SNS COLLEGE OF TECHNOLOGY

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DEPARTMENT OF AUTOMOBILE ENGINEERING

COURSE NAME : 19AUB202 – AUTOMOTIVE SYSTEMS

II YEAR / III SEMESTER

Unit 3 – Transmission System

Topic : Manual Gearbox

INTRODUCTION

- A gearbox is a mechanical component in vehicles and machinery that plays a crucial role in controlling the power and speed of the engine and transmitting it to the wheels or other mechanical systems.
- The primary purpose of a gearbox is to provide a range of gear ratios to optimize the performance and efficiency of the vehicle
- A manual gearbox, also known as a manual transmission, is a type of transmission used in automobiles to control the power transfer from the engine to the wheels manually

FUNCTION OF GEARBOX

- Adapting to the driving condition by changing the gear
- To move the vehicle in reverse
- Neutral Position
- Optimizing engine performance
- Smooth Transition

TYPES OF MANUAL GEARBOX

- Sliding Mesh Gearbox
- Constant Mesh Gearbox
- Synchromesh Gearbox

SLIDING MESH GEARBOX

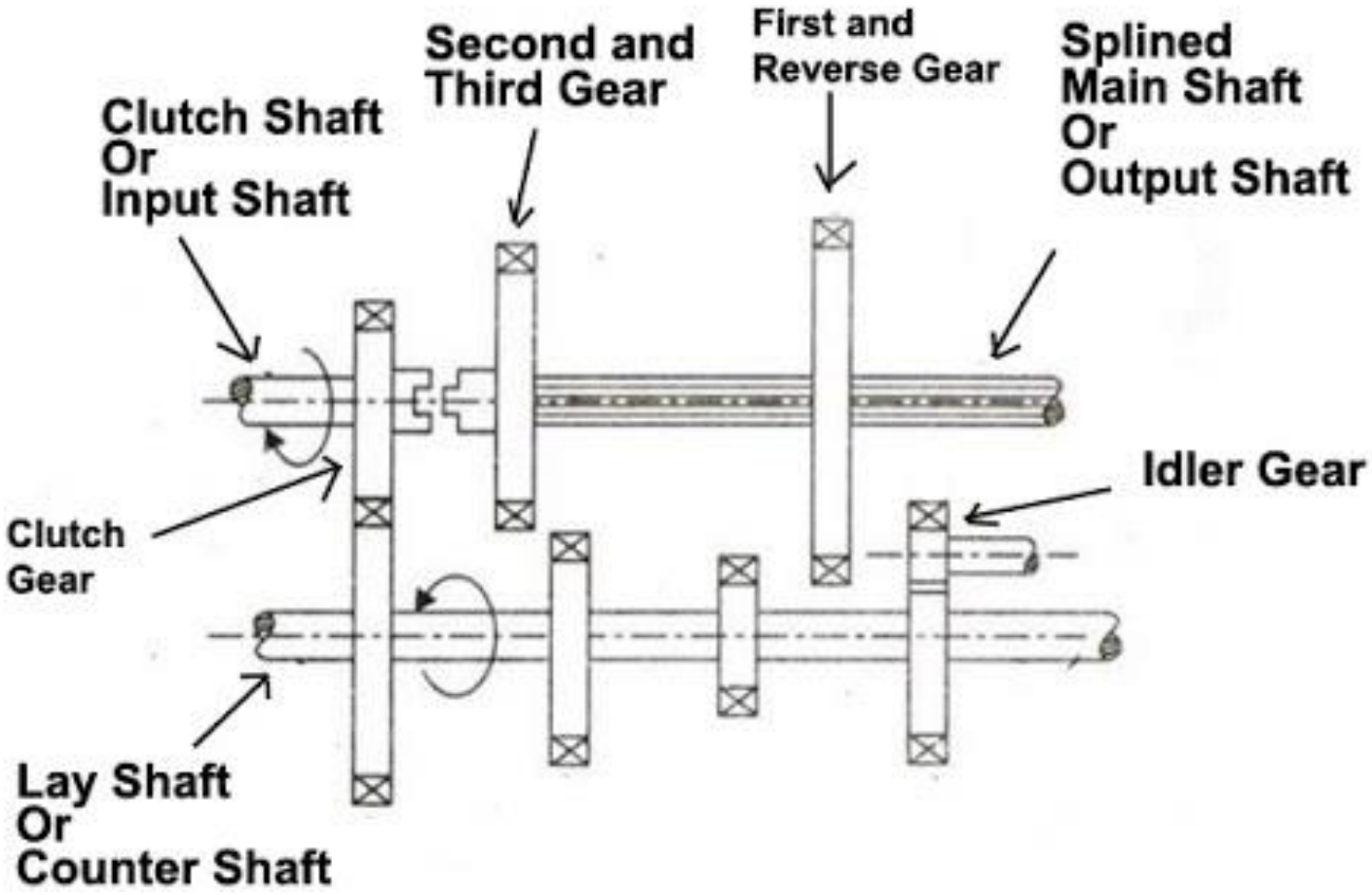
- Sliding Mesh Gearbox was the first gearbox or transmission system invented for an automobile.
- The first transmission system was given by French Inventors Louis-Rene and Emile Levassor in 1894.
- The required gear ratio is achieved by sliding the required gears to bring into mesh with the appropriate mating gear.

