

# Warko

## SUMMARY CHARACTERISTICS

**Modularity** , **wide ratio range** (=9) and **absence of clutch** are the most important characteristics of Warko, the new CVT (Continuously Variable Transmission) presented during the **6<sup>th</sup> International CTI Symposium of Innovative Automotive Transmission**, in Berlin, 3-7 December 2007.

Adding **high efficiency** (95%), **high torque capability** (up to 500Nm), and **compactness** (length: less than 36 cm; diameter: 31 cm; weight: 60 kg), Warko has the right numbers to become, in the near future, a must in Automotive.

## Modularity

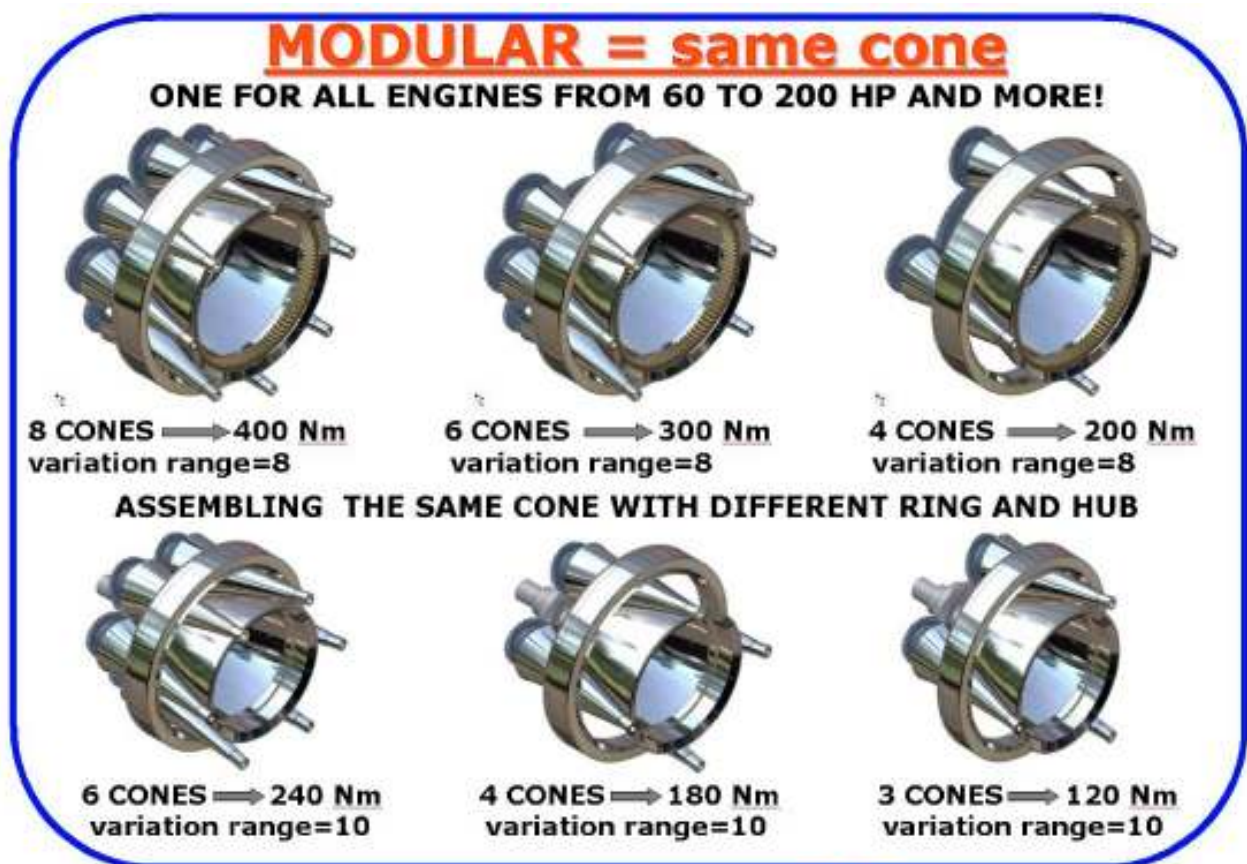
The same identical cone, with different assembly levels, covers the 90% of all the engines produced in the world , with a power range that ranges from 60 to 200 Hp and more, gasoline and diesel.

