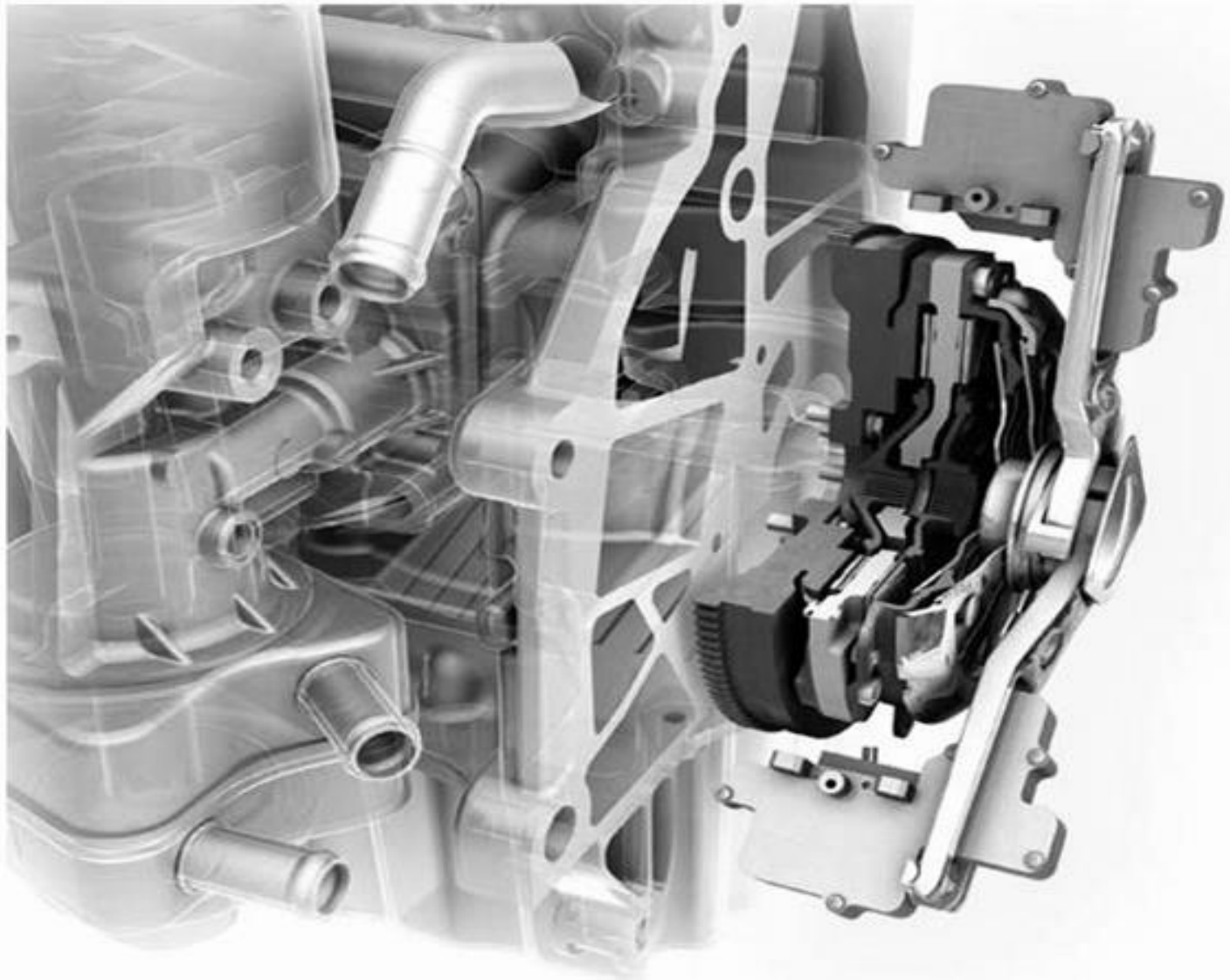
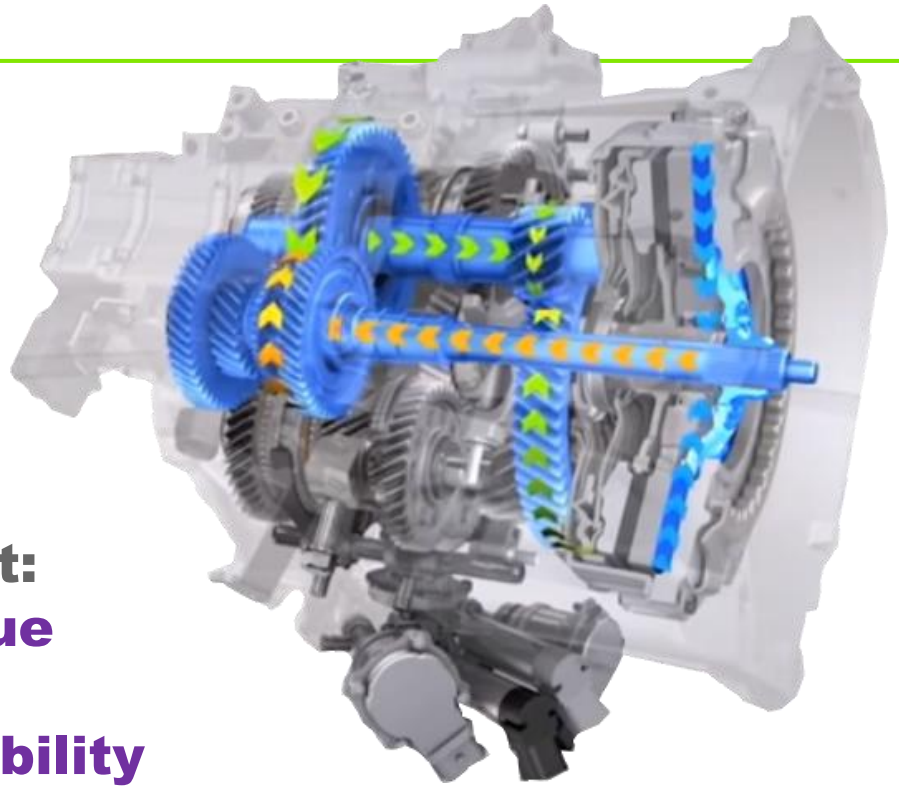

Valeo
SMART TECHNOLOGY
FOR SMARTER CARS
VALEO
SERVICE
LIVE WEBINAR
Technical Training, always
and everywhere.
The future is today. Will you join us?

DUAL DRY CLUTCH



DUAL CLUTCH SYSTEMS



Dual Clutch Technologies can be designed with two technologies:

- **Dual Dry Clutch (DDC)**
- **Dual Wet Clutch (DWC)**

The starting point for any transmission designer is the amount of torque the system needs to handle, but more criterias come into play.

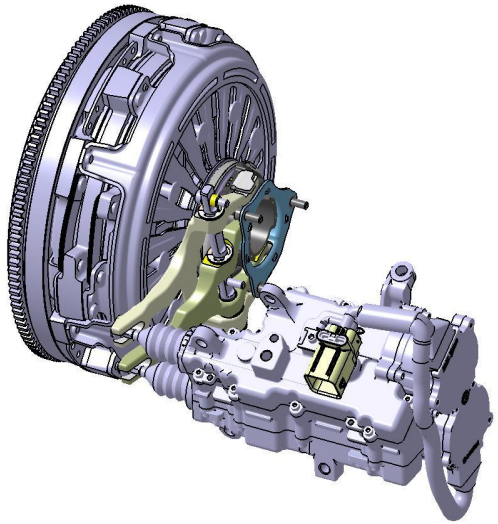
It is about:

- **Torque**
- **Cost**
- **Reliability**
- **Regulations / Efficiency**
- **Resistance to thermal stress**
- **Drive experience (car's 'fun to drive' factor)**
- **Customer habits and reluctance to change (not to be underestimated!)**
- **Powertrain rationalization**
- **Adaptation to further drive train evolutions (hybridization needs)**

DUAL CLUTCH SYSTEMS

Dry or Wet technology ?

