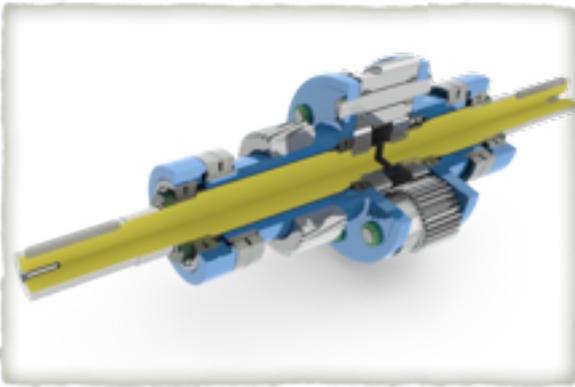


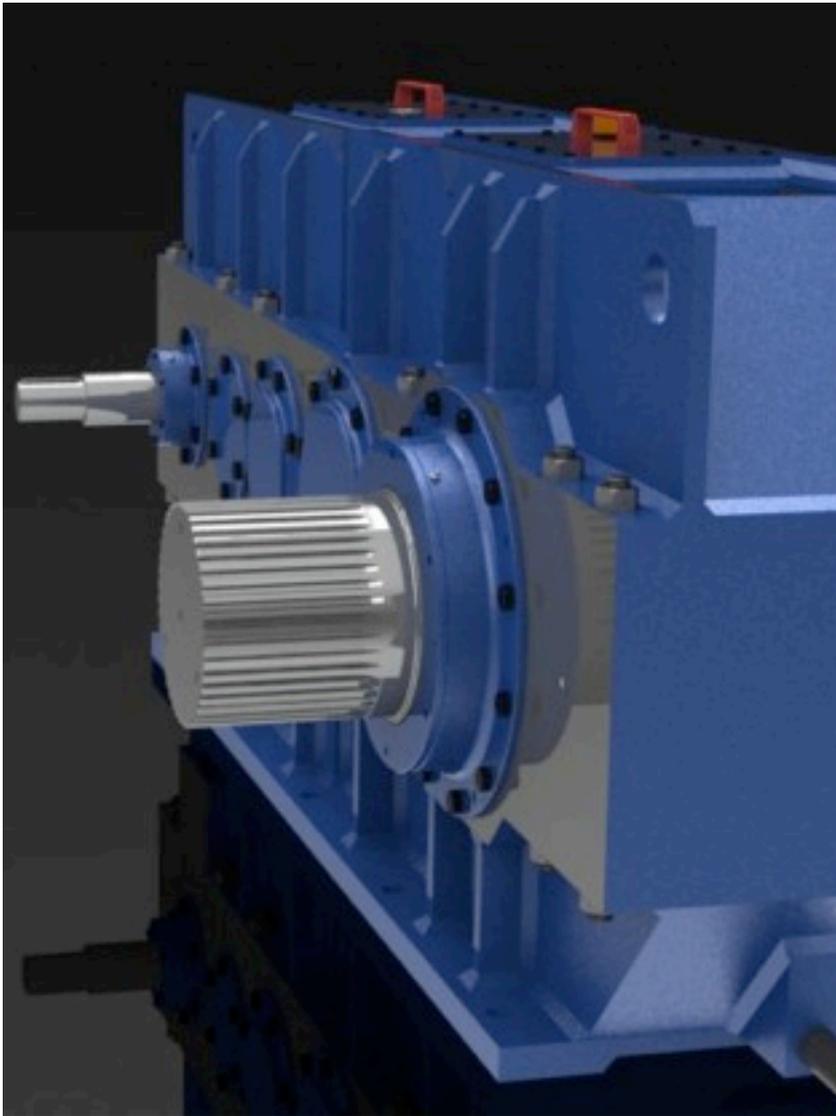


PARALLEL AXIS GEARBOX WITH INTEGRATED DIFFERENTIAL



CINEMATIC has recently developed a series of gearboxes, designed to meet a need expressed by lifting equipment manufacturers and concerning a gearbox, operated by two electric motors having equal power, capable of simultaneously operating with two electric motors, in power sum mode, to lift the rated load at the lifting speed, and if needed with a single motor; in this case, however, it would lift the rated load at one half of the

