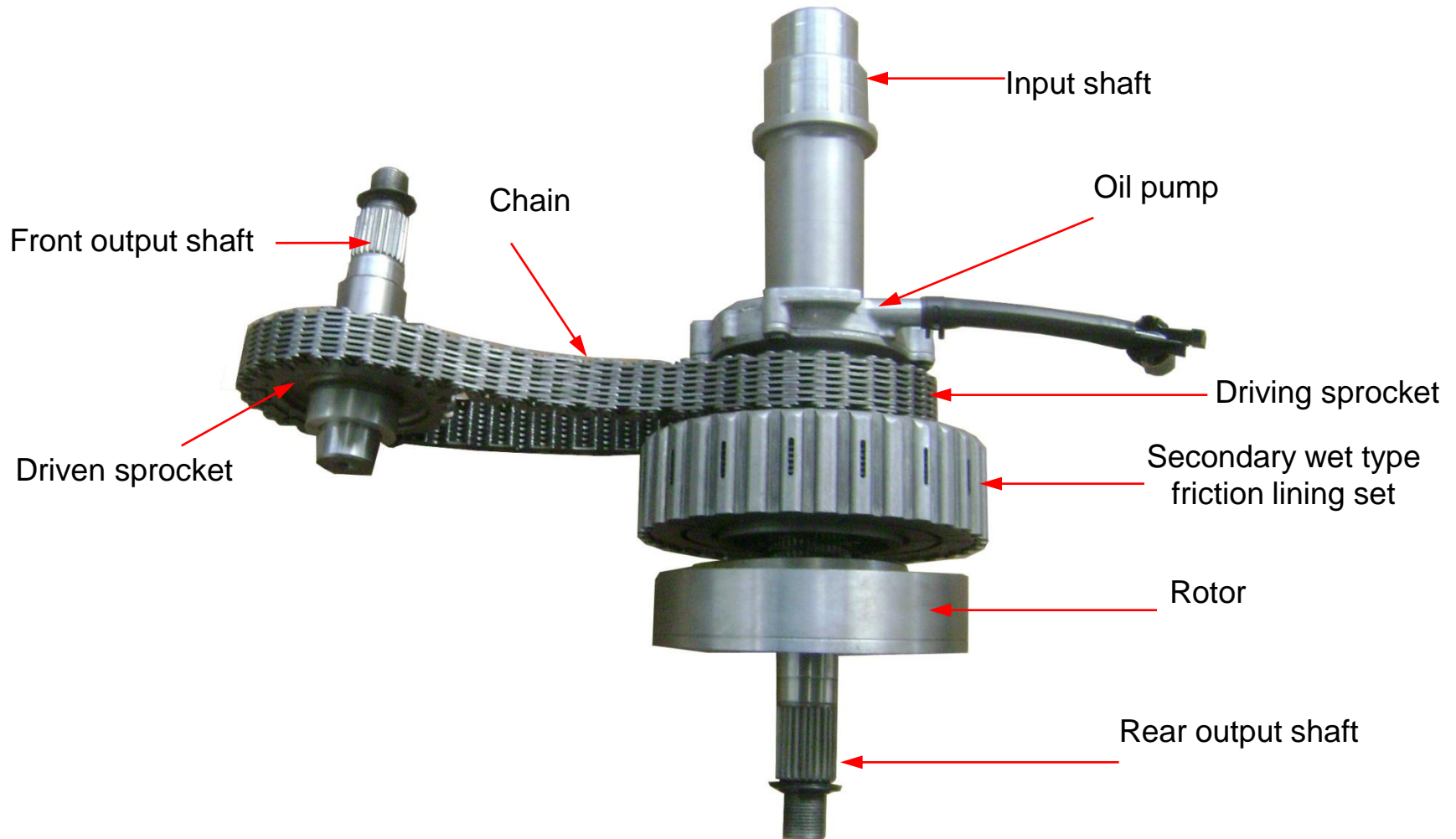


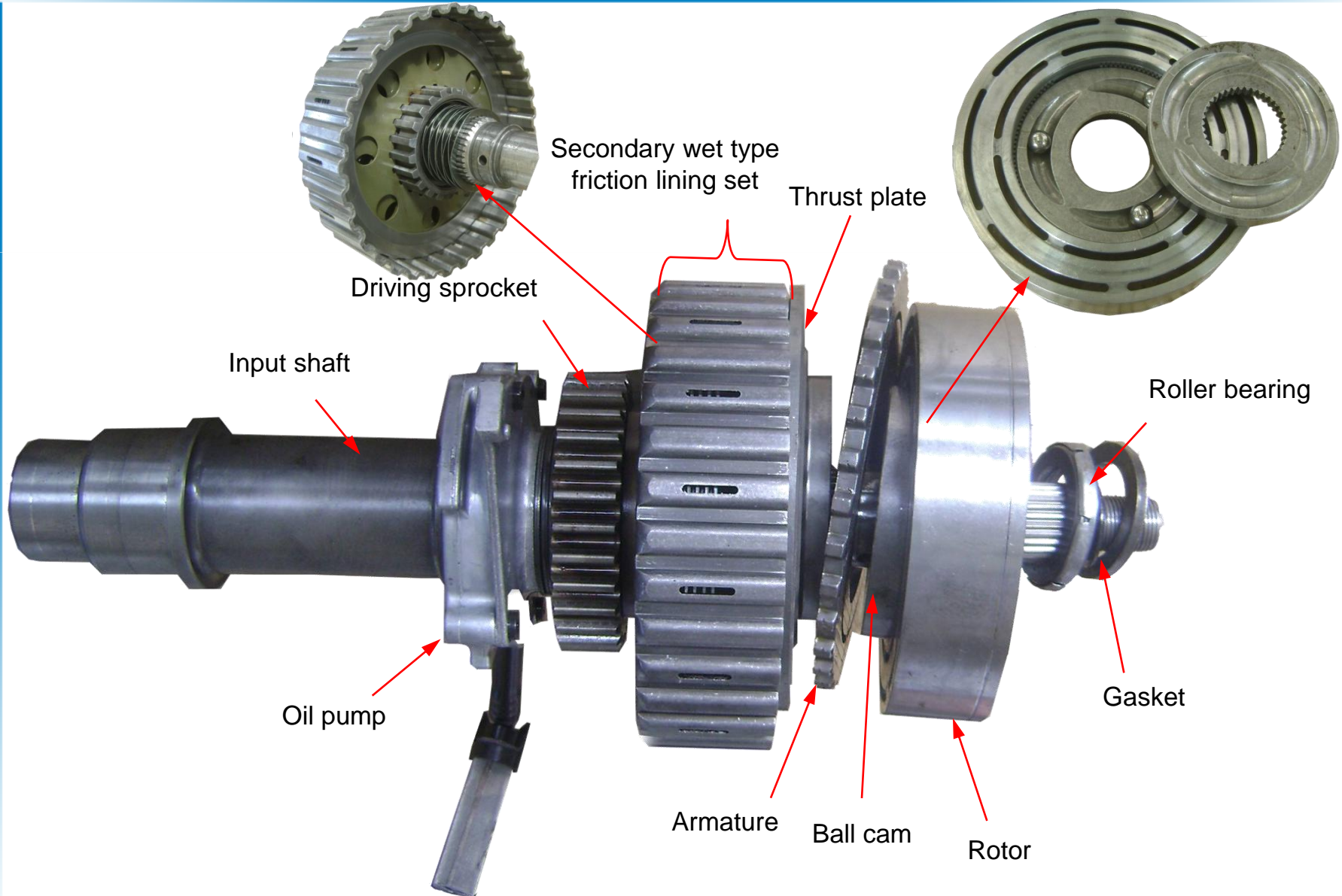
Front output shaft flange

4. Composition of TOD system structure



Structure of TOD distribution and drive components





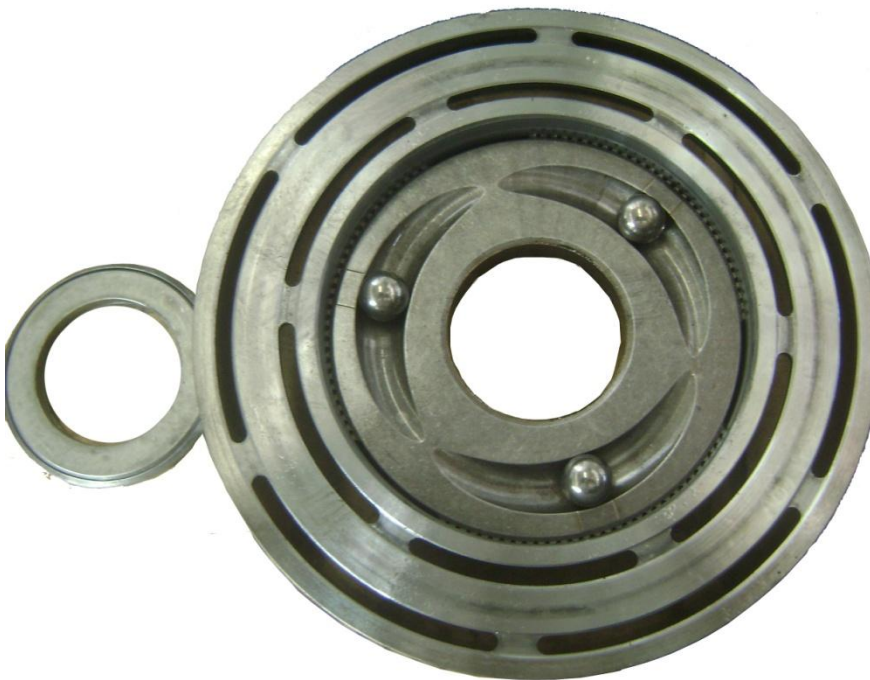
Electromagnetic coil

Receive TMM signal to generate magnetic field and engage rotor and armature.