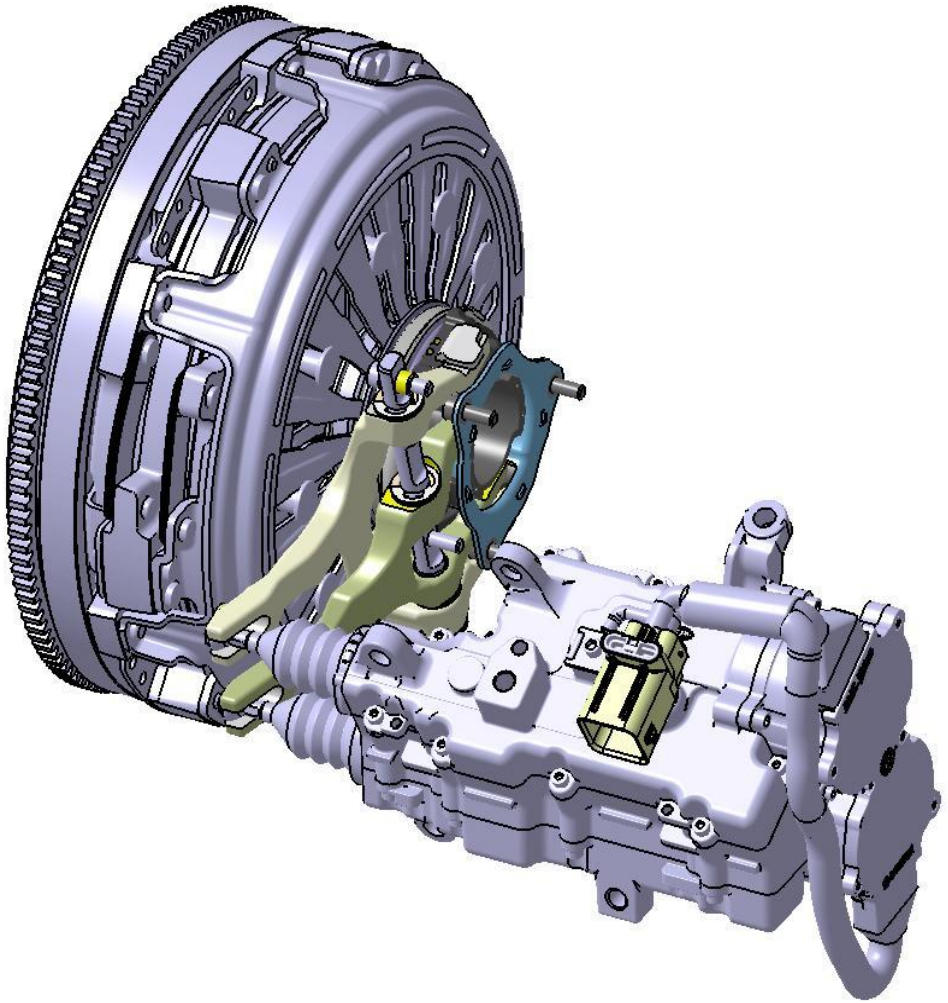
Dual Dry Clutch



Dual Wet Clutch

200 Nm — 350 Nm — 500 Nm — 4000 Nm

- How much torque transfer is required?
- Wet clutch runs in oil bath or mist; used for higher torque, high energy, needs better heat dissipation



VALEO DUAL DRY CLUTCH SYSTEM

DUAL DRY CLUTCH

Two friction disks and two pressure plates, whose rotation is linked to the engine's flywheel.

The engine side friction disk engages:
- **When starting**
- **When shifting the odd gears**

This ensures energy efficiency

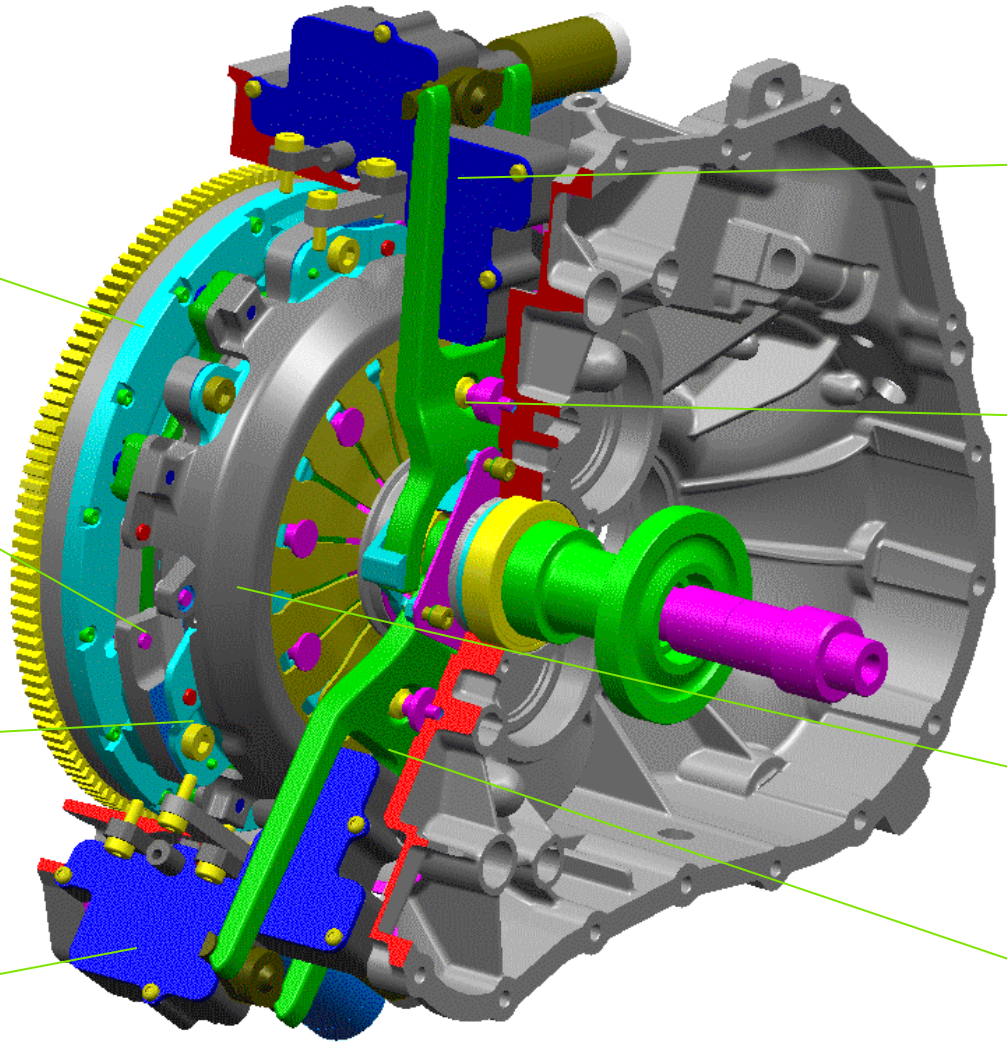
Reduction of fuel consumption and CO_2 emissions of 6% to 10% compared to an automatic transmission with the same number of gears, and a reduction of 4% compared to a wet double clutch.

The electro-mechanical actuators enable synchronized slippage of the two friction disks in a precise manner.