The picture shows two production lines always using the same cone.

The lines differ in the coupling of the hub and the ring.

Of course, when the hub is changed, the ratio between cone diameters and hub diameters will change too.

Considering the big hub (upper line), the **ratio range is 8**. Considering the small hub (lower line), the ratio range is **more than 10**.



by **Warko**

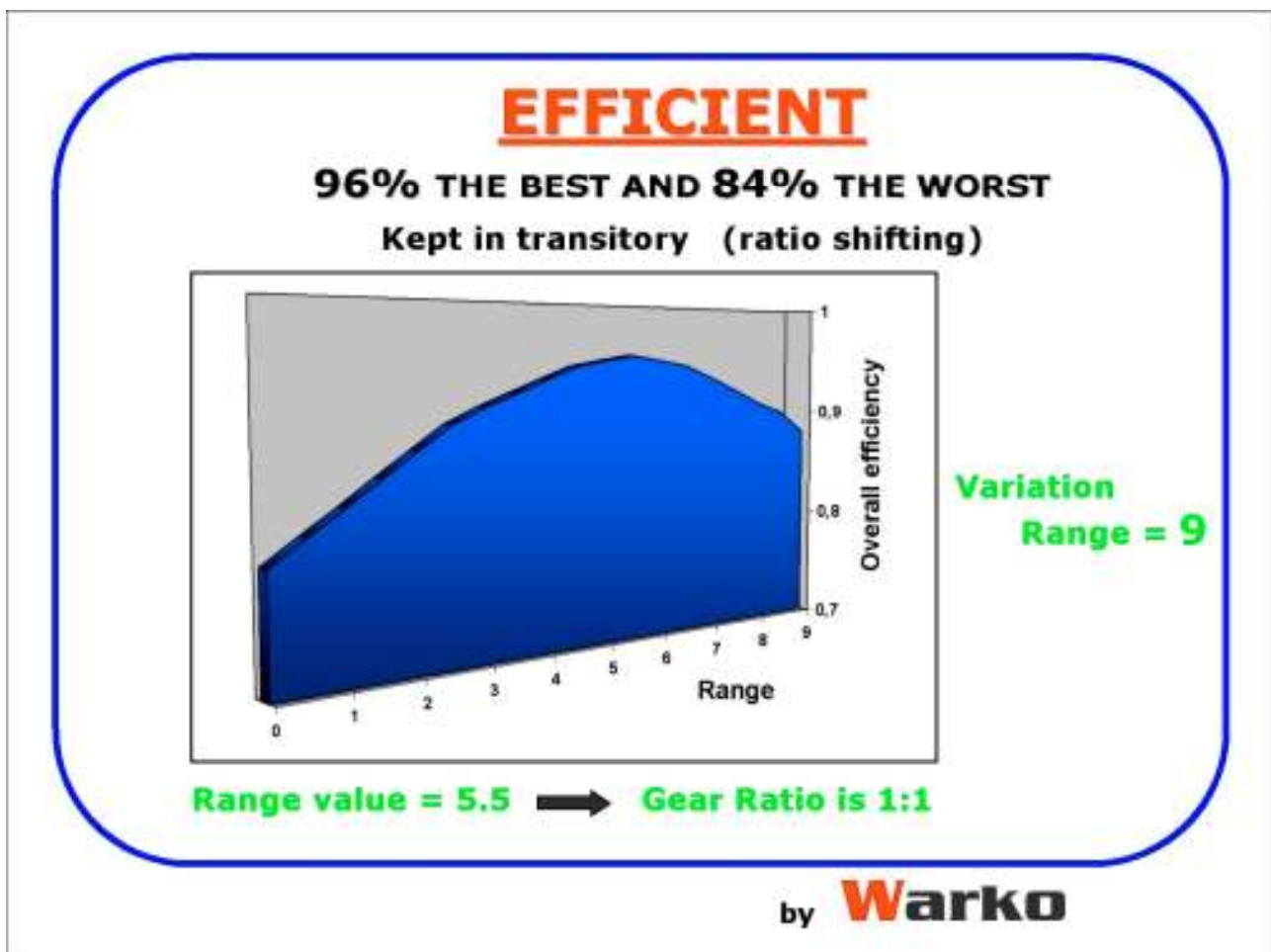
## Large range of variation

More than any other CVT, Warko has a wide range of variation, which is equal to 9. This means having a better acceleration, and further speeds beyond the correspondent mechanical transmission.

At 130 Km/h in highway, the engine revolutions change from 3000 rpm/h (final mechanical speed) to 1800 rpm/h (Warko final ratio).