COMPONENTS

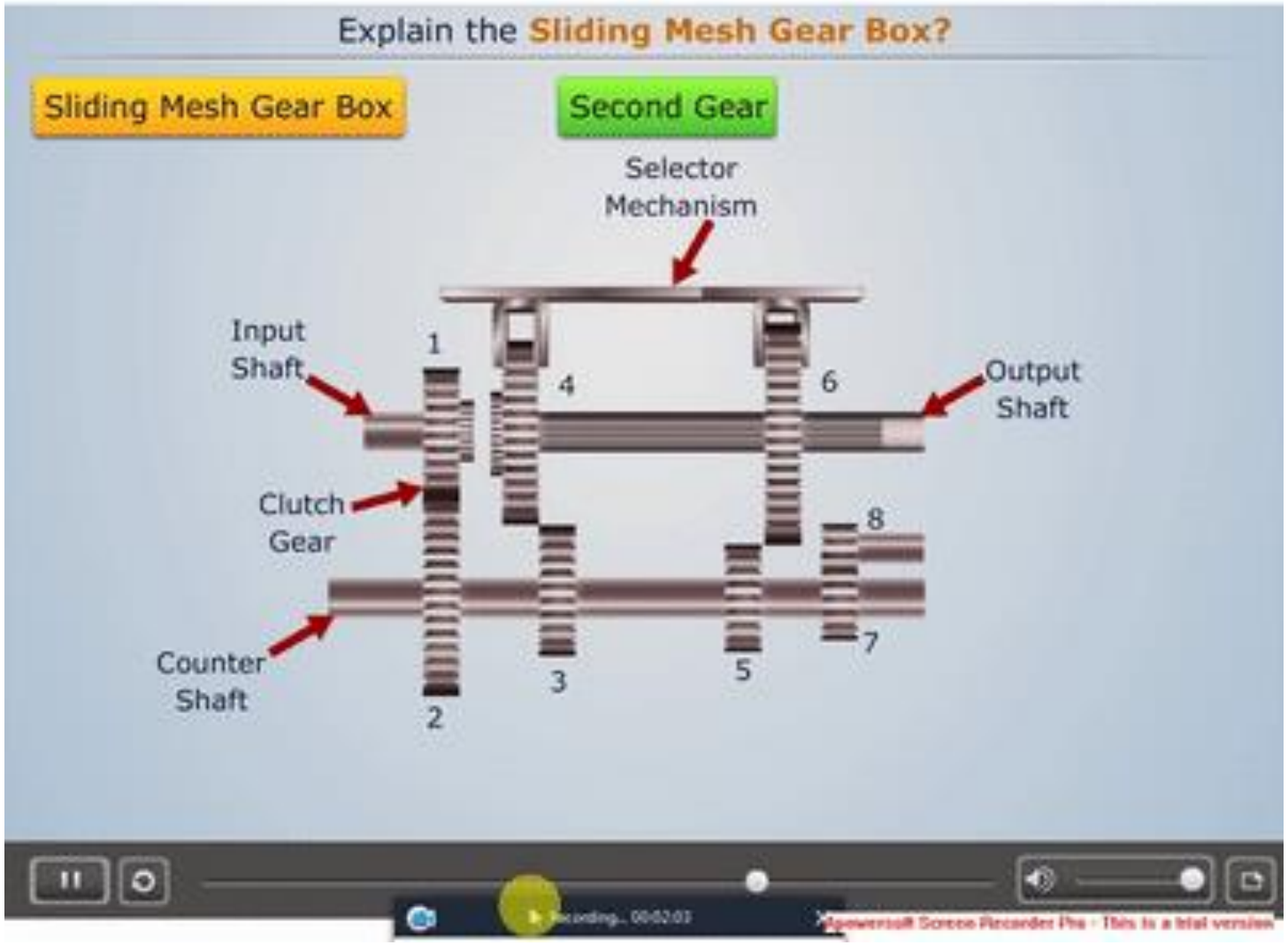
- Main Shaft
- Layshaft
- Clutch Shaft
- Gears