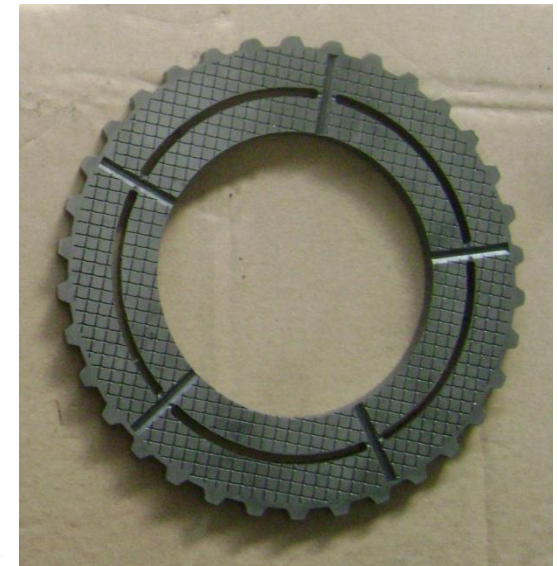


Rotor and armature

When the electromagnetic coil does not generate electromagnetic force, it rotates together with the ball cam driving wheel; when it generates magnetic force, the engagement armature will generate opposite force and move the ball cam driving wheel towards the driving sprocket through the steel ball.