## Efficiency

Warko reaches a very high mechanical efficiency, 96% maximum, 84% minimum. These values are maintained also during the transitional variation, which means that, even during the variation of transmission ratio, there is no loss of performance.



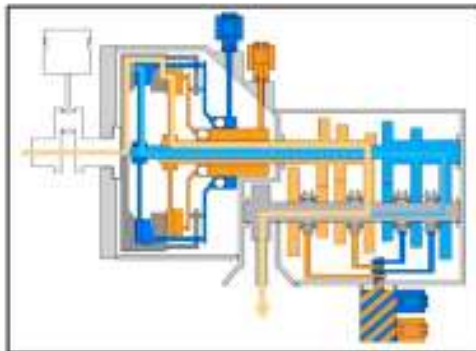
## No clutch

The engine is always connected to the wheels; the rear drive is realised by means of an epicyclic system in output, called *power split*, which allows the condition of *geared*

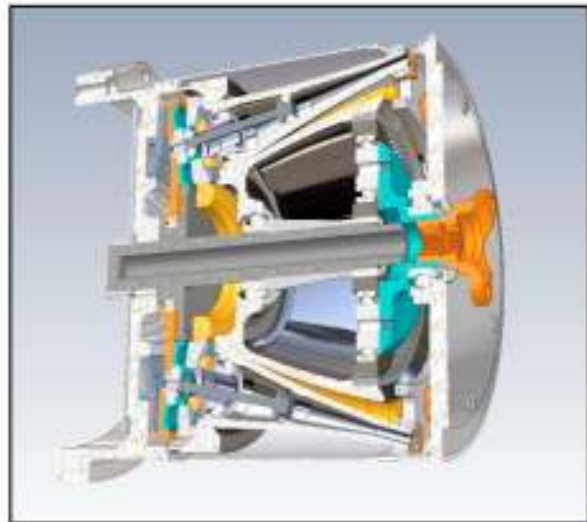
*neutral*, or zero *Dynamic*:

when the engine turns, the variator, in a particular position of its range, will compensate for the engine revolution having zero turns in output.

