News 02:2007
www.imsgear.com
IMS:GEAR Planetary Gears

Standard *and* customized –

Lawn robots with planetary gears by IMS Gear

Fig 1: 200 series "de Luxe"

The Ambrogio lawn robots mow lawns efficiently and ecologically with areas of as much as 3,200 m² and, depending on model, with gradients of up to 30 degrees, automatically evading obstacles such as trees. It detects the height of the grass through the built-in blade motor. For shorter grass, the control lowers the rotary blade speed and so saves battery power. With its integrated rain sensor, it stops work in rainy weather and automatically returns to its charging station. The demands made on the gearing engineering are formidable – high output torque to cope with gradients, ultimate efficiency to save battery power, and a hard-wearing design to withstand the rough conditions during the mowing operation.

Fig. 2: 200 series "Evolution"

Fig. 3: PLG for 200 series

Fig. 4: PLG for the new 300 series

The example "lawn mower robot" shows how the planetary gears have been adapted at various points to our customer's stringent requirements in terms of vibration and blocking wheels, among others.

Performance data

The smaller robot of the 200 series uses a PM32 3-stage planetary gear with 4.5 Nm output torque and a reduction ratio of i=169:1. The 1st and 2nd stage is fitted with plastic planetary wheels, the 3rd stage with metal planetary wheels. The ring gear is made of steel. The radial output forces of as much as 1,000 N generated during operation had to be taken into account in the layout design.

The PM42 3-stage planetary gear with 15 Nm has the reduction ratio i=150:1 and is used in the next 300 series up where the 1st and 2nd stage are also made of plastic planetary wheels and the 3rd stage of metal planetary gear wheels. The radial load is only 300 N, the axial load 110 N.

Standard parts used

- Ring gear
- Planetary carrier
- Planetary wheels
- Motor pinion

Adapted parts

- **Motor flange**

  Special aluminium motor flanges have been designed to connect the various motors with the gears and to reliably absorb the vibrations occurring during mowing.

- **Output bearing flange**

  The complete integration of the customer-side attachment interface into the output flange of the gear meant that no additional fixture and bearing devices were needed at the housing of the mower robot (see Fig. 3)

- **Bearings**

  A combination of ball and needle bearings was chosen because a blocking wheel may cause brief radial peak forces. The distance between the bearings has been adapted to the requirements. This combination allowed the high life expectancy requirements to be met reliably.

- **Output shaft**

  A special output shaft with hexagonal adapter and internal thread was made for the 42 size gear. This allowed the customer to attach the driving wheel directly onto the output shaft (see Fig. 4).

As you can see – standard and customized adaptations do not necessarily have to contradict each other. Contact us if you also need a "customized AND standard planetary gear" for your "cutting" needs!

IMS Gear Planetary Gears
Hauptstraße 52
D-79871 Eisenbach, Germany
phone +49 (0) 7 71.85 07-282
fax +49 (0) 7 71.85 07-220
e-mail plg@imsgear.com

IMS Gear Planetary Gears Inc.
440 Viking Drive, Suite 110
Virginia Beach, VA. 23452, USA
phone +1 (0)757-227-5553 ext 401
fax +1 (0)757-227-5543