MAAG™ CPU central gear unit
For horizontal mills
Our quality policy

FLSmidth MAAG Gear is committed to creating strong lasting relationships that establish us as a trustworthy, reliable and professional partner for customers, suppliers and employees. This commitment includes providing high-quality and high-value solutions, products and services that result in satisfied customers.

Certified to ISO 9001 standards
With a clear focus on process management, we endeavour not only to meet but exceed international quality standards while providing appropriate resources to support and develop our purpose-designed quality system. Our quality policies reflect the importance of meeting our customers’ requirements.

Our management regularly defines and reviews quality goals. Our employees are committed to the company’s management system and to continuously improving not only the system but our entire organisation. Also, each employee is aware of the company vision and strategy and works to maintain a culture of opportunities.

With our suppliers and external partners, we cultivate open communication and focus on performance-based results.
FLSmidth MAAG Gear was founded in 1913 and quickly expanded into an international group that now has almost 100 years of experience in manufacturing gear units. Since introducing the technology of mill gear units to the cement industry with great success in 1966, we have sold over 6000 MAAG™ gear units and 1000 girth gears.

The company
At the FLSmidth MAAG Gear headquarters in Winterthur, Switzerland, more than 100 employees work in development, design, finance, project management, sales, customer service and marketing. Production and assembly takes place in three modern plants equipped with high-performance machines. In Elblag/Poland, Milano/Italy and Bawal/India more than 200 employees manufacture gear units, drive systems and components which satisfy the most demanding quality standards. The company belongs to the successful FLSmidth Group, a listed Danish firm.

Our strength
The combination of unique precision, accuracy and modularized solutions with compact design are leading to high efficiency products and therefore low maintenance cost for the customer. Experience, new technical solutions and the latest manufacturing techniques are regularly incorporated into the production process.

Intensive development and training of our engineers assure best understanding of how to operate a gear unit and lengthen its life cycle.

A constant willingness to innovate, and close collaboration with our customers have helped to ensure that MAAG gear units continue to operate reliably throughout the world under the toughest conditions.

Product range
Today, the product range includes various gear units for mills, complete drive systems, gear solutions for bucket wheel excavators and belt conveyors, as well as maintenance systems for all types of plant. In addition FLSmidth MAAG Gear manufactures components such as bevel sets, girth gears and various replacement parts.

All MAAG gear units are available as standard solutions or are customized to the required needs.
**Innovative technology**

**CPU gear units are specially designed**
The design of the two-stage planetary gear unit guarantees optimum power transmission in the 1'000 to 10'000 kW range. The gearbox comprises two co-axial planetary stages arranged one behind the other. Both stages are spur-toothed planetary gears with fixed ring gear and rotating planet carrier (except CPU-9 ... CPU-17: first stage with fixed planet carrier and rotating ring gear). All bearings are slide bearings. Both stages are provided with its own housing. The internal toothed coupling guarantees reaction-free power transmission from the first planetary stage to the second. More than 440 raw and clinker ball mills around the globe have been operating successfully with CPU central gear drives since 1966.

**MAAG Gear toothed coupling ZCF**
The ZCF toothed coupling installed between the mill and the gearbox is a unique FLSmidth MAAG Gear design combining a high degree of freedom (alignment) with efficient torque transmission. Thermal expansions and mechanical deflections resulting from operating conditions are safely absorbed by the ZCF coupling, and only the torque is transmitted to the mill through a torsion shaft. Upon request a water injection system can be installed. During gearbox maintenance the ZCF coupling remains in place.

**MAAG Gear toothed coupling ZEXF**
The motor to gearbox coupling ZEXF is a toothed coupling specially designed by FLSmidth MAAG Gear. The coupling
has a limited axial displacement and therefore requires an axial bearing on either the motor or gearbox side. The easy disassembly of the coupling spool piece allows the first planetary stage to be displaced towards the motor side for maintenance purposes, allowing the main motor to remain in place during maintenance work. This coupling also provides electrical insulation between the motor and the gearbox.

**Auxiliary drive**
The auxiliary drive is intended to slowly turn the mill for maintenance or for the even cooling down of the mill. The auxiliary drive is equipped with a planetary gearbox and fluid coupling to limit the starting torque and to provide a smooth acceleration. The auxiliary drive is engaged and disengaged by an overrunning clutch between the auxiliary drive and the main motor.

**Lubrication system**
The gearbox is lubricated by an external oil supply unit which is ideally located beneath the mill drive motor. The oil supply unit is standardized so that one size fits several gearbox sizes. The oil supply unit is equipped with the necessary measuring instruments in order to monitor the correct operation of the gearbox lubrication. Top priority is given to operational reliability.
The CPU drive concept

Function
Power input is achieved by the sun pinion of the first stage. In the first and second stage three planet wheels in mesh with the sun pinions transmit the power to the rotating planet carriers. The rotating planet carrier from the first stage is connected by a toothed coupling with the sun pinion of the second stage. The planet carrier from the second stage forms the output flange of the gearbox.