DUAL DRY CLUTCH

Components

*Actuators and fork systems can differ depending on the gearbox



Flywheel

2 Driven plates :
- even gears + reverse
- odd gears

Secondary Intermediate flywheel

Electro-mechanical actuators for even gears

Electro-mechanical actuators for odd gears

Clutch fork 1

Clutch cover

Clutch fork 2

DUAL DRY CLUTCH

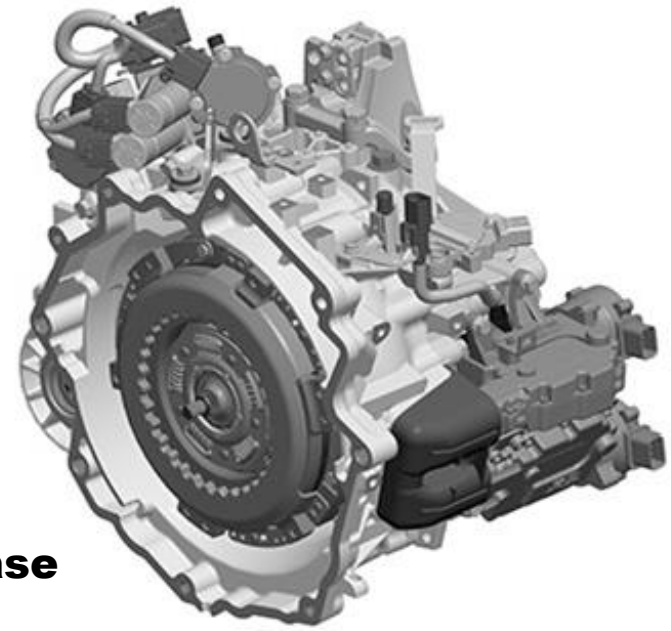
Architecture

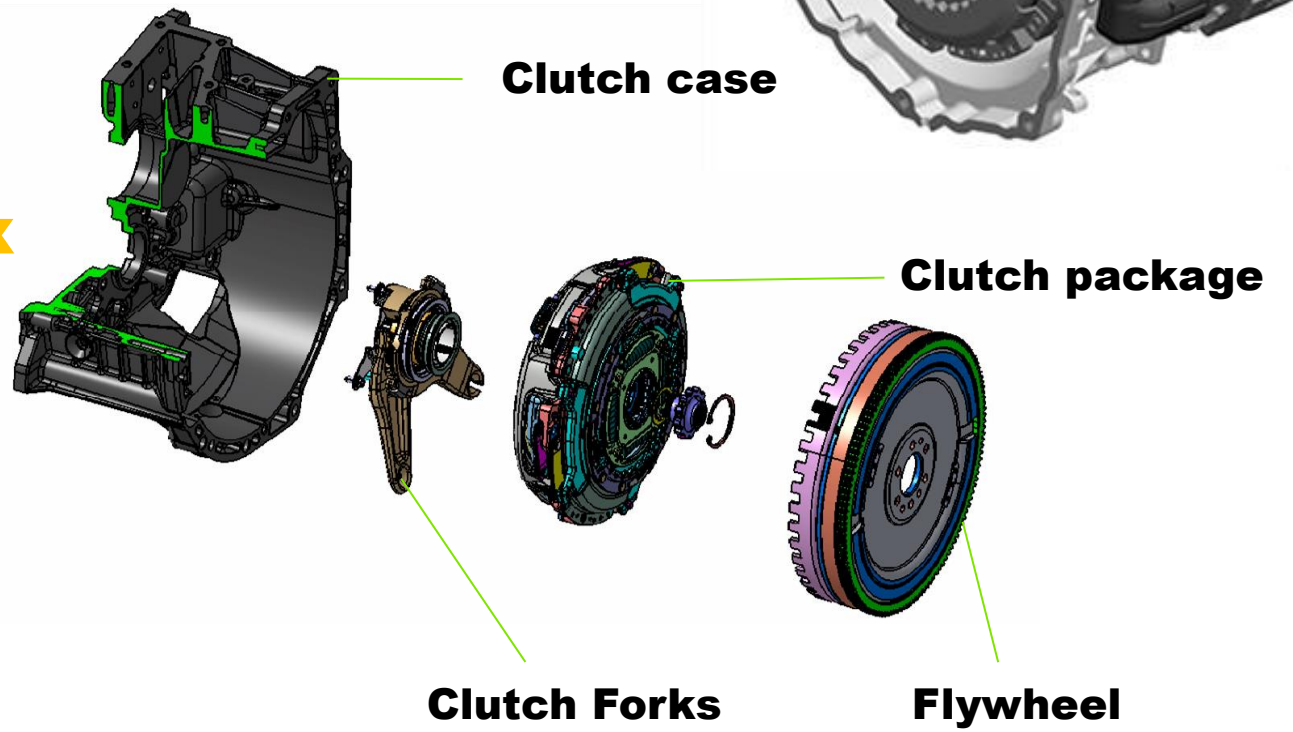
Conception

Both clutches naturally opened

For safety reason: if both clutches are closed at the same time, it causes gearbox failure.

The clamp load is provided by the release bearing load through the diaphragm.