Rotor



Armature

Ball cam driving wheel and return spring

Return spring



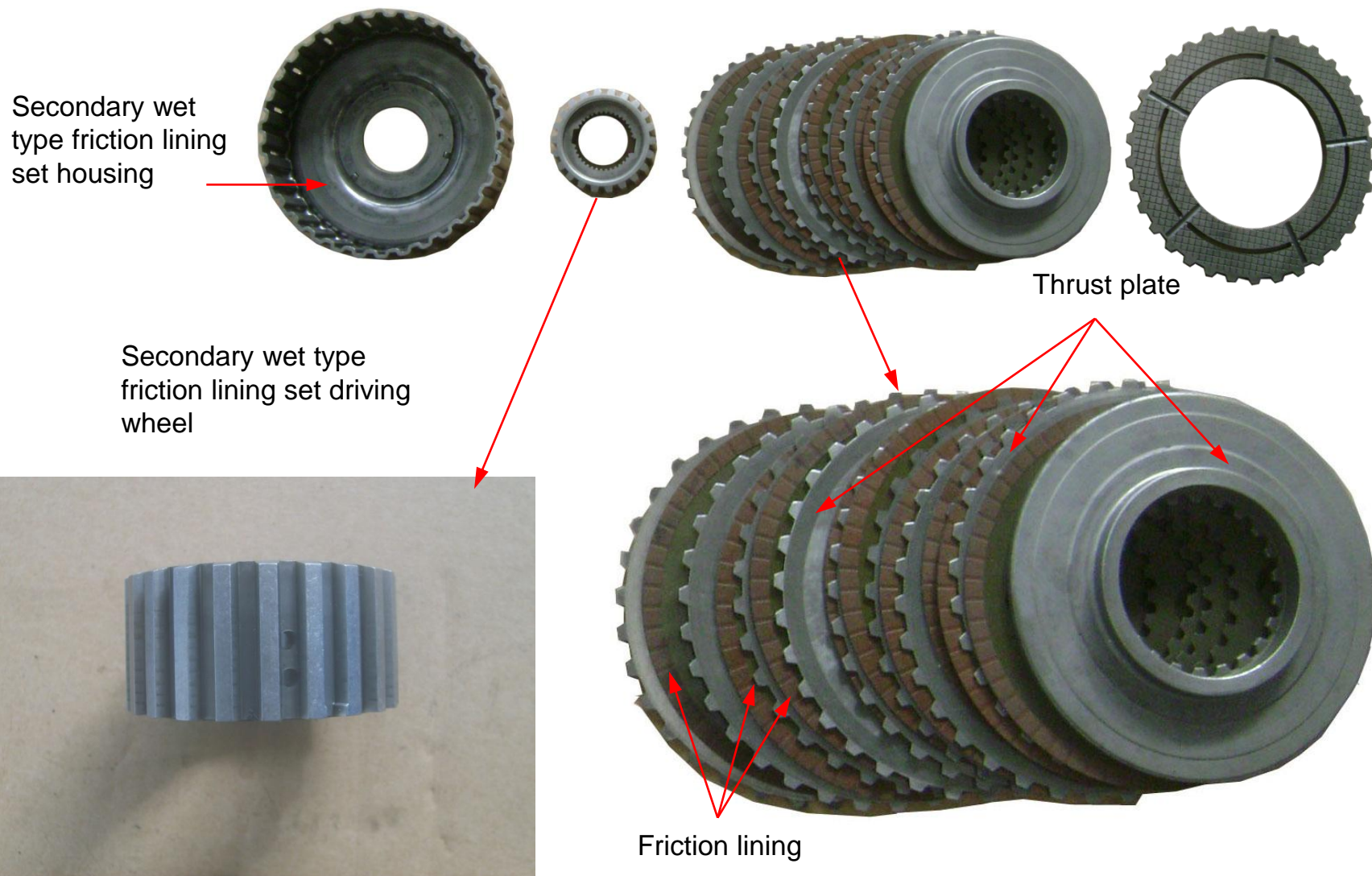
Back of ball
cam driving
wheel