lifting speed. This function is performed by a differential gear, integrated in the parallel axis gearbox and consisting of a double input planetary unit, to which the two control motors are connected. The solution adopted so far uses planetary gear sets arranged in a classic configuration, with a negative ratio and with one of the two central wheels consisting of an inner rotating gear.
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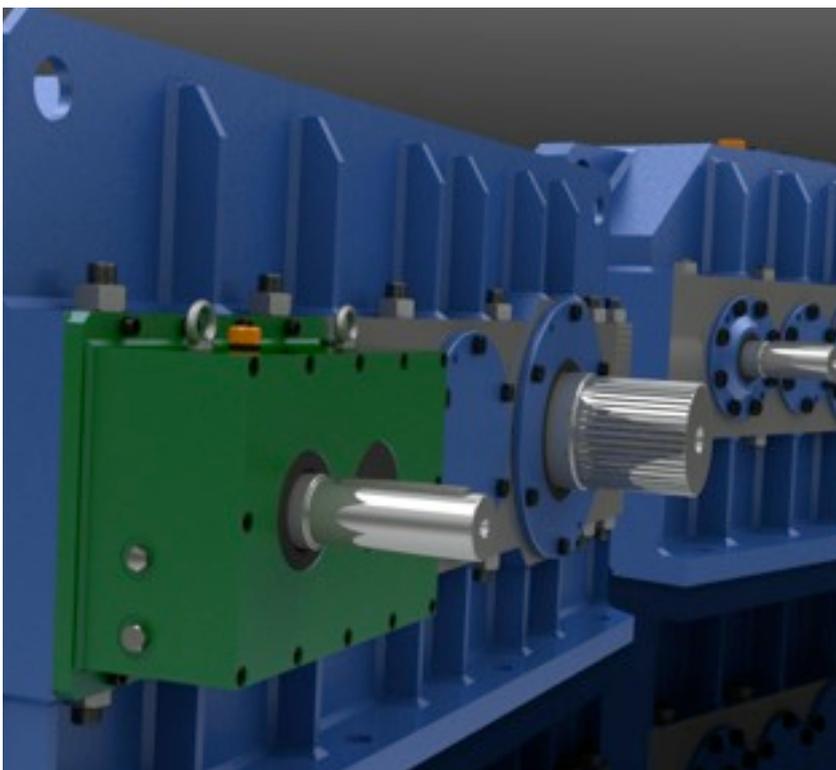


.....The limits of this design solution are:

- The difficult to grind the central inner toothing wheel, which as a consequence is not made of case-hardening and tempering steel.
- The need to adopt different input speeds in the differential unit; this basically makes it impossible to directly input the electric motors and to arrange them coaxially with respect to the planetary unit axis.

As a consequence the size of the differential gear, and subsequently that of the gearbox, is rather large. To resolve these issues Cinematic has designed a differential unit consisting of a positive ratio planetary gear, in which both the two central toothed wheels and the planetary gears have an outer toothing; as a consequence they can be easily ground, and are made of case-hardening and tempering steel.

The resulting unit has a very small size and accepts equal input speeds; this allows to directly input the control motors into it, and to arrange them on opposite sides, coaxially to the planetary unit axis. As no reduction stages are required between the motor axis and the differential input axes, even the gearbox architecture is much simpler; this allows to always get a 1:2 ratio between the speeds at the output shaft, when operating with one or two electric motors.





RATIONALLY SIMPLE AND VERSATILE

Starting from this design solution we have already produced some gearboxes that have been working for quite some time, providing satisfactory performances and good reliability.

This solution, adopted for the heavy-duty series gearboxes, featuring rated torques ranging between 120,000 Nm and 500,000 Nm, can also be extended to gearboxes featuring lower torque values.

Images show both the gearbox and some construction details (of the planetary unit and of the gear pre-stages); in any case we are ready to provide any further elucidations, as well as to develop new solutions to designed to meet any specific needs.



*All the above
and much
more...)*



PLANETARY GEAR.

The planetary gear unit has a small size with respect to the torque ratio it is designed to transmit and has been entirely redesigned. This has allowed to improve hardness, as well as to simplify all the assembly steps and any maintenance operations. The planetary train component flanges are made of steel, from a single piece.



VERSION WITH PRE-STAGE BOX.

Where needed, the planetary gear unit can be supplied with an external gear stage. In addition to the benefits deriving from the adoption of a gear pre-stage, this solution allows to install the planetary gear unit on smaller-sized parallel axis gearboxes without affecting the general dimensions.