

The Ultimate Drive Train for Mobile Robots



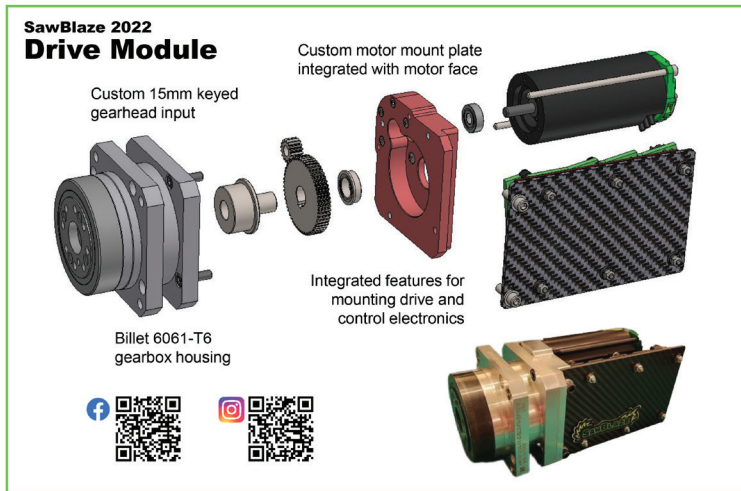
SawBlaze is a 250-lb robot featured on the TV show, BattleBots. It features a powerful drive train to bully opponents into corners where it can deliver its signature “slash & burn” attack! And it has two Harmonic Drive® HPGP gears in its wheel drive!

Durability, reliability, & survivability in a high-shock environment. These important criteria were delivered in abundance to Team SawBlaze in the form of an HPGP planetary gearhead. The current reigning BattleBots champion, and well known for their participation in six prior world championship competitions, Team SawBlaze has employed the four planet, two stage gear train for wheel drive propulsion since the initial robot design.

Recent upgrades to the gearbox includes a self-contained keyed input shaft. This upgrade provides a bearing supported input facility allowing for an additional spur gear reduction from the motor. Combined with an 8kW brushless servo, this newly configured propulsion drive train produces optimal speed, thrust, and efficiency conditions. A customized motor faceplate, produced by Harmonic Drive as a mating assembly to the gearhead, includes features designed to house drive and control electronics, and ensures proper motor location and support.



Team SawBlaze, led by team captain Jamison Go, are the current BattleBots World Champions and holders of the Giant Nut.



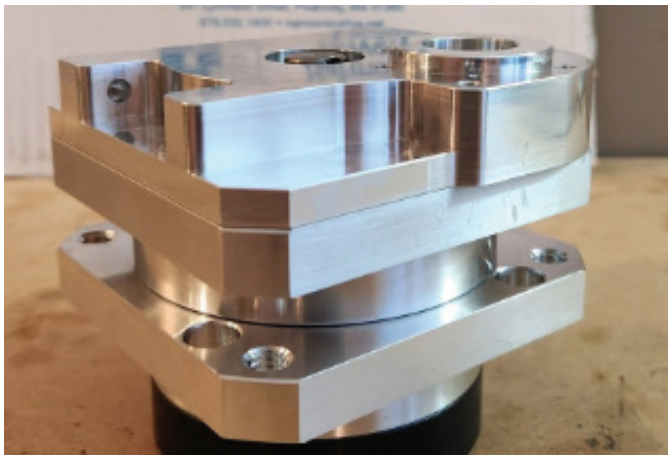
Features

- Custom **Harmonic Drive®** HPGP 20A planetary gearhead
- 3.6:1 spur gear stage
- 8000W brushless motor with encoder
- 700 rpm output speed
- All in one solution for quick turnaround repairs

HPGP planetary technology employs aluminum housings, which minimizes weight while offering sufficient strength to withstand high impacts. The roller bearing supported planet gears react to shock loads with line contact while being distributed over four planet locations. Load sharing also has a positive influence on torque density, as the four planet HPGP gearheads deliver roughly 30% higher nominal and peak torque ratings over comparable three planet systems. Lastly, the cross roller bearing (CRB) supported output carrier has a significant role to play in terms of durability in the BattleBots arena. Impact is the name of the game in BattleBots competition and the output CRB has answered

the call. Integrated with the output flange, the CRB provides a compact form factor and high resistance to impact due to the narrow, single row arrangement. The bearing is preloaded and rolling elements placed orthogonally to one another between the ground raceways.

The structure of the Harmonic Planetary® gearhead is highly integrated with the CRB. This further minimized envelope and simplifies the internal design. The rotating output flange, which is the inner race of the CRB, also functions as the output planet carrier. The vulcanized rubber drive wheels are directly affixed to this flange.



HPGP-20A two stage planetary gearhead with customized motor face plate; the face plate includes special milled pockets to house and protect drive and control electronics. It also facilitates the addition of a spur gear stage between motor and gearhead.

HarmonicDrive®

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