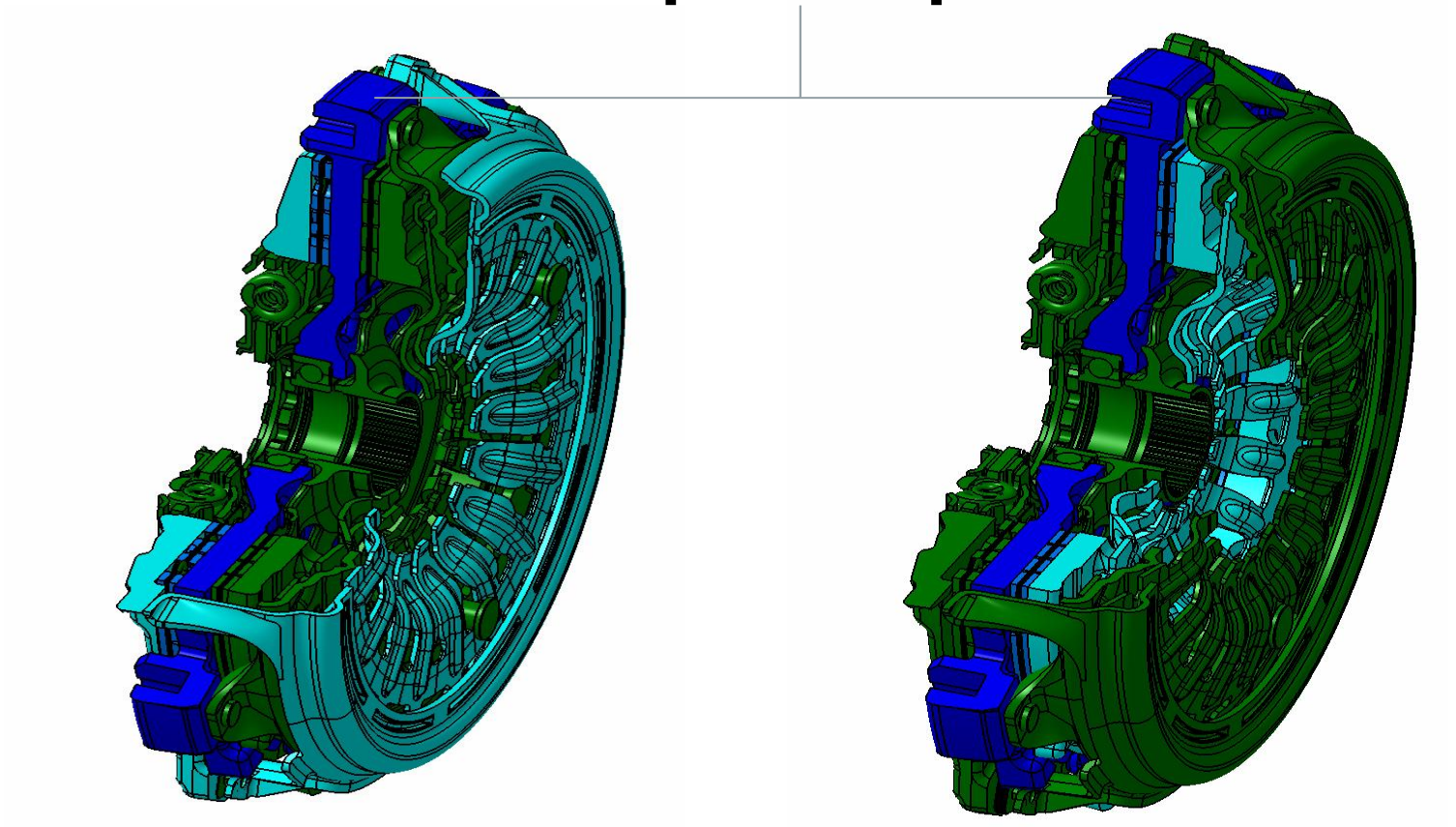




DUAL DRY CLUTCH

Friction disc

Fixed pressure plate in dark blue



Clutch 1 in light blue

Clutch 2 in light blue

DUAL DRY CLUTCH

Working principle - Clutch 1 disengaged

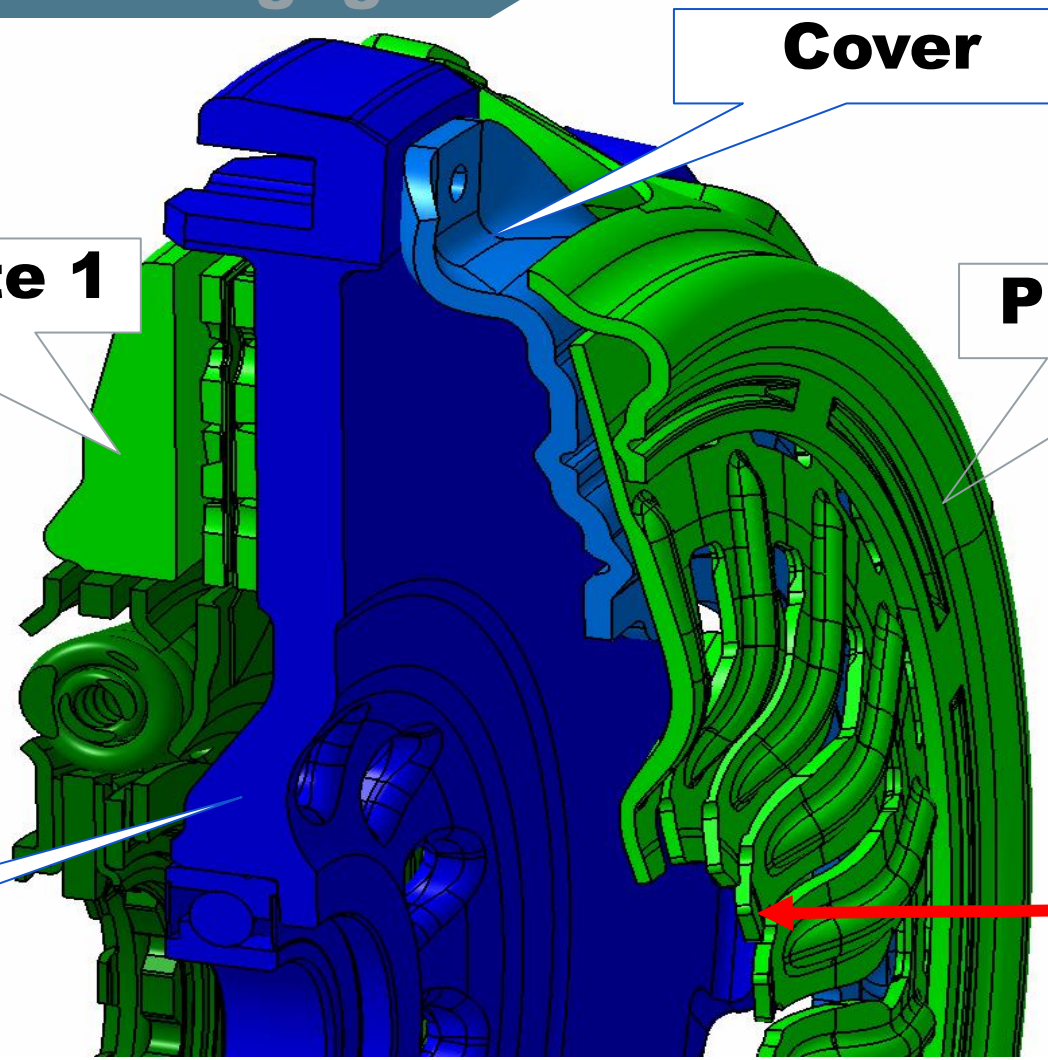
Color legend of following slides:

Green parts are moving axially

Blue parts are fixed axially

Drive straps are holding pressure plate 1 in disengaged position.

Free play between pressure plate 1 and friction disc: clutch 1 is open



DUAL DRY CLUTCH

Working principle - Clutch 1 engaged

Color legend of following slides:

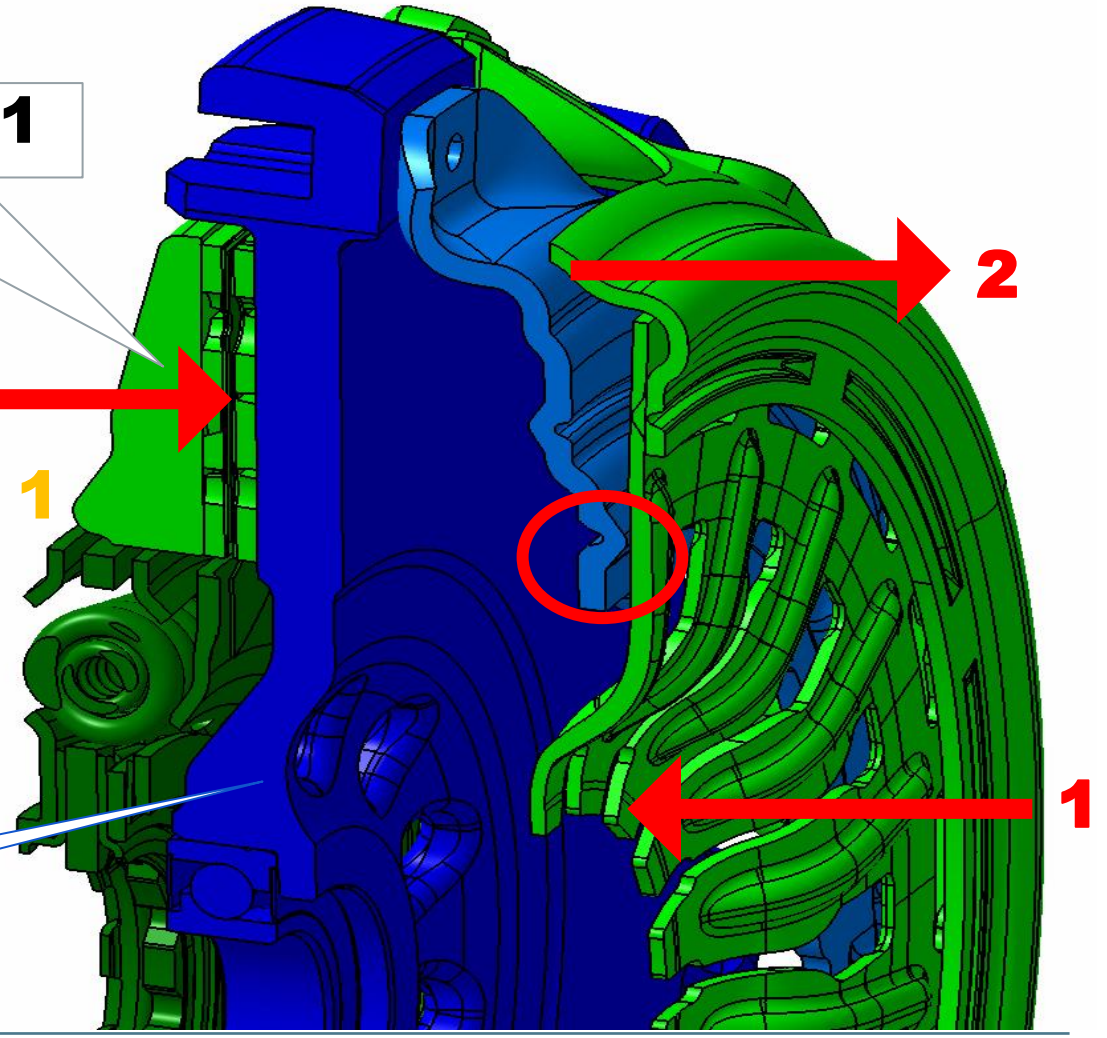
Green parts are moving axially

Blue parts are fixed axially

1 Bearing load applied

2 Pulling cover is pulled by diaphragm 1

3 Pressure plate is pulled by pulling cover and pushes on pressure plate: driven disc 1 is engaged



DUAL DRY CLUTCH

Working principle - Clutch 2 disengaged

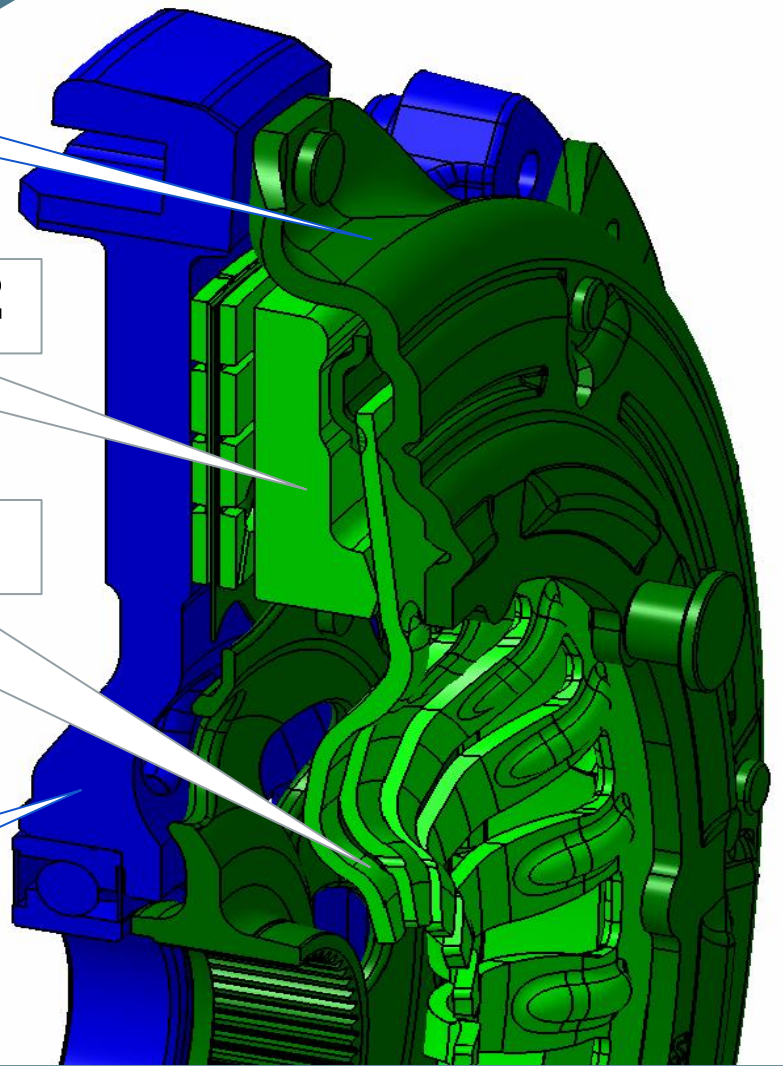
Color legend of following slides:

Green parts are moving axially

Blue parts are fixed axially

Drive straps are holding pressure plate in disengaged position

Free play between pressure plate 2 and friction disc: clutch 2 is open



DUAL DRY CLUTCH

Working principle - Clutch 2 engaged

Color legend of following slides:

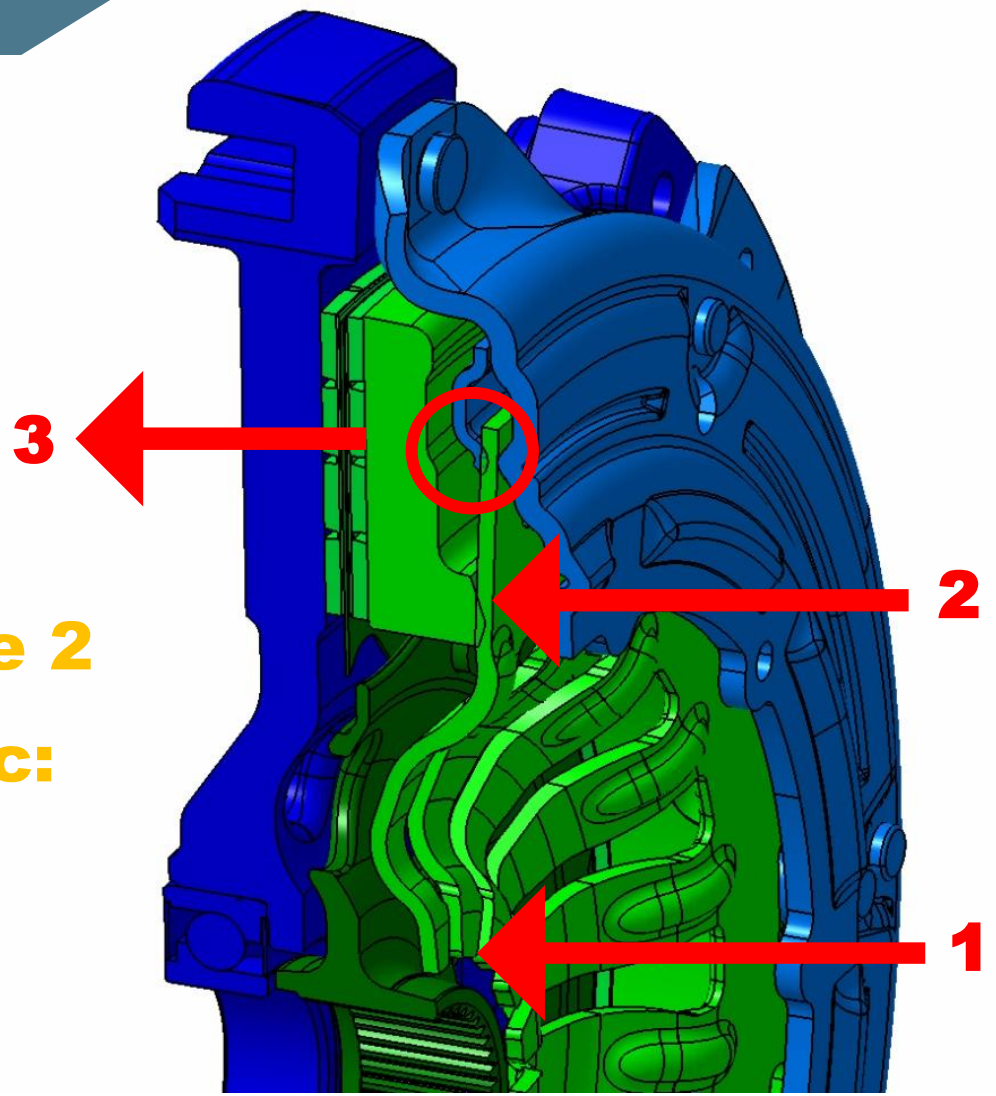
Green parts are moving axially

Blue parts are fixed axially

1 Bearing load applied

2 Diaphragm 2 pushes on pressure plate 2

3 Pressure plate 2 pushes on driven disc: clutch 2 is engaged



DUAL DRY CLUTCH

DMF Flywheel

The DDC flywheel has two sets of curved springs.

Each set includes external and internal spring, it may have one or two stages.

Friction washer;

During engine start-up, a high angular deflection occurs between the two inertias.

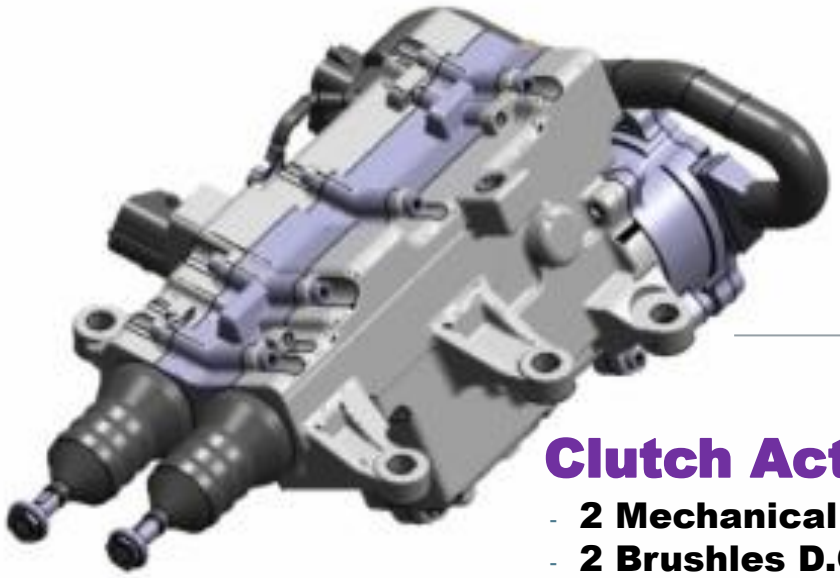
To limit this deflection and help improve engine start-up, friction washers are added on certain applications. They do not operate in drive mode.