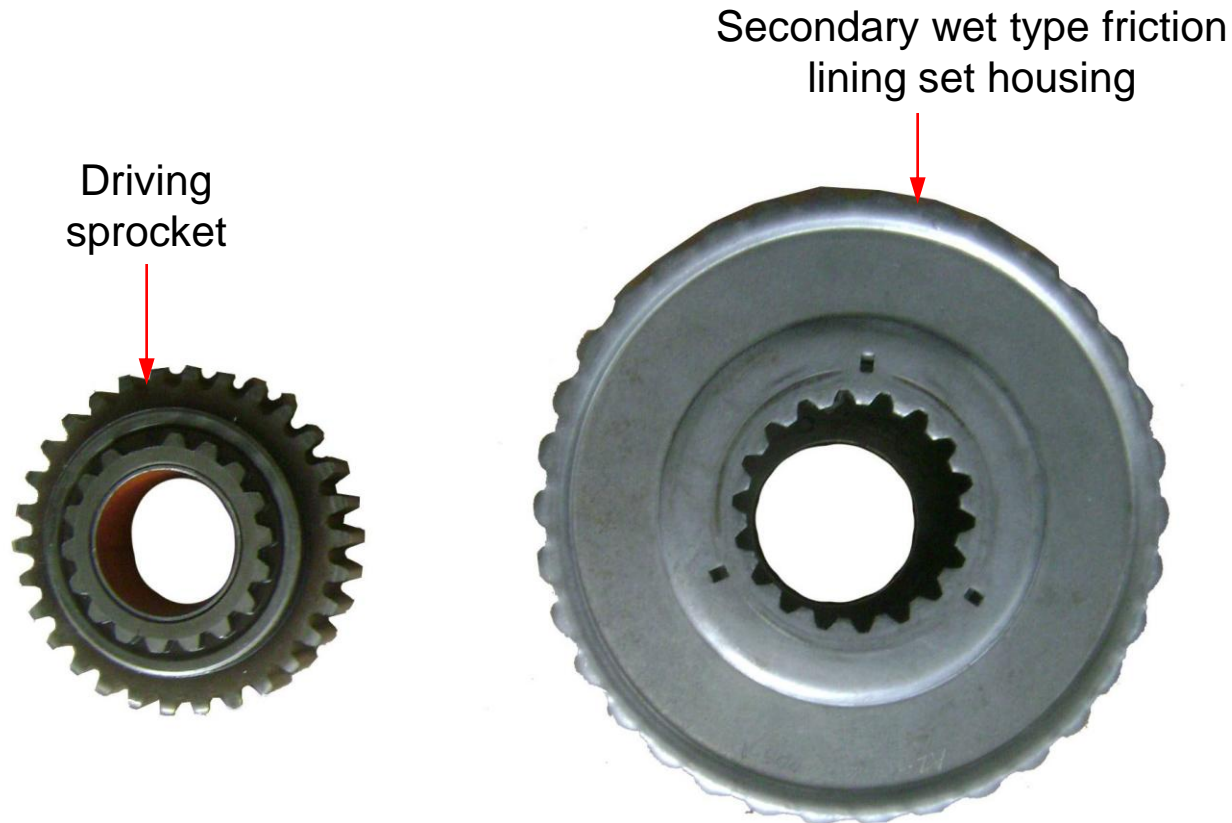
Front of ball
cam driving
wheel



Secondary wet type friction lining set



Driving sprocket secondary wet type friction lining set housing

