

Limited-Slip Differentials

The Torsen differential (contraction of the words "Torque Sensing", that is "sensitive to the torque") is used as a central differential fig.2 on cars usually equipped with four-wheel drive or rear axle / front fig.1 on cars with rear-wheel drive / front and allows to distribute torque between the two wheels without completely locking the two shafts.

In the case in which one of the two wheels tends to accelerate, as when going to slip, and the other does not tend to reduce its speed, the system is almost blocked and consequently the torque is directed towards the wheel which engages, preventing the spin of the other. This type of mechanical limited slip differential is used a lot for the great reliability and lack of maintenance during the operating life, due to the fact that there are no inside friction elements; the only it's obvious flaw is given by the overall dimensions that are more of the locking differentials to strip and the cost that is significantly higher than conventional differentials. To overcome these problems we have designed a new type differential based on the exploitation of a patent filed by Girotto Brevetti TV2011A000118 .

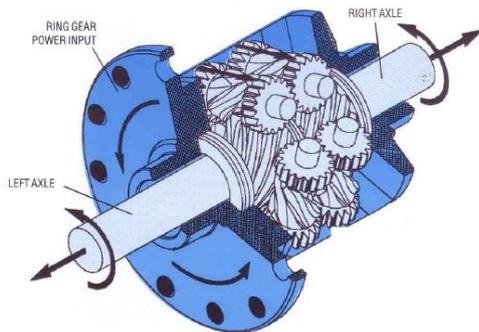


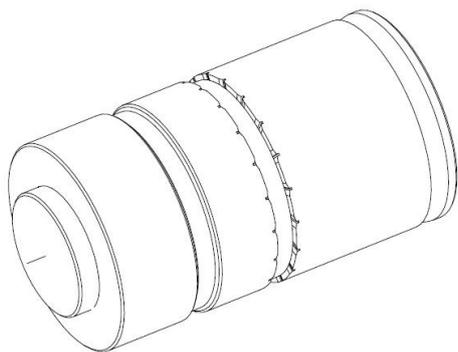
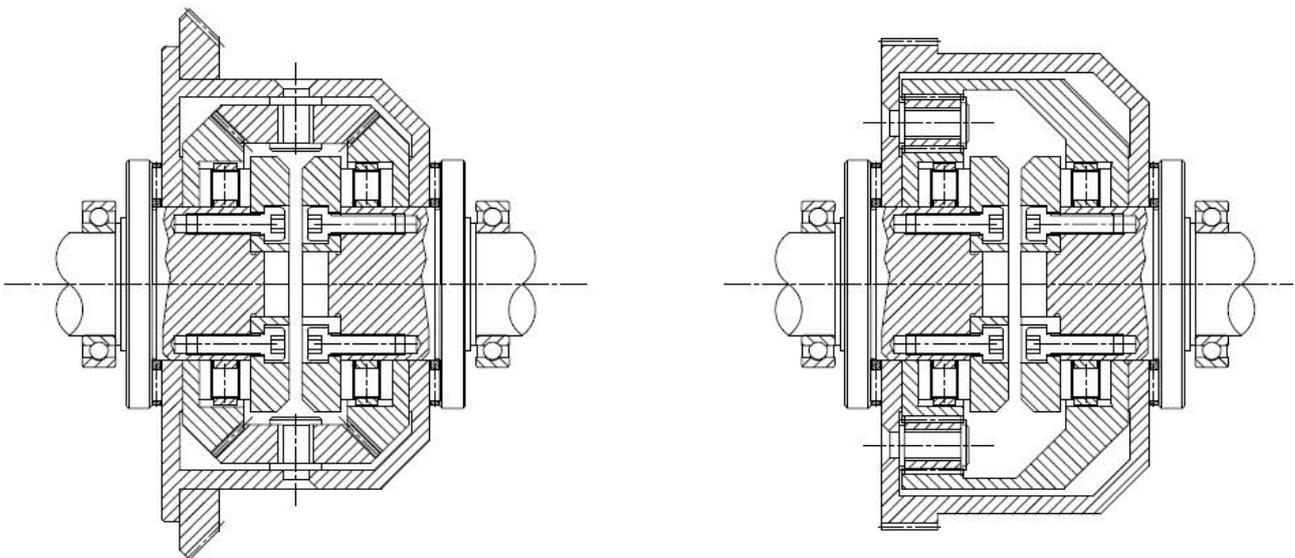
Fig. 1