CONSTRUCTION

- The clutch shaft is connected to the engine output and gear is mounted on the clutch shaft which is connected with a gear of lay shaft.
- The lay shaft has several gears, one of which is connected to gear of clutch shaft
- Other gears connect with different gear of main shaft to obtain different gear ratio.
- Also, one gear in lay shaft is reverse gear and has and idler gear which is placed between the lay shaft gear and main shaft gear when operated.


Clutch Shaft
Or
Input Shaft
Second and
Third Gear
First and
Reverse Gear
Splined
Main Shaft
Or
Output Shaft
Idler Gear
Clutch
Gear
Lay Shaft
Or
Counter Shaft

WORKING


Explain the Sliding Mesh Gear Box?
Sliding Mesh Gear Box
Second Gear
Selector Mechanism
Input Shaft
Output Shaft
Clutch Gear
Counter Shaft
1
2
3
4
5
6
7
8

ADVANTAGES

- Its efficiency is more than constant gearbox as only one gear is in mess unlike the constant mesh gearbox in which all gears are in constant mesh.
- Its manufacturing is easy as compared to constant mesh gearbox.
- Its mechanism is simple.

DISADVANTAGES

- More effort is required to engage the gear as the gear has to be slide in sliding mesh gearbox.
- Less life of gear as more wear and tear of gear is caused in sliding mesh gearbox due to friction.
- It takes more time and money to replace the gears if the gearbox fails