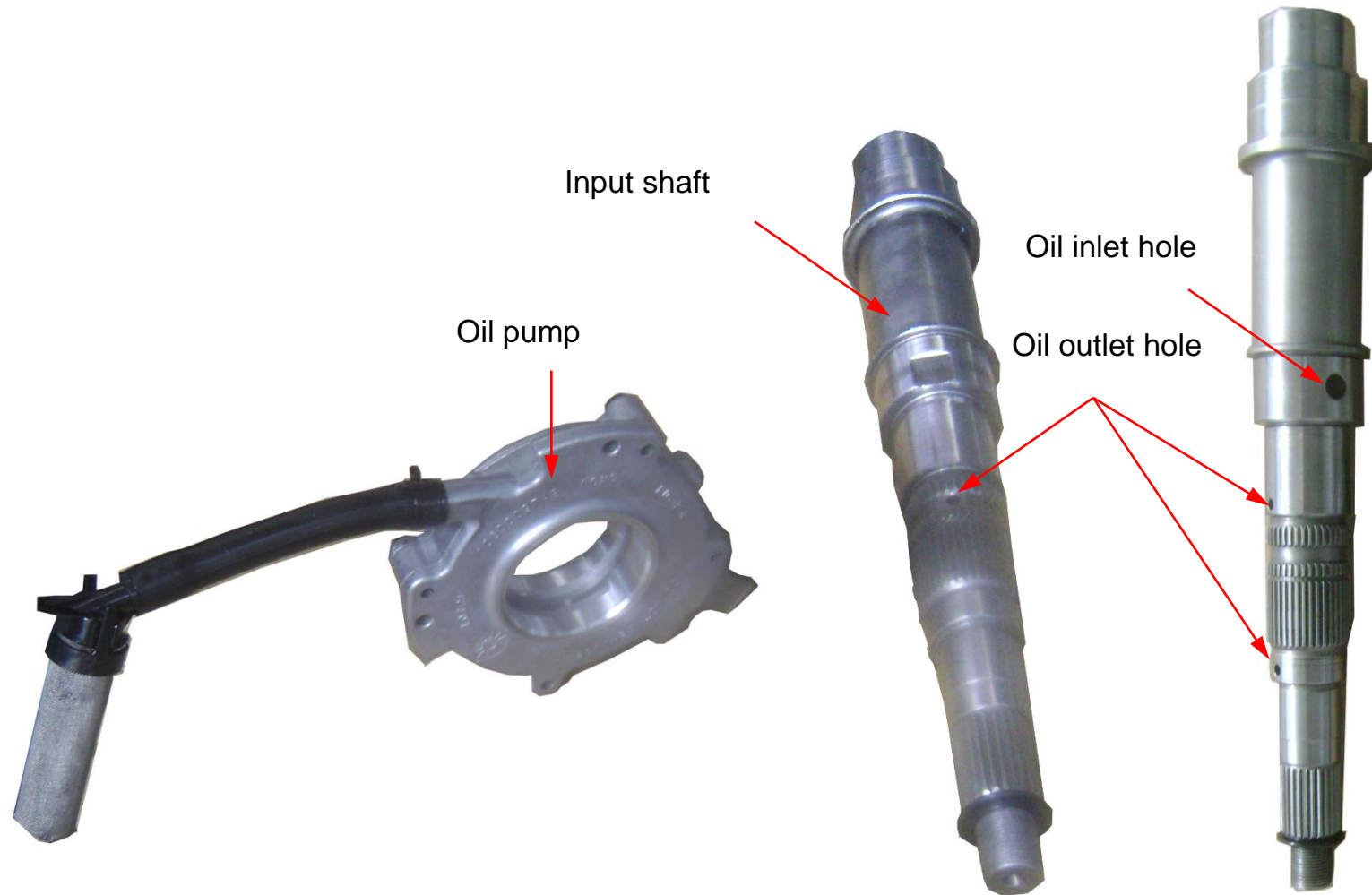


Chain

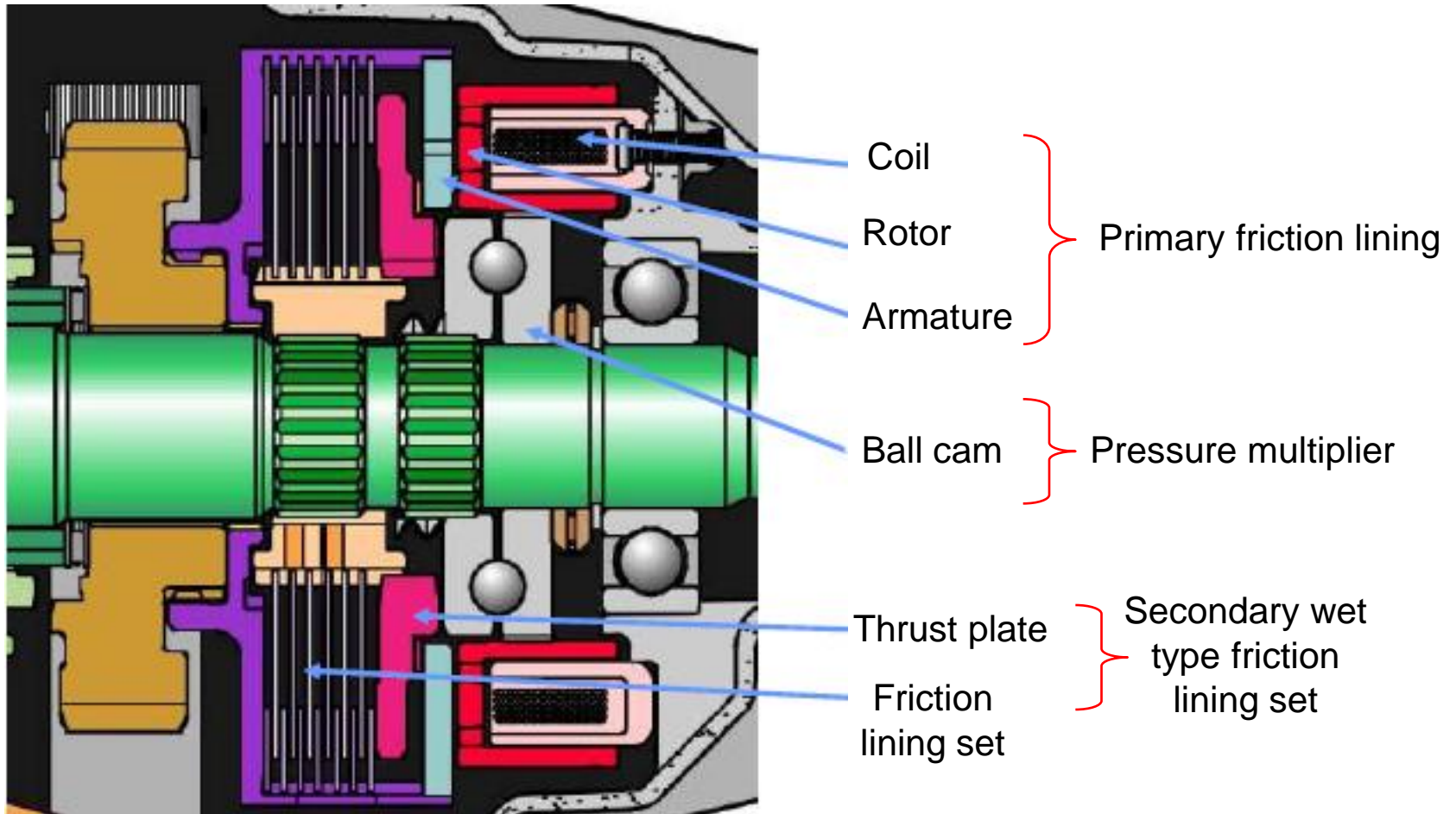
To transmit torque of driving sprocket and driven sprocket.