Fig.2

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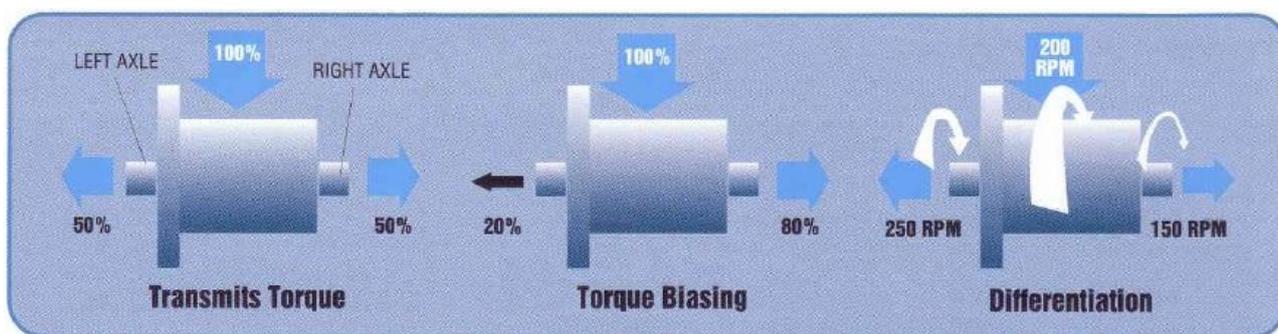
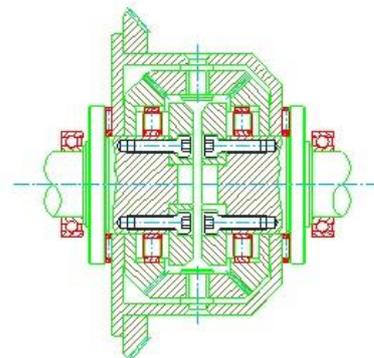
The two previous sections are the limited slip differentials obtained by the application of the irreversible joint principle depicted on the left and deposited by Girotto Brevetti. The irreversible coupling is a mechanical device which comprises a motor element (input) and a driven element (output), both movable with respect to a fixed structure, usually a frame. The motor element imparts a controlled thrust to move the duct element, and the purpose of the joint is to prevent a transfer of thrust in the opposite direction, ie from the output to the input. So We want that the joint has the function of preventing the return motion of an duct outlet organ whatever the direction of the input

drive rotation that actuates it. In the differentials drawn over the joint is placed between the case and each of the two crowns which give the motion of the left and right output axis. In this way joints prevent returns of motion due to any slippage of the wheels by the axes right or left towards the crowns of the internal differential. This limited slip differential behave exactly like the Torsen differential with the difference that in the Torsen irreversible movement is created between rings and satellites. In the Girotto differential the irreversibility is created between the crown and the differential case. This feature allows to control higher torque in lower dimensions with obvious advantages in terms of realization costs. Another interesting feature is that the sensitivity to the torque of differential can be varied by replacing only the contact disks of the irreversible joints, this allows to maintain unchanged the transmission organs.

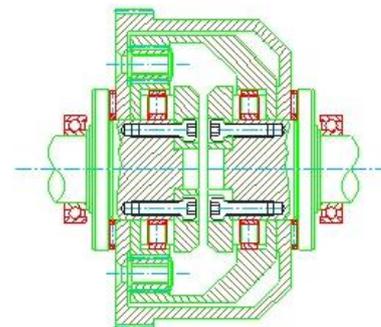
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The differential shown here on the right is ideal to be applied to the front and rear transmissions. Unlike conventional locks differential this is continuously incorporated into its control function Breakdown torque according to driving conditions, requirements and conditions of the route. It has no clutch preloaded or electronic systems that over time can cause problems. It is designed to be maintenance-free long suit life of the vehicle. Can be sized for any torque value and for any desired transmission ratio which requires the vehicle. It is compatible with any control system of the car ABS type or another.



The differential drawn here to the right is ideal to be applied for the distribution of torque between front and rear axle in the 4 wheel drive vehicles. As in the previous version is continuously incorporated into its control function Breakdown torque according to driving conditions, requirements and conditions of the route. It has no clutch preloaded or electronic systems that over time can cause problems. It is designed to be maintenance-free long suit life of the vehicle. Can be sized for any torque value and for any desired transmission ratio which requires the vehicle. It is compatible with any control system of the car ABS type or another.



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