CONSTANT MESH GEARBOX

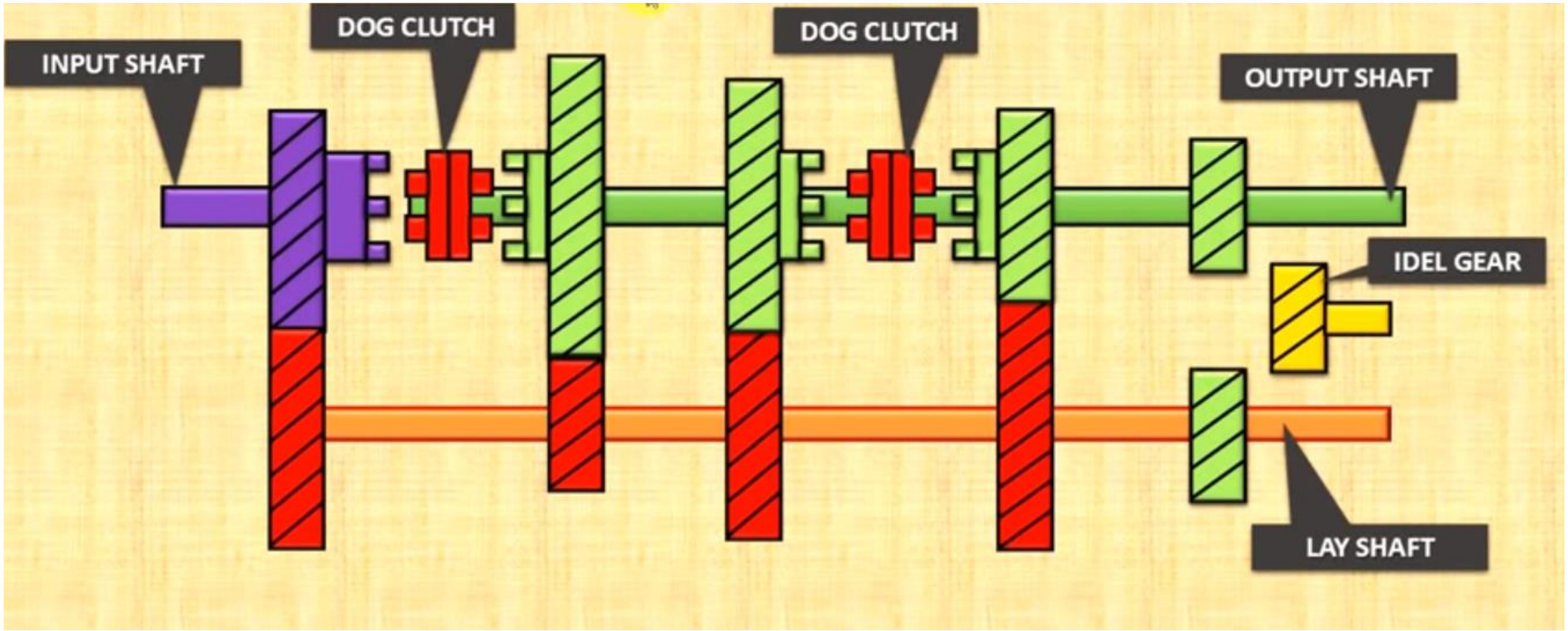
- Constant Mesh Gearbox was invented to overcome the limitations of the sliding mesh gearbox.
- In this gearbox, all the gears are always in mesh.
- The gear remains fixed and not slide like the sliding mesh gearbox.
- In this type , the sliding mesh was replaced with constantly meshed pairs of gear.
- The new shifting devices named dog clutches were introduced in it.

COMPONENTS

- Main Shaft
- Layshaft
- Clutch Shaft
- Gears
- Dog Clutch

CONSTRUCTION

- The output of the engine is carried by clutch shaft. The gear in clutch shaft is in constant mesh with the gear of lay shaft.
- There are 5 gears in lay shaft, one of which is connected to gear of clutch shaft and the other 4 are connected with gears of main shaft.
- All four gears are of different sizes to obtain different gear ratios.
- An idler gear is present between the gear of lay shaft and gear of main shaft to form reverse gear.


INPUT SHAFT
DOG CLUTCH
DOG CLUTCH
OUTPUT SHAFT
IDEL GEAR
LAY SHAFT

WORKING

ADVANTAGES

- Constant Mesh Gearbox is quitter in operation.
- Since the gears are engaged by dog clutches, if any damage occurs while engaging the gears, the dog unit members get damaged and not the gear wheels.

DISADVANTAGES

- It is less efficient than the others due to higher **mesh** teeth.
- Skill is required for it.
- The double clutch **mesh** is required

