

Comparative Study between Automatic and Manual Transmission Car

Mayur R. Mogre

Abstract— “Which transmission car is better?” is the most commonly raising question in every persons mind while buying a car in recent times. Which is followed by questions like “which is suitable for my need?”, “Which is more efficient?”, etc. Main thing that arises is about the fuel consumption and initial cost for automatic and manual transmission car. The presence of the clutch pedal plays an important role in manual transmission, which is absent in automatic transmission. This study tries to answer many questions that arises for both transmission. It gives study about the comfort level in automatic and manual transmission car. Also gives deep study for the maintenance and initial cost of automatic and manual transmission car. Also deals with the advantages and disadvantages of both the automatic and manual transmission car. At the end of this study one can get all the answers related to the automatic and manual transmission.

Keywords— Clutch, Automatic Gearbox, Manual Gearbox.

I. INTRODUCTION

IN the recent times the craze for automatic transmission car has increased to great extent. Many people are attracted towards automatic transmission car. But it didn't decrease the sale of manual transmission car. Many companies of car manufacturing has manufactured both automatic and manual transmission car. A transmission basically transfers the power from a car's engine to drive shaft and the wheels. The gears present inside the transmission change the drive wheel speed and torque in relation to the engine speed and torque (pulling power). Lower gear ratios helps the engine to build up enough of power so that the car can easily accelerate from a halt. The transmission is a device that is connected to the back of the engine and sends the power from the engine to the drive wheels. An automobile engine runs at its best at a certain RPM (Revolutions per Minute) range and it is the transmission's job to make sure that the power is delivered to the wheels while keeping the engine within that range. It does this through various gear combinations. In first gear, the engine turns much faster in relation to the drive wheels, while in high gear the engine is loading even though the car may be going in excess of 70 MPH. In addition to the various forward gears, a transmission also has a neutral position which disconnects the engine from the drive wheels, and reverse, which causes the drive wheels to turn in the opposite direction allowing you to back up. Finally, there is the Park position.

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In this position, a latch mechanism (not unlike a deadbolt lock on a door) is inserted into a slot in the output shaft to lock the drive wheels and keep them from turning, thereby preventing the vehicle from rolling. Let us study manual and automatic transmission individually. For transmission mode refer Fig. 1.

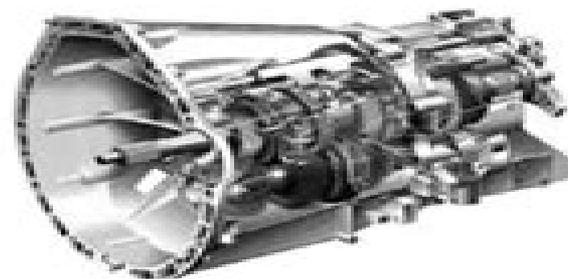


Fig. 1 Transmission Model

II. MANUAL TRANSMISSION

As the name itself indicates, A Manual Transmission enables the driver to shift the gears manually as per the driving requirements and a manual clutch is pressed while shifting the gear from one to another, which uses a solid clutch plate. There is no doubt that a Manual adds the fun in driving due to the changing of gears but as long as you are driving on a clean empty stretch. There are various types of gear system refer to Fig. 2 which shows simple gear system that is the method for shifting the gear. And also there is column type of gear shifting ref. Fig 3. Also there is planetary gear system ref. Fig 4 which shows side view of it.[1]. In city driving, especially like of India where there are mammoth traffic jams, A Manual gearbox could prove to be tiresome to shift in every next moment.

Easiness.

Speaking particularly about the person who is new to driving may find manual gearbox to be messy and confusing to operate but it's all about interest and doesn't takes much time to get familiar with its functioning.[2].

Fuel Efficiency.

For Fuel Efficiency conscious, Manual makes an ideal choice over an Automatic gearbox due to its less consumption of fuel by which your car runs on. However, nowadays with

Self Study Manual Transmission

RJ Alexander



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Model-based calibration of automated transmissions Huang, Hua, 2016-11-18 With continuous restrictions on emission standards and demands for higher driving comfort the calibration of shift quality is linked deeply and widely to automated transmission control algorithms This calibration process is typically implemented with real vehicles on the road under poorly reproducible conditions where the calibration engineer has no other choice but to try different control parameters till the subjective assessment on the shift quality meets certain requirements such as shifting comfort or sportiness Compared with today's multiplying number of variants in vehicle engine transmission combinations and exponential growth of control parameters this traditional method is backward and costly An efficient way to rise to the challenge is the model based automatic calibration In contrast to the conventional shift quality calibration this novel method uses a closed loop approach based on a dynamic model instead of human know how A shift quality correlated position trajectory is proposed Compared to the traditional control parameter adjustment method the guided trajectory has a higher tolerance to the system's hardware components and a better compatibility with TCUs from diverse suppliers Since shift quality is not restricted to a general summarized grade e.g. comfort and sportiness are always two conflicting influence factors in the terms of shift quality calibrations a multi objective evolutionary algorithm is applied to search the set of Pareto optimal front which includes all the optimal compromised control parameters of the gear shifting trajectory for possible choice In this work a hydro mechanical AMT synchronization system is used as an example to explain the proposed optimization process A Modelica based non linear hydro mechanical AMT system is modeled which describes the transient behavior during gear shifting in detail An effective fuzzy sliding mode position controller is designed for the referenced position tracking during synchronization in contrast to the conventional trial and error tuning method a genetic algorithm is applied to automatically identify and optimize the sliding mode controller parameters A novel multi objective evolutionary algorithm MLIA is developed to find out the optimal control set for the synchronization trajectories Verification at a transmission test bench shows that this model based multi objective optimization method has a guiding capability in automated transmission calibration Mit deutlich strengeren gesetzlichen Anforderungen hinsichtlich der Abgasemissionen und einer zunehmend anspruchsvolleren Nachfrage bezüglich des Fahrkomforts rückt die Frage nach der Schaltqualität stärker in den Fokus der Getriebeentwicklung Die Kalibrierung umgangssprachlich die Applikation ist deshalb ein Schwerpunkt bei der Entwicklung von Algorithmen für die Schaltqualität von automatisierten Getriebesteuerungen Der Kalibrierungsprozess wird in der Regel im Fahrzeugversuch auf der Straße durchgeführt Der Applikationsingenieur versucht unter diesen nicht reproduzierbaren Bedingungen verschiedene Steuerparameter zu adaptieren Dies wird für eine Schaltung solange durchgeführt bis die subjektive Beurteilung der Schaltqualität und die zugehörigen Eigenschaften wie zum Beispiel Schaltkomfort und Sportlichkeit erfüllt ist Dieser beschriebene Prozess ist zeit und personalaufwendig was mit dem aktuellen Angebot an Motor Getriebe Fahrzeugvarianten

