

## [ joining forces ]

Our performance spectrum: from specification to serial production

### Specification



**Learning what's needed:** Performance specification and scheduling while taking into account general economical and technological conditions.

### Feasibility study



**Showing our approach:** 3D bid with a dimensional drawing, project schedule and pre-processing of important and/or cost-intensive components.

### Project management



**Keeping all in perspective:** Close coordination with all departments involved and recording the process workflows secures quality, time and costs.

### Design & Prototyping



**From concept to reality:** Design of the drivetrain under FE stress tests as well as design FMEA and documented prototype assembly.

### Testing & Validation



**Proof of theory:** Torque tests, customer-specific stress tests, tests for climate-related influences and noise and vibration tests.

### Industrialization



**Get ready for quantities:** Serial tool manufacturing including filling simulation and 3D scans as well as the FOT phase and selection and certification of suppliers.

### Serial production



**Trust & reliability:** In-house machining of plastics and metals, including SPC production monitoring and product planning software.

### Assembly



**Putting it all together:** Automated machining processes with certified quality controls and intermediate and end-of-line tests allowing for backtracking.

## [ being present ]

Wherever you need us, we're there for you

At our production and development sites around the world, we combine global know-how, developed over generations, with local expertise and innovative ideas.



## In-depth expertise for electromobility

Whether gear technology or drive technology, metal processing or plastic injection molding technology, electronics, mechatronics, sensors or actuators – at Morat Swoboda, you get everything from a single source. We are your reliable and experienced partner and support you from specification to series production. The core business of the joint venture between **Swoboda** and the **Franz Morat Group**, founded in 2018, is the production of drive components for all types of mobile electric mobility applications.

### Franz Morat Group



The Franz Morat Group designs and implements metal and plastic drive ideas – from gears to complete drive systems.

- Sales > € 90 million
- More than 670 employees
- Founding year: 1912
- Manufacturing area: 28,000 m<sup>2</sup>

### swoboda

technologies

Swoboda develops and manufactures high-precision, innovative components and systems for the automotive future.

- Sales > € 450 million
- More than 4,000 employees
- Founding year: 1947
- Manufacturing area: 100,000 m<sup>2</sup>

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# Morat|swoboda

## [ advancing e-mobility ]

Drive solutions for the mobility of the future



# [ generating motion ]



## Electric cars



## E-bikes, cargo bikes, e-scooters



## We bring motion to the streets

### In-depth expertise for electromobility

Customer-specific drive components and systems by Morat Swoboda provide comfort and motion reliably and precisely in all kinds of electric vehicles, no matter whether in electric cars, e-scooters, pedelecs, e-bikes or cargo bikes. The joint venture between Swoboda and the Franz Morat Group, founded in 2018, combines the expertise in gear and drive engineering with know-how in electronics, sensors, mechatronics and actuators.

### From specification to serial production

At Morat Swoboda, you are in good hands. We support you from the creation of the requirements specification through to serial production. You will benefit from decades of experience gained in numerous automotive projects. Project management from start

to finish ensures compliance with the specifications regarding quality, costs and deadlines. During the design and validation phase, our development department relies on cutting-edge tools and the knowledge that our technology specialists have been accumulating for generations.

### Drive solutions for the mobility of the future

Our product range includes geared drive shafts, planetary gears, spur gears and pinions as well as assemblies and technical housing parts that combine the advantages of metal and plastic. We perform all quality-crucial production steps in-house at our newly erected production plant in Nowa Ruda, Poland. This includes turning, hobbing, annealing, grinding, gear cutting and even final quality control.



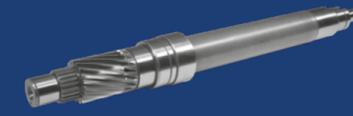
## Drive solutions for the mobility of the future



Worm gear set for the strictest safety requirements and driving comfort with electrical steering systems.



Internal geared plastic wheel for start/stop automation to reduce fuel consumption and CO<sub>2</sub>.



Rotor shaft for electric motors that drives the newest generation of electric vehicles.



Drive shaft for electric scooters with the strictest requirements on smooth operation and quality.



Metal and plastic spur gear stage for e-bike motors to reduce weight and operating noise.



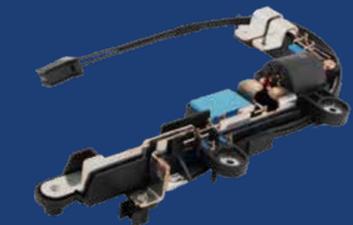
Maximum-precision, high-performance planetary gear for dynamic applications.



Assembly for Electric Power Steering Systems (EPS) as an integral component of driver assistance systems.



Sensor to measure the angular position of the brake, clutch or gas pedal.



High-power assembly to improve the performance of electric motors with the highest requirements for ampacity and EMC protection.



Planetary carrier in cargo bike hub drives with strict requirements on load capacity and durability.



High-performance planetary gearbox for fast rotating BLDC motors in e-scooters.



Wheel hub gears provide drive in electrically powered micro-vehicles in E-axes.