Input shaft and oil pump



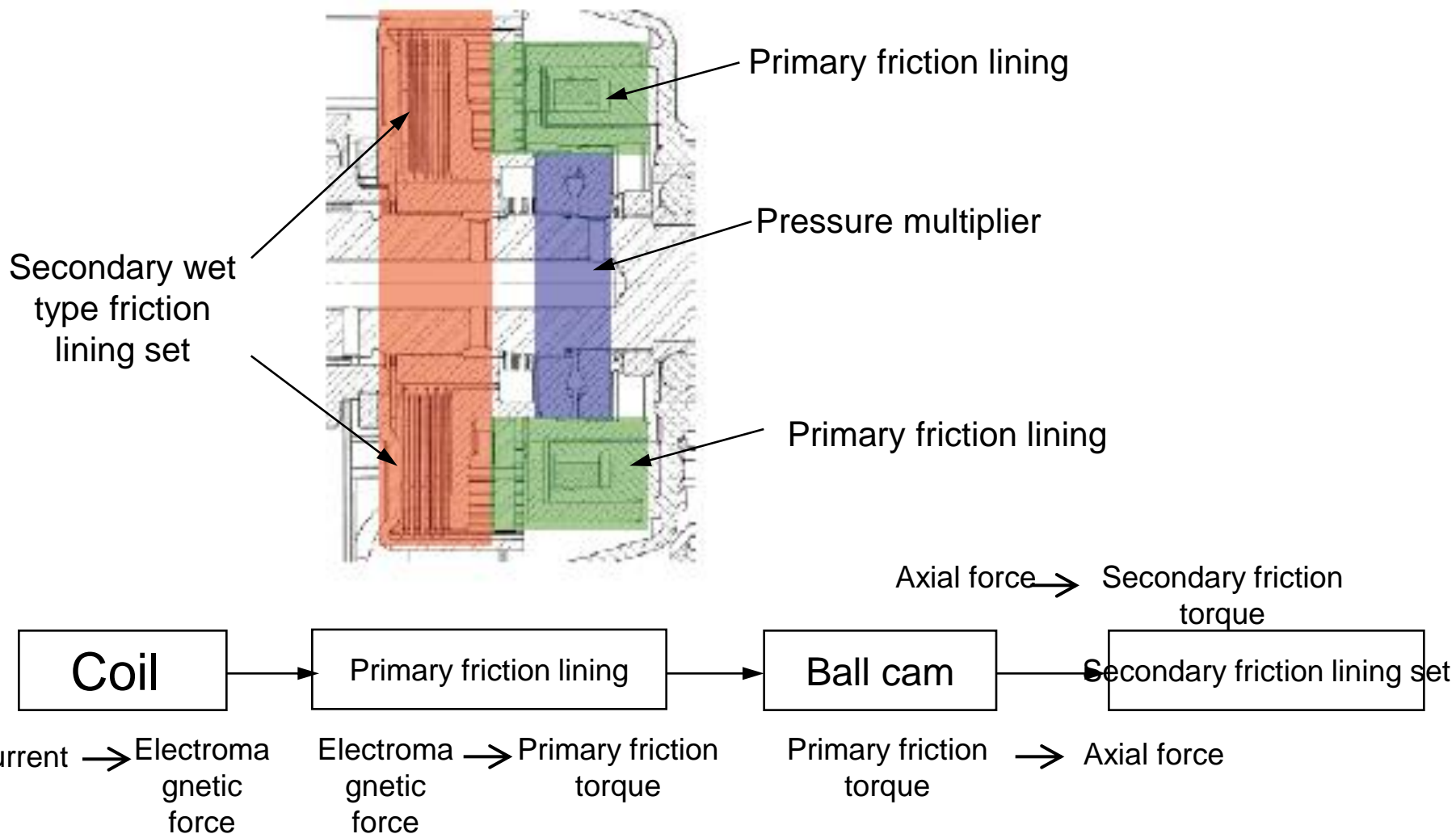
Structure of TOD main component section



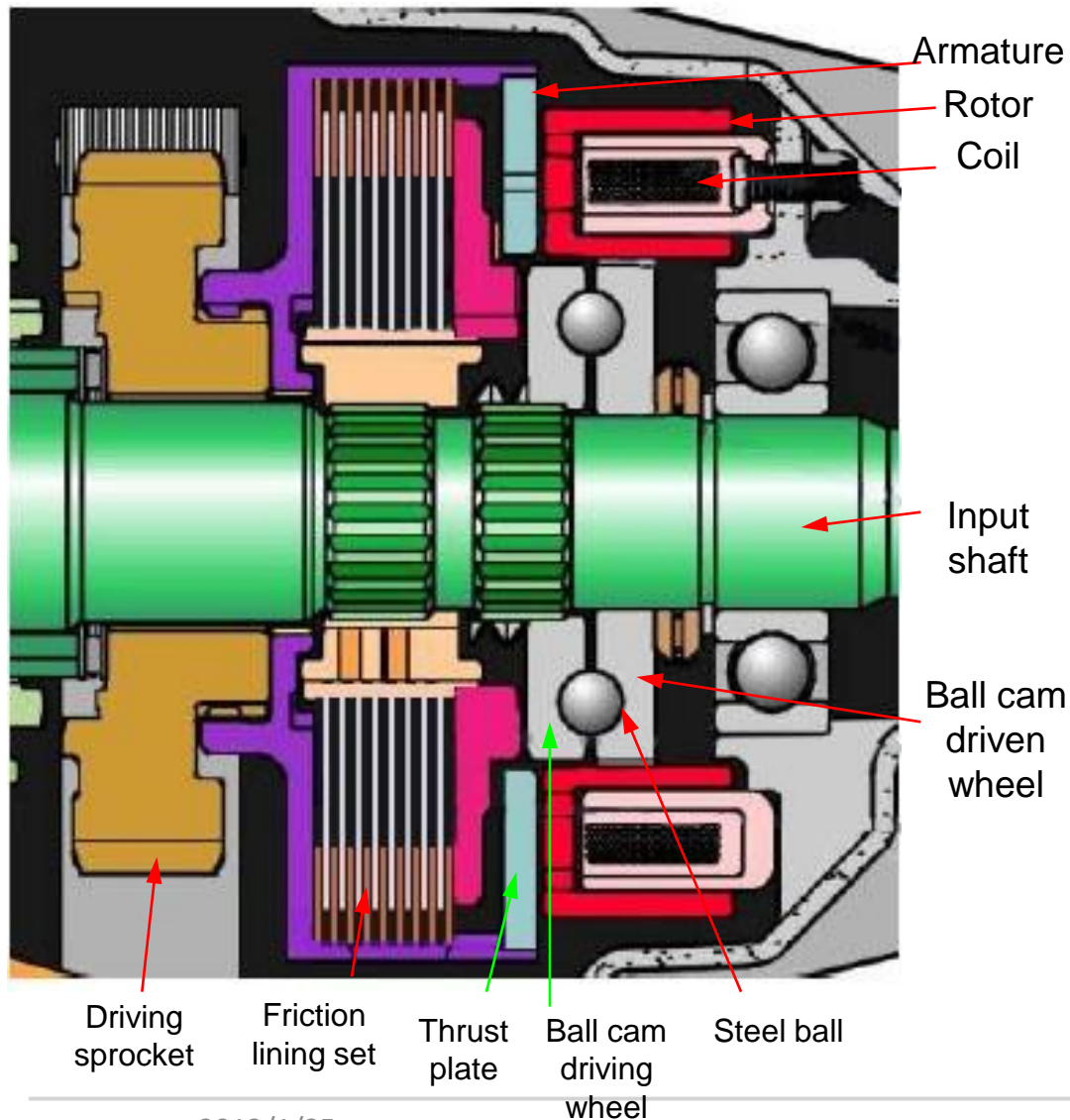
II Operating Principle of TOD