SYNCHROMESH GEARBOX

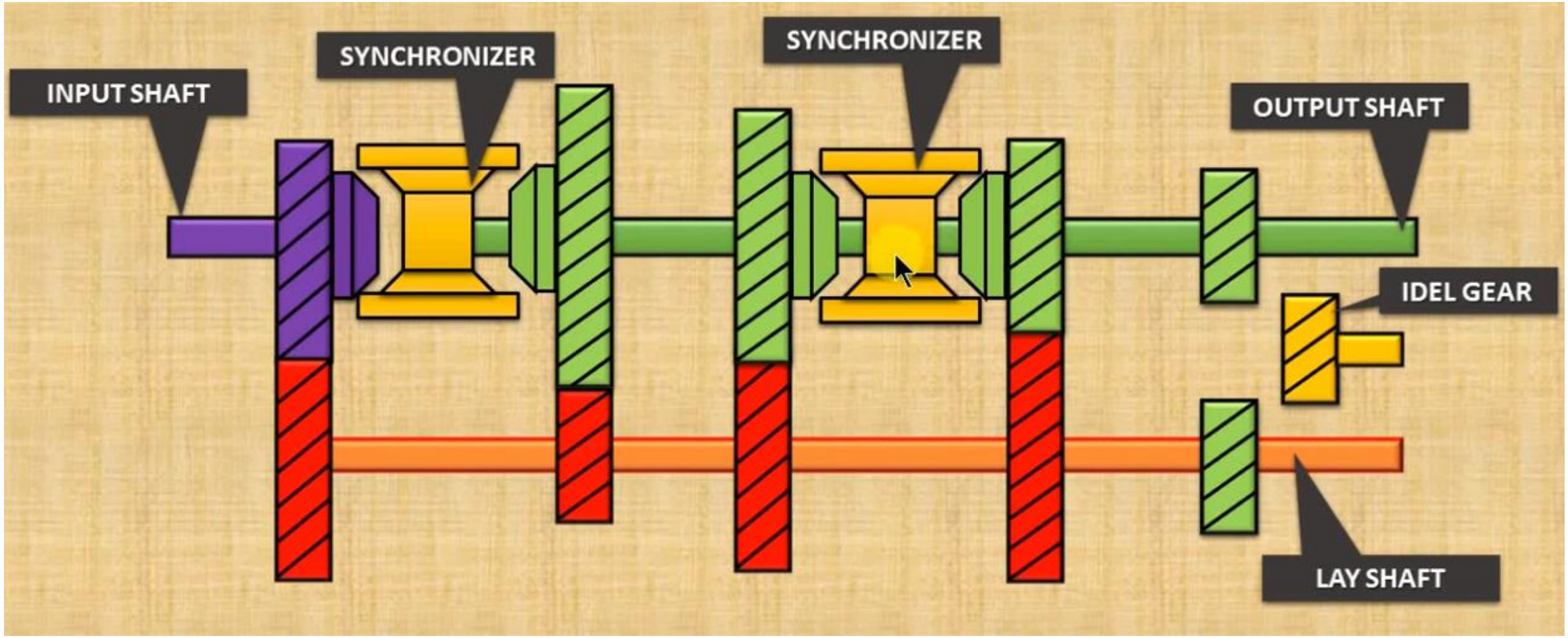
- The latest version of the Constant mesh model is the Synchromesh gearbox.
- This is a manually operated transmission in which transmission changes occur between rotating gears at the same speed.
- The gears can roll freely or they can be locked on the layout shaft in this sort of gearbox.
- Synchromesh is an upgrade on the dog embrace, really