Gearbox side

DUAL DRY CLUTCH

Command system

The command systems has dual brushless actuators linked to a dual clutch fork

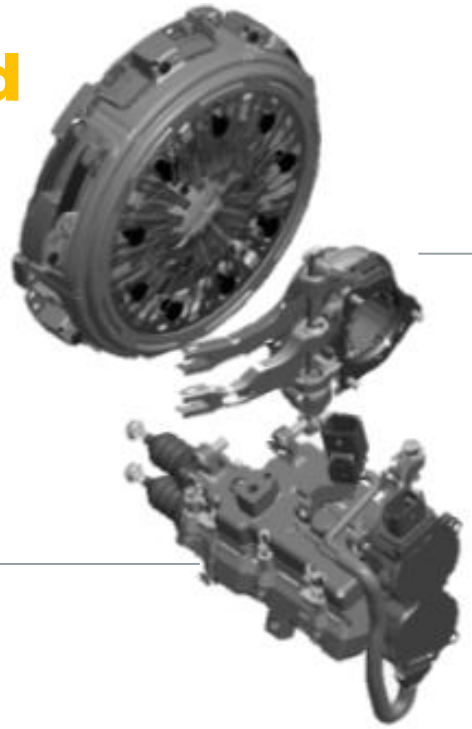


Clutch Actuator

- 2 Mechanical part
- 2 Brushles D.C motor

Clutch Engagement System

- 2 Engagement Bearing
- 2 Engagement Fork

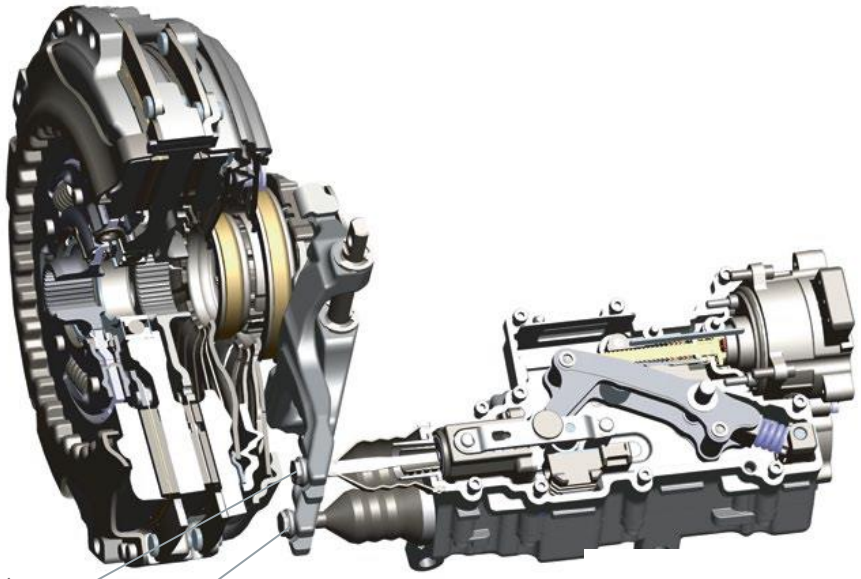


DUAL DRY CLUTCH

Command system

DUAL DRY CLUTCH

Clutch actuator



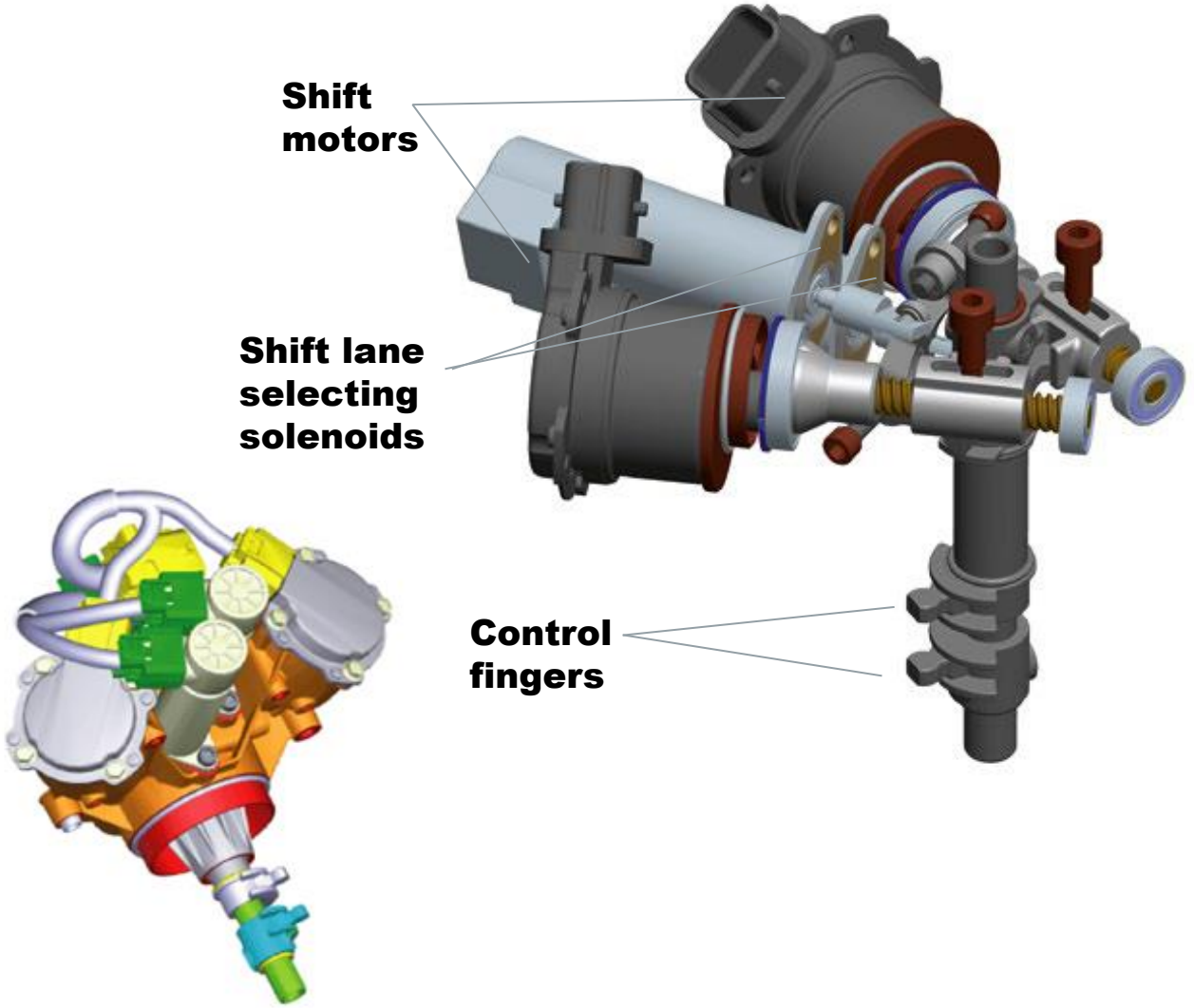
13	L2 (V)	Actuator Odd gear C1
7	L3 (W)	
1	L1 (U)	
8	Hall 1 (U)	
11	Hall 2 (V)	
14	Hall 3 (W)	
2	Hall Supply +8.75V	
16	L2 (V)	Actuator Even gear C2
10	L3 (W)	
4	L1 (U)	
9	Hall 1 (U)	
12	Hall 2 (V)	
15	Hall 3 (W)	
3	Hall Supply +8.75V	
5/6	Hall ground	global hall sensors ground

DUAL DRY CLUTCH

Gear actuator

The gear actuator contains the shift motor and selector solenoid.

The gear actuator's shift motor and selection solenoid use signals from TCM to control the gears.



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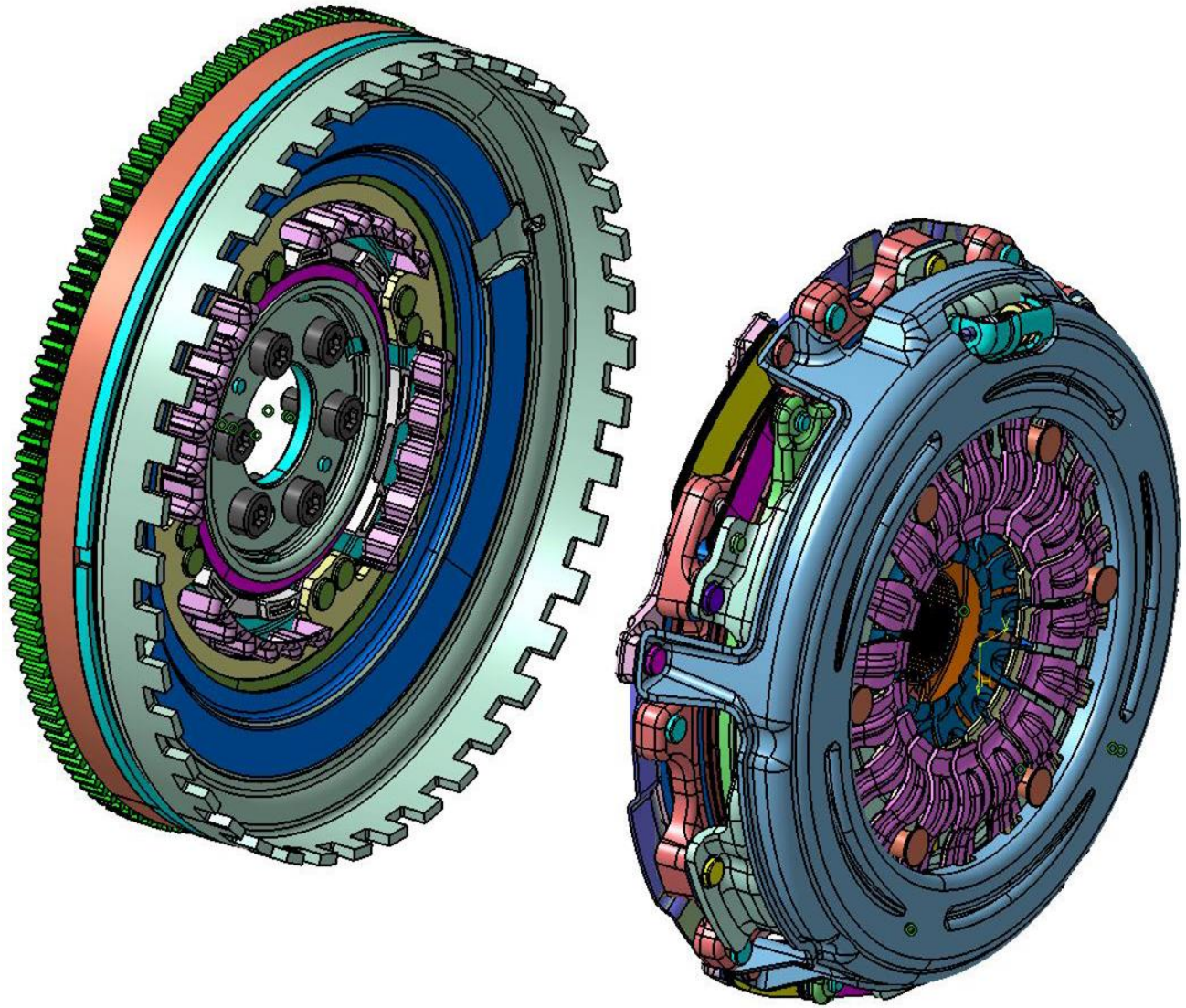
Cooling