1. Operating principle of TOD system
2. TOD maintenance

1. Operating principle of TOD system



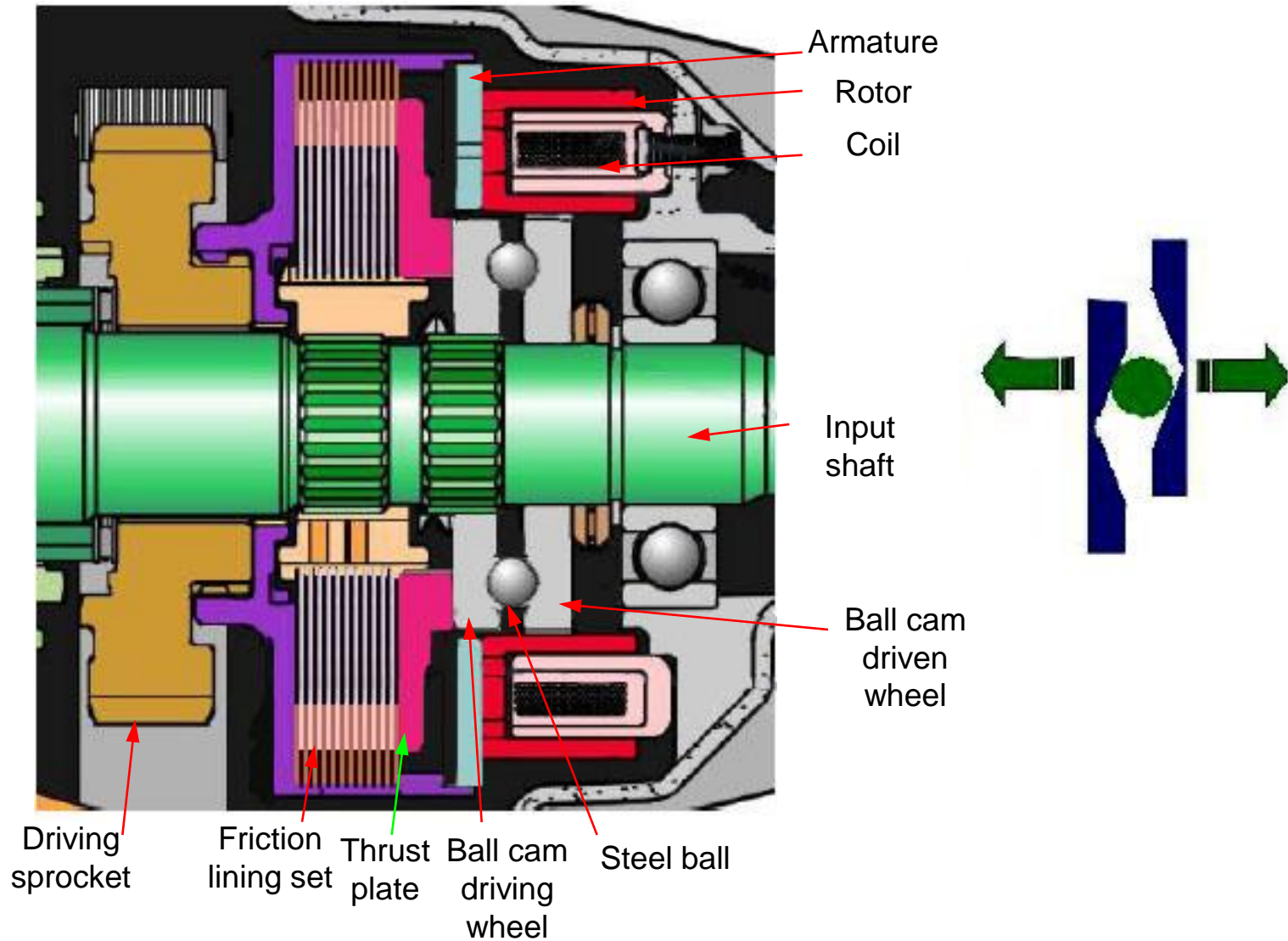
Transmission route of TOD transfer case in 2WD mode



