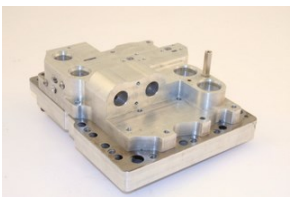


## **Powertrain Design and Development Group**

**Specialists in  
(DCT) Dual Clutch, (AT) Automatic,  
(MT) Manual, (AMT) Automated Manual,  
Hybrid Transmissions**



**Power-flow design**

**Clutch design**

**Cross-section design**

**Electro-hydraulic systems design**

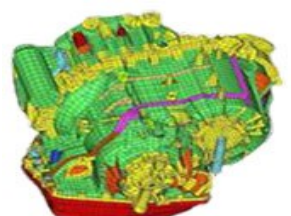
**Control software design and calibration**

**Prototype development and testing**

**Vehicle integration**

**Production development**

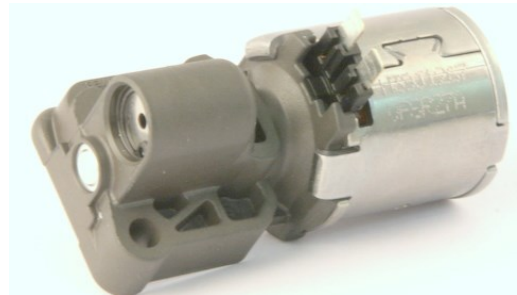
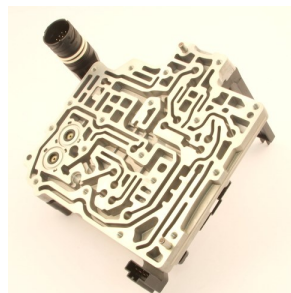
**Test and evaluation**



## Innovation

NTC Powertrain, a Member of the AVL Group, is an innovative tier-one provider of transmission designs and prototype solutions to the world's foremost automotive companies. Key clients include General Motors, Ford, Volkswagen, Geely, Chery, Great Wall Motor Company, SAIC, BorgWarner, FEV and Jatco.

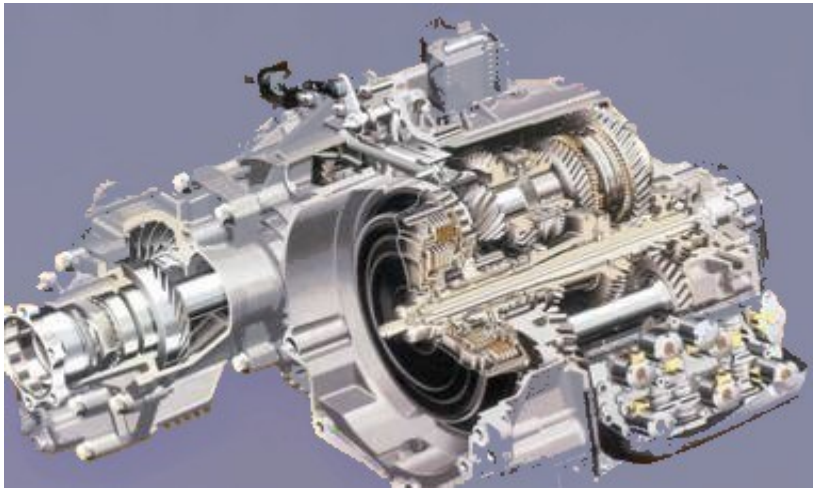
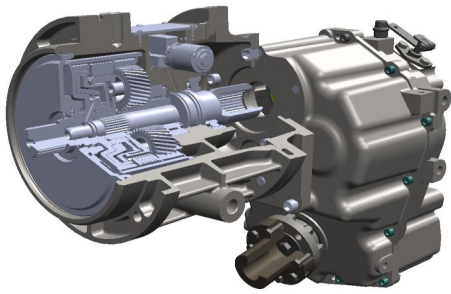
Transmission designs include both front and rear wheel drive Dual Clutch Transmissions (DCT) suited to vehicles ranging from high performance sports cars to small passenger sedans. NTC has to date delivered over twelve new DCT designs in what is still a very new technology segment.