The internal toothed coupling guarantees reaction-free power transmission from the first to the second planetary stage.

Components
High quality materials, used for all parts, ensure a long lifetime.
- Annulus: heat treated steel
- Pinion and planet: alloyed case hardened steel.
- Tooth flanks: ground on precision gear machines, profile and longitudinal modifications.

---

CPU Selection diagram

<table>
<thead>
<tr>
<th>Type</th>
<th>P/n max.</th>
<th>weight</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU-09*</td>
<td>70</td>
<td>20</td>
<td>2350</td>
<td>2000</td>
<td>900</td>
</tr>
<tr>
<td>CPU-11*</td>
<td>88</td>
<td>25</td>
<td>2750</td>
<td>2200</td>
<td>1100</td>
</tr>
<tr>
<td>CPU-14*</td>
<td>111</td>
<td>31</td>
<td>2820</td>
<td>2300</td>
<td>1160</td>
</tr>
<tr>
<td>CPU-17*</td>
<td>146</td>
<td>40</td>
<td>3000</td>
<td>2450</td>
<td>1230</td>
</tr>
<tr>
<td>CPU-22/S</td>
<td>168</td>
<td>44</td>
<td>3130</td>
<td>2700</td>
<td>1200</td>
</tr>
<tr>
<td>CPU-22/B</td>
<td>208</td>
<td>50</td>
<td>3220</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPU-30/S</td>
<td>249</td>
<td>61</td>
<td>3319</td>
<td>3120</td>
<td>1250</td>
</tr>
<tr>
<td>CPU-30/B</td>
<td>289</td>
<td>66</td>
<td>3389</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPU-38/S</td>
<td>328</td>
<td>75</td>
<td>3400</td>
<td>3350</td>
<td>1500</td>
</tr>
<tr>
<td>CPU-38/B</td>
<td>354</td>
<td>80</td>
<td>3440</td>
<td>3350</td>
<td>1500</td>
</tr>
<tr>
<td>CPU-47/S</td>
<td>398</td>
<td>89</td>
<td>3570</td>
<td>3650</td>
<td>1500</td>
</tr>
<tr>
<td>CPU-47/B</td>
<td>438</td>
<td>94</td>
<td>3620</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPU-56</td>
<td>516</td>
<td>108</td>
<td>3760</td>
<td>3880</td>
<td>1600</td>
</tr>
<tr>
<td>CPU-65</td>
<td>617</td>
<td>136</td>
<td>3940</td>
<td>4200</td>
<td>1620</td>
</tr>
<tr>
<td>CPU-74</td>
<td>677</td>
<td>155</td>
<td>4060</td>
<td>4350</td>
<td>1650</td>
</tr>
<tr>
<td>CPU-83</td>
<td>747</td>
<td>175</td>
<td>4260</td>
<td>4700</td>
<td>1670</td>
</tr>
</tbody>
</table>

*first stage with fixed planet carrier and rotating ring gear
Customer benefits

- Customer specific design
- High quality material
- Efficiency exceeding 98.9%
- Extremely compact construction
- Proven design
- High availability and reliability
- Impeccable operation
- Ecological and economical
- Lowest power consumption
- Highly profitable
- Short installation time
- Low-cost maintenance
- Unlimited bearing-life time
- Comprehensive service packages available to guarantee continued customer satisfaction
- Products from the inventor of today’s tooth design
- Unreached life-time

**Design**
The design of the gear unit is optimised to suit the power required, the motor/mill speed and local circumstances. Full account is taken of customer specifications. The MAAG CPU design was copied many times – but never reached in its perfection.

**Quality**
Production and all activities are monitored by the internal quality assurance system in strict compliance with ISO 9001.

**Production**
The latest machines and technical equipment are used in manufacturing.

**Delivery time**
Thanks to continuous monitoring of our production schedule, our clients are provided with the up-to-date status of a project at any time.

**Installation**
The compact design simplifies transport and reduces assembly time.

**Test running**
Gear units are tested and logged in detail on our test bed prior to delivery.

**Spare parts**
Spare parts are available throughout the life of the gear units.

**Customer service**
Customer care by trained and skilled personnel guarantees professional after sales support.

**Monitoring system**
Gear units are equipped with sensors monitoring temperature or vibration.

**Option**
Customized condition monitoring system VIBROWEB XP – ask us for more information about this compact solution.

Overhaul after 37 years of permanent running showed the central drive in a very good condition