COMPONENTS

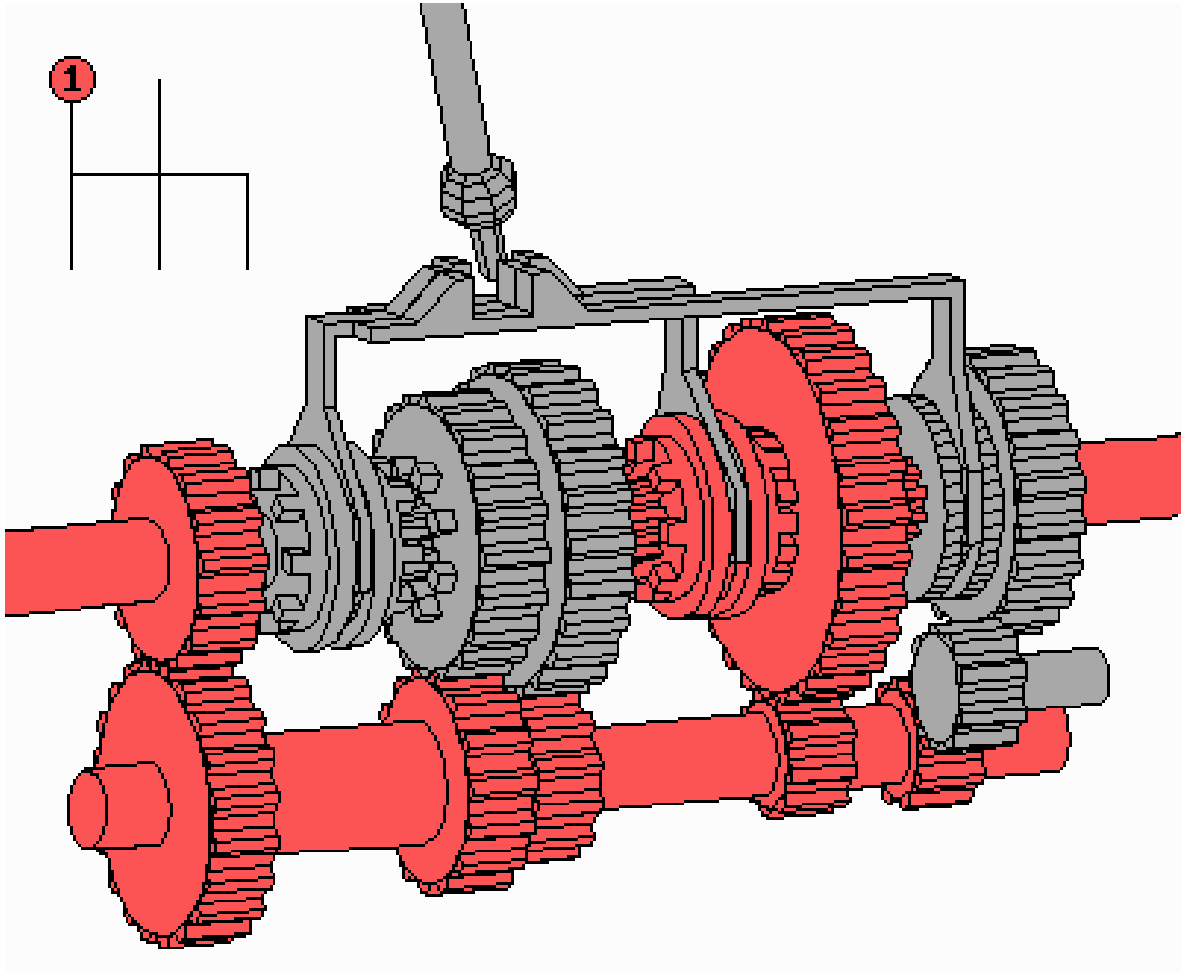
- Main Shaft
- Layshaft
- Clutch Shaft
- Gears
- Synchronizer

CONSTRUCTION

- The output of the engine is carried by clutch shaft. The gear in clutch shaft is in mesh with the gear of lay shaft.
- There are 5 gears in lay shaft, one of which is connected to gear of clutch shaft and the other 4 are connected with gears of main shaft.
- All four gears are of different sizes to obtain different gear ratios.
- An idler gear is present between the gear of lay shaft and gear of main shaft to form reverse gear.
- The synchronizer is placed between two gears. So, we can use one unit for two gears.


INPUT SHAFT
SYNCHRONIZER
SYNCHRONIZER
OUTPUT SHAFT
IDEL GEAR
LAY SHAFT

WORKING



ADVANTAGES

- Smooth and Noise free shifting of gears which is most suitable for cars.
- No loss of torque transmission from the engine to the driving wheels during gear shifts.
- Double clutching is not required.
- Less vibration.
- Quick shifting of gears without the risk of damaging the gears.

DISADVANTAGES

- It is extortionate due to its high manufacturing cost and the number of moving parts.
- When teeth make contact with the gear, the teeth will fail to engage as they are spinning at different speeds which causes a loud grinding sound as they clatter together.
- Improper handling of gear may easily prone to damage.
- Cannot handle higher loads.

REFERENCE

- https://www.youtube.com/watch?v=KOGVXi8rF2k
- https://www.youtube.com/watch?v=4RRvmyD06e0&t=4s
- https://youtu.be/UpmeEz1ydAc

THANK YOU !!!