## International Customers

NTC has gained a reputation for innovation and excellence as demonstrated by the receipt of many industry awards including winning "The Australian Institution of Engineers, Engineering Excellence Awards" on several occasions. NTC's innovation has been recognized with the registration of many patents for transmission innovation and the launching of advanced technology into the international arena with global automotive customers and supply partners. NTC is a preferred Technology Supplier to GM Powertrain and VW and recognised in the industry as a leading tier-one technology supplier with manual, automatic and dual clutch technologies to major automotive customers.

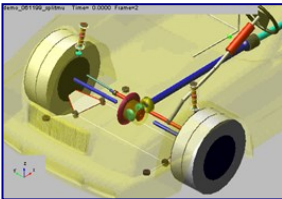




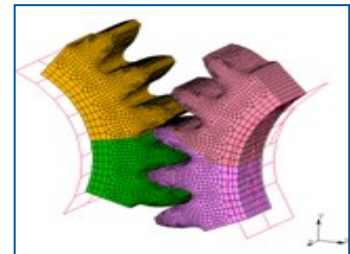
Secured Confidential Test & Development Centre

In-house vehicle test and evaluation with capabilities to test;

- Mechanical reliability
- Software
- Controls
- Cycle fatigue

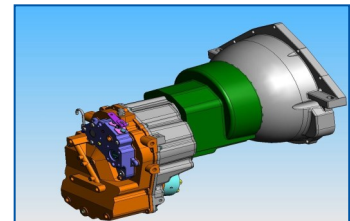


- Rapid Prototypes
- Mechanical Hardware
- Hydraulic Control Systems
- Software
- Complete 3D Analysis
- Engine-to-ground design
- FEA
- FMEA
- Root Cause Analysis
- Warranty Investigations
- DVP and Test Specifications



Design of:

- AT
- AMT
- DCT
- MT
- Transfer Case
- Differentials
- Hybrids
- Control valve bodies
- Solenoids
- Full integrated system simulation



## Over 30 Patents Registered

Method of controlling DCT  
 Multi-speed auto with integrated starting device  
 Dual wet clutch automated manual transmission  
 4/5/6/7 speed transmission  
 Shift spool position detection  
 Electro-hydraulic control for AT  
 Transmission control apparatus

2-Speed marine transmission  
 De-coupling clutch  
 Hydro drive  
 Hybrid reverse pump  
 Marine transmission  
 Wet start clutch limp home valve  
 Method of controlling DCT synchronizers

## Hydraulic Systems

- Hydraulic circuit design
- Solenoid design and development
- Valve body design and prototype
- Lubrication
- Pump/Pump on demand
- Accumulators
- FMEA

## Model Based Design

Through Model-Based Design, embedded control system design teams can begin evaluating software designs without using prototype products and real-time targets. The Simulink environment for Model-Based Design allows NTC Powertrain engineers to mathematically model the behavior of the vehicle, design the software and model its behavior, and then simulate the entire system model to accurately predict and optimize performance. The system model becomes a specification from which you can automatically generate real-time software for testing, prototyping, and embedded implementation, thus avoiding manual effort and reducing the potential for errors.

## Controls & Software

- PCB (Printed Circuit Board) design
- PCB Prototyping
- Calibration/Development Tools
- Simulators/Hardware in the Loop
- Transmission Code
- Software solutions
- Shift schedules/vehicle matching
- Vehicle interfacing
- Diagnostic code eg. OBD
- Sensors (position, temperature, speed, oil level)
- FMEA

Embedded Success **dSPACE**



**PERFORCE**  
SOFTWARE

**AUTOSAR**



## Industry Awards & Recognition

### Australian Institute of Engineers Excellence Awards

- *Hazardous Area Communication and Lighting System - 1997*
- *Dual Clutch Transmission (DCT) Electro-Hydraulic Control System - 2003*
- *ION575R6 6 speed transmission - 2004*

### Hills Industry Award for Excellence

- Dual clutch transmission electro hydraulic control system - 2003
- ION 575R6 6 Speed transmission - 2004

### Australian IAME award for service to the Industry - 2003



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