

# TECHNOLOGY/PRODUCT PROFILE AUTO COMPONENTS

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# Design and Manufacture of Clutches, Cerametallic & Metallic Discs

## Description

Clutch Auto Ltd. designs and manufactures a wide range of clutches. This includes Cover Assembly (Push/Pull) and Disc Assembly clutches. The designs are optimum to suit arduous conditions i.e. overloading, higher gear starts, high temperatures etc. Higher clutch life is achieved through better design, better heat sink properties, friction material etc.

The In-house Diaphragm Manufacturing is a state of art facility with consistency in loads of final product and increased fatigue life. Clutch Auto Ltd. has R&D facility to test/ evaluate/ validate clutches along with NVH facility for refinement of clutch characteristics. Engine based dynamometer is available for actual driving condition for clutch testing. It also has MOEST (Multi Environment Overstressed Test) simulation testing facility.

## Cerametallic and Metallic Discs

Clutch Auto has developed cerametallic discs with perfect flatness of each disc. These cerametallic and metallic discs are used in wet type multi disc clutches that finds applications in critical vehicles like defense tanks.

The discs are based on in-house developed Powder Metallurgy Technology which ensures that these clutches have 100% fail safe bonding while having very low sintering layer thickness (upto 0.1 mm). The manufacturing process involves cerametallic grooves being performed during sintering without disturbing the matrix of the sintered layer, knurling and chamfering of each individual tooth.

The product involved development of special steel & standards for all inputs i.e. raw-material, tools, furnaces and equipments. All the processes and raw materials were tested and harmonized & engineered to the end product.

## Advantages

The clutches made by CAL have several advantages. The clutches have an increased life and lower pedal life. It has better heat sink characteristics and lower MOI. The optimised clutch design offers refined NVH characteristics

Cerametallic and Metallic Discs have almost nil warpage and a smooth surface finish, consistent hardness & near zero wear in operation, due to 100% fail-safe bonding. It is cost effective and has led to savings of foreign currency for Indian defense establishment.

## Applications

The clutches find application in automobile and agricultural tractors, earth movers, armoured vehicles and off-highway vehicles.

Cerametallic and metallic discs find application in wet type clutches for earth mover, off-highway vehicles, tractors and defence tanks.

## Target countries

The clutches developed would find applications primarily in developing countries. CAL is keen to promote its products in Mexico, Pakistan, Indonesia, Kenya, Nigeria and Italy.

CAL has 13 design patents and 11 trademarks registered in India. Additionally, it has started applying for patents and trademarks in US and Mexico.

## Collaboration Options

License Agreement, Marketing, Manufacturing Agreement and Technical Collaboration

## Organisation

Clutch Auto Limited

## Specifications of Clutches

Range	Cover Assembly (Push/ Pull)	Disc Assembly
160- 430	Diaphragm Type Clutch	Single & Multi Stage Disc Predamped Disc Long Travel Dampers PDHT
	Coil Spring Type Clutch Angle Spring Clutch EZN Lite Clutch Double/ Dual/ Twin Clutches Wear Adjustment Indicator	

Other technical details available on request

## Specifications of Cerametallic and Metallic Discs

Cerametallic Discs available in:

- 7 spring 4 paddle
- 8 spring 4 paddle
- 9 spring 4 paddle
- 10 spring 4 paddle
- 8 spring 3 paddle
- 9 spring 6 paddle
- 8 spring 4 paddle

## Design and Manufacture of Diaphragm Spring & Sheet Metal Components

### Description

Clutch Auto Ltd. designs and manufacturing diaphragm spring & sheet metal components. CAL has the capability to design and manufacture these components from concept to finished products.

Advanced simulation software including special software for design of diaphragm spring is used. CAL has endurance test rigs for simulating field condition. The diaphragm plant is ultra modern comparable to the best in the world. They have sophisticated equipment for pressings, heat treatment and post surface treatment.

### Advantages

There is close consistency in metallurgy & load parameters. The components thus manufactured have increased wear span & reduced release loads leading to less pedal effort & improved life of clutches.

The technology used is cost-effective and capable of producing higher volumes continuously.

### Applications

The technology finds application in all automobile industry and in Belleville spring application or any other relevant industry.

### Target countries

The clutches developed would find applications primarily in developing countries. CAL is keen to promote its products in Mexico, Pakistan, Indonesia, Kenya, Nigeria and Italy.

CAL owns the intellectual property in the form of both patents and trademarks. CAL has 13 design patents and 11 trademarks registered in India. Additionally, it has started applying for patents and trademarks in US and Mexico.