Like conventional clutches, dry DCT’s cooling relies on the component's ability to exchange heat between them and release it in the gearbox bell ambiance.

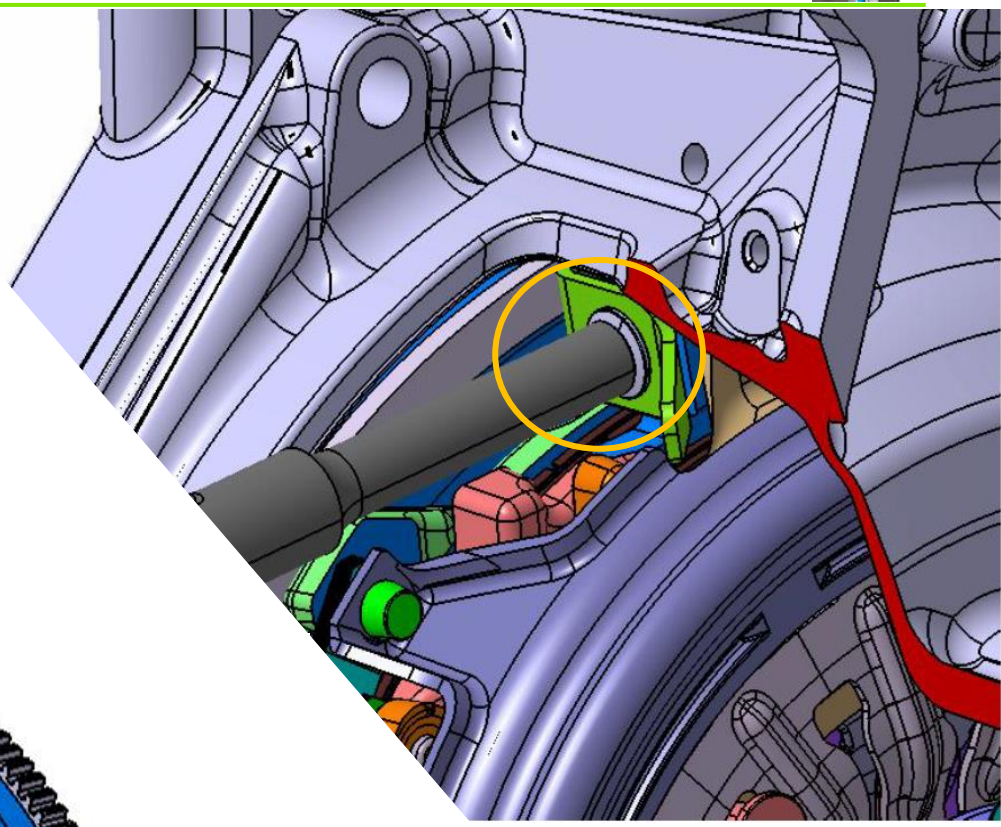


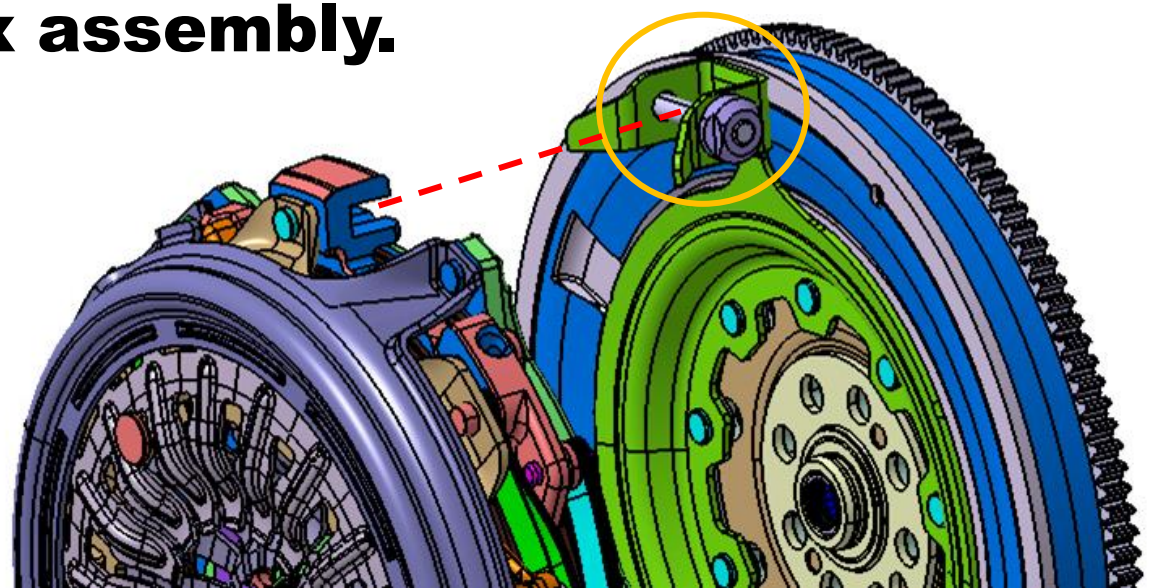
DUAL DRY CLUTCH

Fixation by pads

In Valeo 1st generation DCT, the DDC and the flywheel are fixed together by 3 pads at 120° and do not require any specific tools.

The bolting together is performed before gearbox assembly.