kaum bewältigt werden kann. Als weitere Herausforderung steigt die Anzahl der kalibrierbaren Parameter der Regler und Steuerungsmethoden stetig um, die Kundenbedürfnisse zu befriedigen. Weshalb auch aus Kostensicht ein besserer Prozess gefunden werden muss. Eine effiziente Möglichkeit zur Lösung der skizzierten Problemstellungen ist die modellbasierte automatische Kalibrierung. Im Gegensatz zu der herkömmlich auf Fahrversuche basierende Kalibrierung der Schaltqualität verwendet dieses neue Verfahren ein dynamisches Modell in einer geschlossenen Schleife anstelle des Applikationsingenieurs. Für die Fahrvorgaben wird in der Schleife ein Fahrerregler und ein Optimierungsalgorithmus verwendet, um so eine hohe Reproduzierbarkeit des Schaltereignisses sicherzustellen. Es wird vorgeschlagen, die Bewegung der Schaltstellung zu optimieren, da diese mit der Schaltqualität korreliert. Diametral steht dem die allgemeine Regleranpassung verschiedener Parameter für die Synchronisation gegenüber. Die vorgeschlagene Methode der geführten Schaltbewegung weist eine deutlich höhere Toleranz gegenüber der Varianz an Hardwarekomponenten und damit eine bessere Kompatibilität zu den Getriebesteuergeräten TCUs verschiedener Lieferanten auf. Die Schaltqualität lässt sich nicht auf ein subjektives Kriterium zusammenfassen; es werden immer unterschiedliche Faktoren wie z. B. Komfort und Sportlichkeit den Schaltvorgang bestimmen. Deshalb wird für die Optimierung des Schaltvorgangs eine mehrkriterielle evolutionäre Algorithmus angewandt, um die Paretofront zu identifizieren, was alle Kompromisse der Schaltbewegungsregelung einschließt. Es wird ein Modell eines hydromechanischen Synchronisationssystems für ein automatisiertes Getriebe als Beispielanwendung benutzt, um den vorgeschlagenen Optimierungsprozess zu demonstrieren. Das nichtlineare hydromechanische Synchronisationssystem wird mit der objektorientierten Sprache Modelica modelliert. Mit dem Modell werden Schaltvorgänge detailliert beschrieben. Ein Fuzzy Sliding Mode Regler wird für die jeweilige Bewegung der Schaltung während der Synchronisation benutzt. Im Gegensatz zur herkömmlichen empirischen Anpassung der Reglerparameter wird ein genetischer Algorithmus angewendet, um die automatische Erkennung und Bewertung der Parameter vom Fuzzy Sliding Mode Regler zu optimieren. Ein neuartiger evolutionärer mehrkriterieller Algorithmus MLIA wurde angewandt, um eine optimale Bewegung der Schaltstellung während der Synchronisierung zu finden. Die Validierung am Getriebeprüfstand zeigt, dass diese modellbasierte Methode der mehrkriteriellen Optimierung in der automatisierten Getriebekalibrierung eine deutliche Verbesserung darstellt.

Electronic Transmission Controls Ronald K. Jurgen, 2000-06-10. The evolution of the automotive transmission has changed rapidly in the last decade, partly due to the advantages of highly sophisticated electronic controls. This evolution has resulted in modern automatic transmissions that offer more control, stability, and convenience to the driver. *Electronic Transmission Controls* contains 68 technical papers from SAE and other international organizations written since 1995 on this rapidly growing area of automotive electronics. This book breaks down the topic into two sections. The section on Stepped Transmissions covers recent developments in regular and 4-wheel drive transmissions from major auto manufacturers including DaimlerChrysler, General Motors, Toyota, Honda, and Ford. Technology covered in

this section includes smooth shift control automatic transmission efficiency mechatronic systems fuel saving technologies shift control using information from vehicle navigation systems and fuzzy logic control The section on Continuously Variable Transmissions presents papers that demonstrate that CVTs offer better efficiency than conventional transmissions Technologies covered in this section include powertrain control fuel consumption improvement development of a 2 way clutch system internal combustion engines with CVTs in passenger cars control and shift strategies and CVT application to hybrid powertrains The book concludes with a chapter on the future of electronic transmissions in automobiles

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