### Collaboration Options

License Agreement, Marketing and Manufacturing Agreement and Information Exchange

### Organisation

Clutch Auto Limited

## Pneumatic Prime Mover for Small Vehicles

### Description

Pneumatic Prime Mover is a reciprocating engine that is used in vehicles for short-distance transportation.

The key innovation of this engine is that it runs on compressed air, which ensures that the vehicle is pollution-free as compared to the conventional IC engine. Both single cylinder and multi cylinder versions have been developed.

The technology developed at Indian Institute of Technology, Delhi has been proven at prototype stage. A vehicle prototype adapted on a fiat car chassis has been successfully developed and demonstrated.

### Advantages

The engine is totally pollution free at site and environment enriching as it emits clean air.

The engine operating pressure and temperature are much lower as compared to conventional IC engine. This gives it a better engine life and reduced maintenance cost. The exhaust of the prime mover is emitted at temperature of 15-20°C and can be effectively used for cabin air conditioning.

The technology is available for transfer to entrepreneurs as well as established companies.

### Application

Pneumatic Prime Mover finds application in short distance transportation in congested area, small campuses, factories, airports, hospitals etc.

### Target Countries

All Countries

### Collaboration Options

Know-how transfer and Consultancy services

### Organisation

Indian Institute of Technology, Delhi

# Electronic Catalytic Converter

## Description

Electronic Catalytic Converter is a pre-engine device used to control the exhaust emissions of all four stroke internal combustion engines using diesel, leaded and unleaded petrol and gaseous fuels.

The Electronic Catalytic Converter comprises of an open ended fuel passage cum wave guide for obstruction of free fuel flow in the fuel system. A resonator and mechanisms for propagation of one or all waves - microwaves, sound waves, surface waves and other types of wave including electrostatic ion-cyclotron waves in the presence of a transverse direct electric current filed in a magnetised plasma through the wave guide/resonator to excite the electrons of the fuel molecules using 12V DC battery of the vehicle/ engine as the power source.

Catalysts in the covertor are the electrons due to Resonant Capture doing Energy Catalysis when the atoms and molecules of the fuels are electronically excited during their meta-stable state. Particles in the electronically excited state do not directly participate in the act of chemical interaction but serve only as agents that transfer energy from the electron gas of the discharge plasma to the molecules to be activated, thereby facilitating the formation of activated states.

The changes in the kinetics of the combustion process consequent to molecular energy changes (via) change in vibrational energy, rotational energy and translational energy and electronic motions makes the combustion full and complete resulting in reduced emissions than occur in the exhaust catalytic converter. When used along with a conventional exhaust catalytic converter, it facilitates moving towards zero emissions in gasoline engines tuned towards lean mixture.

## Advantages

The key features and benefits are:

- It is the first common catalytic converter in the world for diesel, leaded, petrol, unleaded petrol and gaseous fuels
- It is the first Indian invention in the area of Microwave Electronics based Converter
- Emission reductions surpass even conventional catalytic converter. The Engine performance is improved due to complete combustion of fuel
- Improvements in engine pick-up is noticed both in petrol and diesel vehicles
- It restores and maintains engine's designed compression power at all times
- Microwave synthesis and microwave heating of fuel eliminates gum formation and clogging of fuel injection nozzles and fuel lines
- It makes the conventional carburetor distributor ignition engine performance excel engine's performance with fuel injection and electronic ignition system. Enhance the performance of MPFI engine
- Removes gum and varnish deposits from engines in 500 km after fitment
- It makes the engine start instantly from cold start and lessen the strain on battery
- It increases the efficiency by 20%-30% due to operation in changes slope of efficiency curves of engines for a given compression ratio with lean ratio mixture
- It is economical than the conventional catalytic converter
- Proved in actual road conditions over 60 month trials

## Application

Hydrodrive Electronic Catalytic Converter is suitable for diesel and leaded and unleaded petrol engines, gasoline and gaseous engines, turbine and external combustion systems of all makes.

## Target countries

All countries .

Hydrodrive owns the intellectual property rights of this technology.

## Collaboration Options

Marketing and Sales Agreement

## Organisation

Hydrodrive Systems and Controls (P) Ltd.

## Specifications

Model FW-I	
Overall Length	320mm
Overall Width	45mm
Overall Height	53mm
Net Weight	940gms
Gross Weight	1040gms
Operating Voltage	12V D.C.
Red Wire	Positive
Black Wire	Negative
Fuse Rating	Maximum 10 AMPS

(cont.)

## Combination Switch Assembly

### Description

Combination Switch Assembly is manufactured using state-of-the-art technology. The ergonomically designed, steering column mounted combination switches have been indigenously developed at NTTF.

The parts are constructed out of Engineering - Plastics like Polyacetal, Heat Resistant ABS, Polycarbonate Nylon, etc. Sheet metal components are made using Copper, Brass, Phosphor Bronze, Beryllium Copper, Steel, etc.