**Dual clutch?!?**



**Why not  
WITHOUT!**



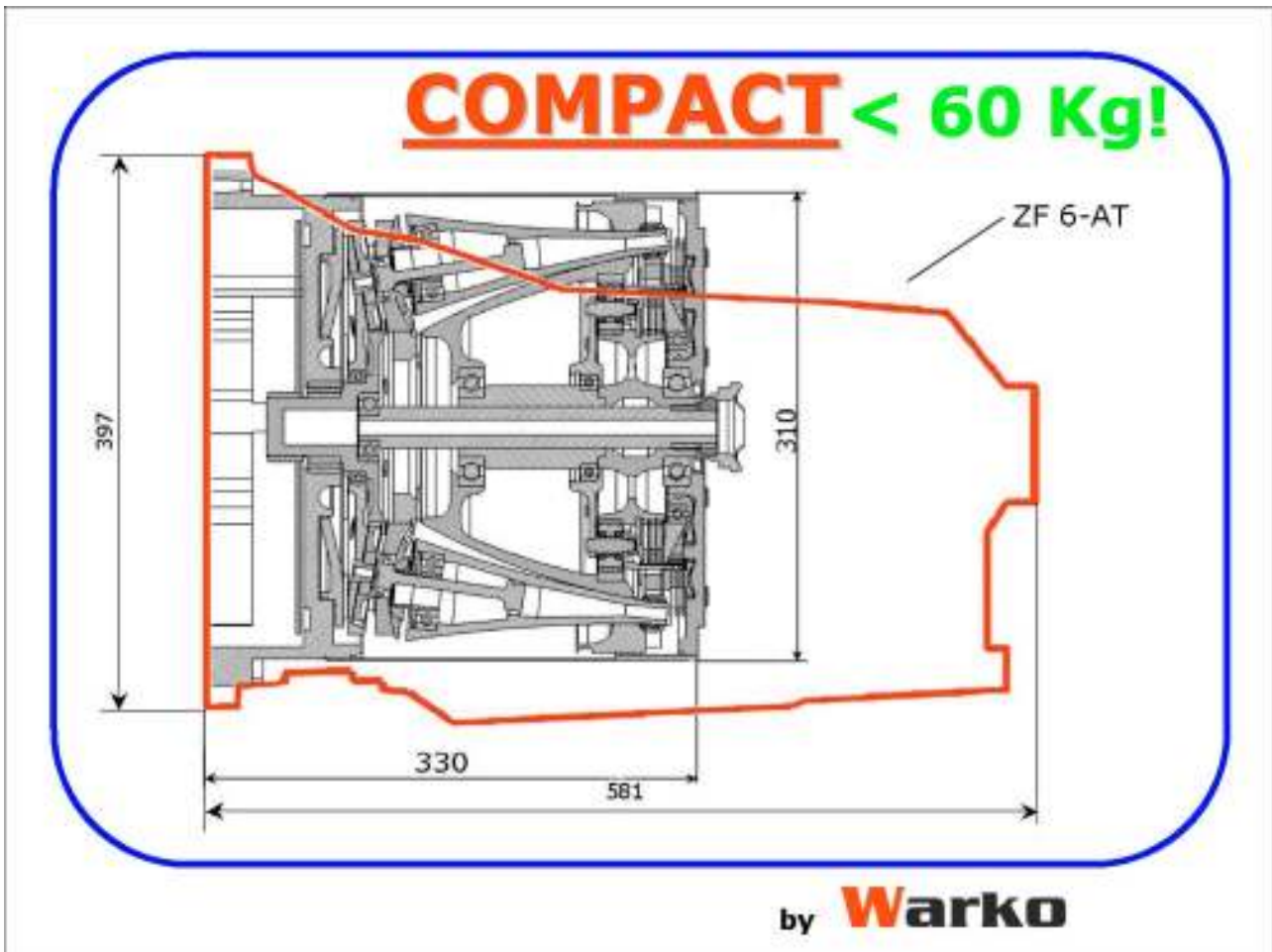
by **Warko**

## Compactness

Warko is relatively compact and light. It is only 36 cm long, its diameter is 31 cm, and its weight

does not reach 60 Kg.

Thanks to its dimensions, Warko can be employed also in front drive vehicles.



## Economical

Warko is economical both for manufacturers and users. Since it is manufactured in millions of pieces, and due to the use of commercial steel, its production costs are comparable to the mechanical transmissions costs.

Moreover, as regards the OEM Design Department, Warko will be a

standard "black box" to be simply included in the final project, only designing the final drive ratio.

The use of Warko in a car noticeably reduces fuel consumption: 15-35%, as compared to cars with the same engine and mechanical transmission.