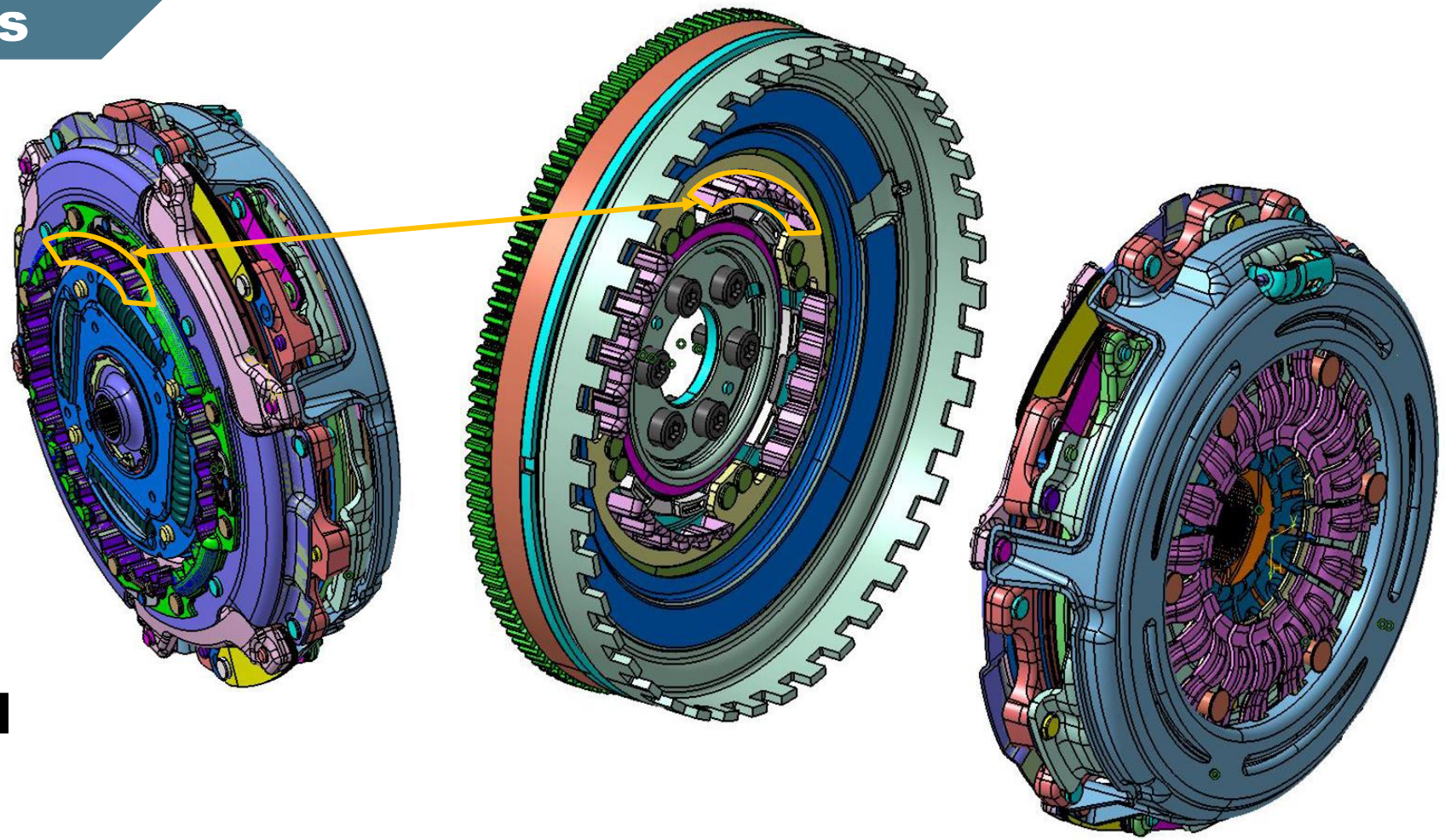


DUAL DRY CLUTCH

Fixation with splines

In Valeo's 2nd generation 6 and 7 speed DCT, the DDC and the flywheel are locked together by a combination of splines.

No bolts are required



DUAL DRY CLUTCH

Valeo applications

Accent

Tucson

Elantra

Veloster

i30

i40

Sonata

Carrens

Cerato / forte

Niro

Ceed

Rondo

Soul

Tools

DDC TOOL SET

Ref. 855513

Special tools for removal and installation of Valeo DDC and adjustment of clutch actuator

DUAL DRY CLUTCH

Tools

DDC Clutch kit Removal

Name	**DDC clutch kit Removal Tool**
Function	**To remove the DDC kit form the gearbox housing**
Note	**Technical Bulletin with DDC fitting process DDC Fitting instructions**

DUAL DRY CLUTCH

Tools

DDC Clutch kit installer

Name	**DDC Clutch kit installer**
Function	**To install the Clutch cover in the gearbox housing**
Note	**The tool includes three bearing pushers to add between the installer and central DDC bearing in order to locate the bearing in the correct position** **Each bearing pusher depends on the bearing diameter.** **Technical Bulletin with DDC fitting process** **DDC Fitting instructions**

DUAL DRY CLUTCH

Tools

Actuator Adjustment

Name	**Actuator adjustment tool**
Function	**To calibrate the internal levers of the actuator to the correct position according with DDC kit**
Note	**Technical Bulletin for Actuator calibration** **DDC Actuator calibration process**

DUAL DRY CLUTCH

Tools

Setting tool

Name	Actuator setting tool
Function	To calibrate the actuator turning the internal bolt to fix the levers in the correct position according with DDC kit
Note	Technical Bulletin for Actuator calibration DCC Actuator calibration process

DUAL DRY CLUTCH

Tools

Coupling rotor installer (for hybrids)

Name	**Coupling rotor installer**
Function	**Use this accessory fitted in the installer tool to fit the DDC klt with coupling rotor in hybrid engines**
Note	**This accessory is linked with the installer tool by three nuts**

DUAL DRY CLUTCH

Fitting videos

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Dual Dry Clutch

DDC replacement process from gearbox

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Fitting videos

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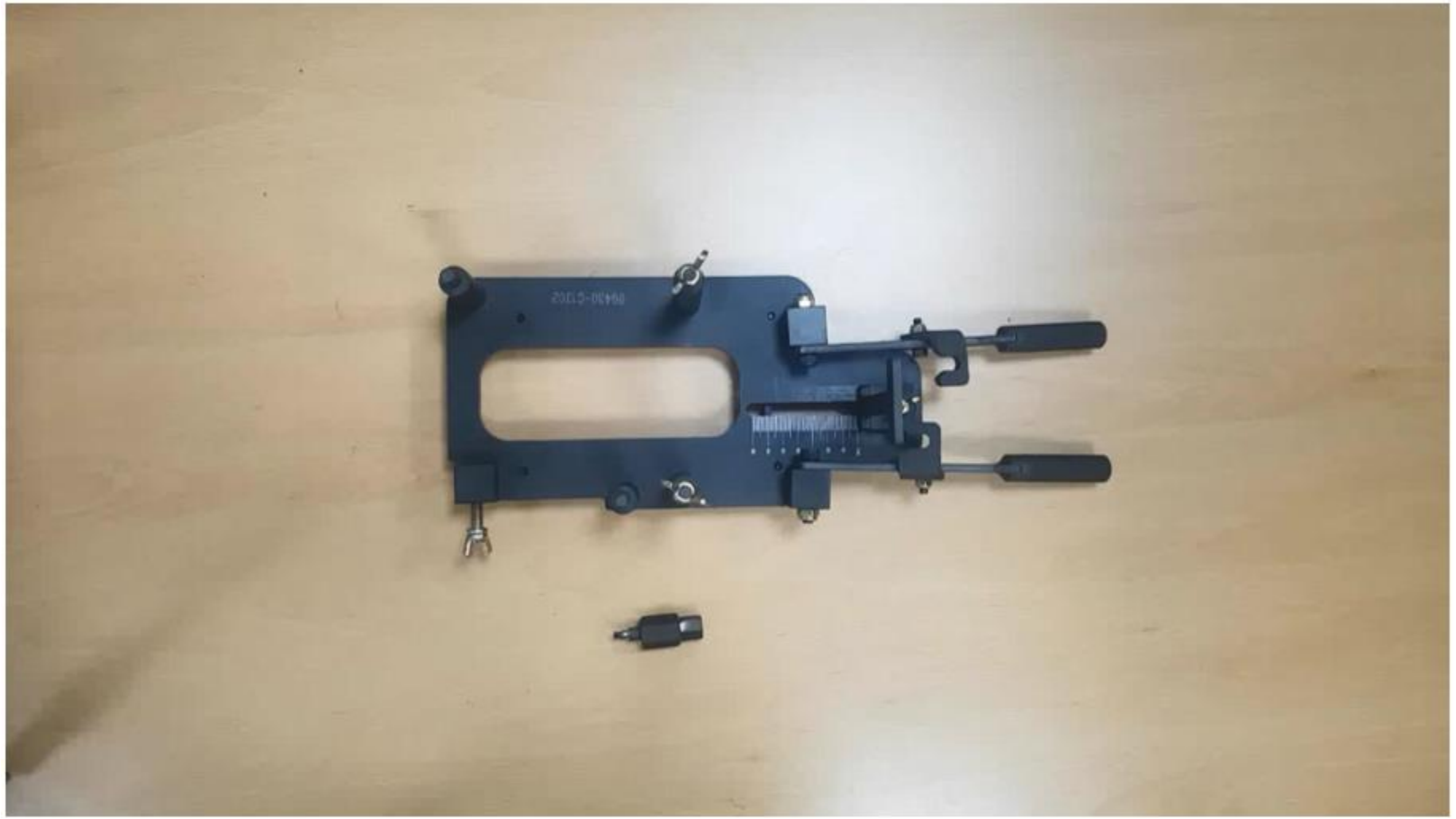
Dual Dry Clutch
Actuator replacement process from gearbox

DUAL DRY CLUTCH

Fitting videos



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ANY QUESTIONS?

THANK YOU FOR YOUR ATTENTION!


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