TMM coil does not energize the signal and the rotor and armature are not pulled-in; the power drives the ball cam driving wheel through input shaft and is transmitted to the ball cam driven wheel through the steel ball. Then the ball cam driving wheel will compact the driven wheel under the function of spring force. In such cases, the driving wheel presents no relative axial motion with the driven wheel and these two wheels perform synchronous rotation to achieve 2WD.



Transmission route of TOD transfer case in AWD mode



Transmission route of TOD transfer case in AWD mode

TMM sends TOD coil energization signal and then rotor and armature will be pulled-in. The resistance is transmitted to the rotor through the driving sprocket passing by secondary wet type friction lining set housing and armature to make the rotor decelerate in a moment; the ball cam driven wheel rotates relative to the driving wheel and the driven wheel inclined plane drives the steel ball and ball cam driving wheel to make the ball cam driving wheel overcome the spring pressure and perform axial movement; the ball cam driving wheel moves the thrust plate to compact the friction lining subassembly and drive the driving sprocket to enter AWD state. Then the power is transmitted to the driving sprocket through friction lining set to achieve front-wheel drive.

2. TOD maintenance

- TOD transfer case must use Mobil LT oil only
- TOD transfer case requires no periodical oil replenishing or change, maintenance-free for life
- Any service related to oil change or replenishing should be made by the factory

III Maintenance and Diagnostic of TOD

1. TOD diagnostic and fault code indication
2. TOD torque distribution system fault service and testing
3. TOD diagnostic and fault code read

1. TOD diagnostic and fault code indication

Indication of GWM Haval H5 TOD system fault:

In the event of TMM fault, AWD indicator lamp will twinkle at an interval of 0.3s to indicate the system fault.

Note: TMM is under the passenger driver's seat

2. TOD torque distribution system fault service and testing

- 1) Confirm the stalled vehicle model, that is, the type of TOD
- 2) Read fault code with diagnostic tester and determine the fault cause
- 3) Confirm the intelligent AWD system fault
- 4) Replace the defective component and check whether AWD system operation is normal
- 5) Clear the fault code with diagnostic tester and connect/disconnect the power to ensure the system operation is normal and there is no fault code.

3. TOD diagnostic and fault code indication

Read of GWM Haval H5 TOD system fault code:

The read and clear of any TOD system fault code must be made by diagnostic tester. The fault codes are detailed as following:



Note: use CAN BUS connector, update X431 system to 31.0 and select K5N2 program.

Fault code and meaning (1)

U0101	AT signal error	U0100	Accelerator pedal signal error
U0402		U0401	
U0101	Gear signal error	U0100	Engine speed signal error
U0402		U0401	
U0140	Hand brake signal error	U0100	Engine torque signal error
U0431		U0401	
U0140	Reverse gear signal error	U0100	Atmospheric temperature signal error
U0431		U0401	
U0100	Clutch pedal position signal error	U0126	Steering wheel angle signal error
U0401		U0428	

Fault code and meaning (2)

U0100	Engine state error
U0401	
U0121	Front left wheel speed signal error
U0415	
U0121	Front right wheel speed signal error
U0415	
U0121	Rear left wheel speed signal error
U0415	
U0121	Rear right wheel speed signal error
U0415	

U0121	Brake system request error
U0415	
U0001	CAN bus break
P3003	System voltage out of normal range
P1773	Overheating protection
P1771	
P1728	Electromagnetic clutch coil fault
P1729	
P1730	
P1734	Front axle clutch feedback signal error

Description of fault code and cause

Fault Code	Cause
U0100	Not receiving signal from engine controller
U0101	Not receiving signal from AT
U0121	Not receiving signal from ABS/ESP controller
U0126	Not receiving signal from steering wheel angle controller
U0140	Not receiving signal from body controller
U0401	Engine controller signal containing invalid data
U0402	AT signal containing invalid data
U0415	ABS/ESP controller sending signal

U0428	Steering wheel angle controller signal containing invalid data
U0431	Body controller signal containing invalid data
P1728	Electromagnetic clutch coil open circuit
P1729	Electromagnetic clutch coil short to power
P1730	Electromagnetic clutch coil short to ground
P1734	Front axle clutch fault or line fault
P1771	Torque manager overload (excessive slipping)
P1773	Torque manager overload (excessive slipping)
P3003	Complete vehicle electrical system fault
U0001	<ol style="list-style-type: none"> 1. CAN bus open circuit 2. CAN Hi short to ground or CAN Lo short to power 3. CAN Hi and CAN Lo short-circuit

Review of Course

- 1. Operating principle of TOD system**
- 2. TOD system maintenance and service**
- 3. TOD system fault diagnostic**

Thank you!