The switches are manufactured with excellent quality assurance back up and conform to relevant Japanese International Standards (JIS) and European Standards or as specified by customer.

### Advantages

It is an ergonomic multi-function switch which has been developed indigenously.

### Application

Some of applications of these switches are:

- Wiper low speed and high speed with in-built electronic module for intermittent wiper sweep control
- Wind shield wash (spray) control
- Direction indicators with self-cancellation
- Head lamp, low beam and high beam, dimmer passing and parking light controls
- Hazard warning switch
- Horn contact

### Target countries

All countries with automotive manufacturing industry (USA, Canada, Korea and Germany) and large replacement industry would find this product useful.

### Collaboration Options

Joint Venture, License, Marketing and Manufacturing Agreements.

### Organisation

NTTF Industries Ltd.



## Fuse and Junction Box

### Description

Fuse and Junction Box houses all the electrical junctions in the Car Electrical System.

The system cables from the battery are routed through the fuses to various loads like head lamp, tail lamp, flasher, wiper, washer, backup light, blower switch, hazard lamp, ignition switch and any other accessory.

This assembly is analogous to multi layered Printed Circuit Board. The various layers of copper Bus Bars (conducting tracks) are housed between plastic insulation plates with matching grooves for the conducting bus bars. The same bus-bars are formed into tabs to function as terminals for the input and/or out put leads. 10, 15, 20 Amp capacity fuses are provided for various electrical functions.

### Advantages

The switch acts as a Central Distribution Board.

### Application

It finds application in Automotive four wheeler vehicles.

### Target countries

All countries with automotive manufacturing industry (USA, Canada, Korea and Germany) and large replacement industry would find this product useful.

### Collaboration Options

Joint Venture, License, Marketing and Manufacturing Agreements.

### Organisation

NTTF Industries Ltd.



## Central Locking System

### Description

The Central Locking System provides locking/unlocking of the entire vehicle from one central exterior point.

A popular international concept, Central Locking System - manual and keyless (remote) versions are introduced in India by NTTFIL.

It locks all doors automatically when the driver's door or the front passenger side door is locked from inside or outside.

Precisely timed motor control using micro-motors, PCB mounted relays in the control module and precision plastic gears encased in engineering-plastic housing contribute to ensure reliability.

Every CLS passes through stringent in-process quality checks.

### Advantages

Economically priced and easy to install, this system can be fitted on all new generation cars.

### Application

It finds application in automotive four wheeler vehicles.

### Target countries

All countries with automotive manufacturing industry (USA, Canada, Korea and Germany) and large replacement industry would find this product useful.

### Collaboration Options

Joint Venture, License, Marketing and Manufacturing Agreements.

### Organisation

NTTF Industries Ltd.

## Elevator Gear Unit

### Description

Elecon has developed a compact vertical traction machine having technical superiority edge over products available in the market. It has been designed for elevators/ lifts to ensure smooth and jerkless operation with very low noise level. Elecon elevator gear has been developed for carrying 6 to 18 persons.

Key features of the gear unit are:

- Very compact mono block casing made out of close grained cast iron with integral ribs to take care of load
- Thread ground high speed shaft made out of case hardened alloy steel
- Slow speed pulley shaft made out of high tensile steel to take care of bending and torque transmission
- Centrifugally cast phosphor bronze wheel of special grade manufactured with dedicated tooling to obtain center contact
- Fail safe type electro-magnetic shoe brake
- Low vibrations due to provision of inline motor mounting provide symmetrical shape
- Drive pulley construction in two piece i.e. removable sheave bolted with center hub
- Thrust bearing on high speed shaft to take thrust load in both directions
- Adaptable flange to suit motor mounting
- Rigid construction due to bearing block support

### Advantages

The gear unit has a sleek design with low weight. It offers the ease of assembling and dismantling. It ensures comfortable ride and is technically superior to other products in the market.

### Applications

This gear unit finds application in plastic, food, cheap conveyor systems, packing and chemical industries. It is best suitable where lightweight and corrosion resistance properties are required.

### Target countries

Developing Countries

### Collaboration Options

Marketing Agreement.

### Organisation

Elecon Engineering Company Ltd.

### Specifications

Gear Type	Vertical
Size	L-127
Load, Capacity	476 Kg, 7 passengers
Gear Ratio	37:1                      52:1
Sheave Size	Ö 480 550      Ö 480 550
Velocity- m/sec	1.02    1.17    0.72    0.83
Electric Motor	132-L (7.5 Kg/ 1500 RPM)
Brake	Electromagnetic type
Start/Hour	240
Brake Drum Dia	200 mm
Weight (without motor)	145 Kg (approx.)