Foodservice Equipment

MULTI PRODUCTS
Company, Inc.
Your Partner. In Motion.

Choosing the Right Gearmotor for Your Application.

Tailor-Engineered Gearmotors For Your Application.

High quality, attention to detail, on-time delivery, and quick lead times have been the pillars of Multi for over 60 years. We are committed to being the partner you can count on.

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1. Where to begin with gearmotors for Foodservice Equipment?

When developing a new product or re-designing an existing piece of equipment, there are always limitations to consider. It is best to find the ideal version of the product in the early stages of design and development. Costs are over 10x lower when making changes to the product design or production process early on in the course of development.

Ultimately, the choice you will make comes down to the type of foodservice application you are working with. Whether you need a motor for a popcorn popper, hot dog roller, pizza turntable, confectionery fryer, conveyor oven, coffee roaster, or something completely different, there are important considerations to keep in mind.

Let's take a look at what you need to know, from conception to production.

A. What kind of motion is required to make it work?

Different types of motors, gearboxes, and accessories are better suited for various types of motion. The type of motion your application requires will dictate the gearmotor design.

- **Linear** – High precision, repeatability, and flexibility are important. This type of motion requires the use of gear racks, cams, or rails.
- **Rotational** – Measured in RPMs, rotary movement will require motion-based mechanisms, using gears, belts, and bearings.
- **Reciprocal** – Similar to linear, this type of motion involves repetitive, short-distance, forward and reverse movement.
- **Oscillating** – Oscillating rotation and motion controls the range of a sweeping angle, using linkages, controls, or encoders.

B. What are the technical requirements?

Now that we have defined the basic requirements of the application, we can determine the hard numbers that will bring us closer to the best gearmotor solution for the application. This step is critical for equipment reliability over many operational cycles. What are the requirements for daily usage?

- **Torque** – The rotational force of the gearmotor. Knowing the maximum torque to optimally move a load helps to determine the best gearmotor requirements for the application. Measured in in-lb. or Nm. Torque increases as gear ratio increases.
- **Speed / RPM** – Will your application operate at low or high speeds? Will those speeds be continuous or variable? Measured in RPMs. Speed decreases as gear ratio increases.
- **Duty Cycle** – Will your application be running continuously or intermittently? How often will it be stopping and starting? Will there be changes in speed or load? Will any changes be uniform, continuous, or sudden? All these factors will need to be considered in your motor choice.
- **Power** – Measured in horsepower or Watts (W). What are the wattage restrictions for input electrical power? Are there any amperage limitations? What is the optimal gearmotor output power for the equipment system? Power increases as gear ratio increases.
- **Voltage** – Will the equipment be driven by AC or DC power? If DC, what voltage will your application need? If AC, what voltage and frequency will the application require (60 Hz, 50 Hz, or 50/60 Hz)?
- **Efficiency** – Consider energy loss resulting from heat, friction, couplings, or bearings being used. How important is efficiency in your application?

C. Location and space considerations

The gearmotor location and space where the gearmotor will be mounted in the equipment are nearly as important as the major technical requirements. This will determine the form factor of the gearmotor and may determine the motor and gearbox design.

- **Mounting Location** – Where will the gearmotor be mounted within the application? How large is the space where it will be installed? A design that works well in the space provided saves time during manufacturing and maintenance installation.
- **Washdown** – Will the equipment be in a washdown area? This is an important consideration in food service equipment, as water spray, humidity, chemicals, and other compromising environments are often a reality. Secondary motor protection may be required.
- **Maintenance** – Do you need to make design considerations that allow for ease of access and maintenance if equipment needs to be serviceable?
- **Environment** – It's best to keep the motion actuation assemblies away from heat, humidity, and other compromising environments to ensure reliable operation.

D. Environmental conditions

Food and beverage equipment often needs to stand up in tough operating conditions. Your application may be contending with challenging environments. Taking these conditions into consideration will help you determine materials and the need for any special orders or treatments. Types and degrees of exposure vary, depending on the piece of equipment the gearmotor is being installed in.

- **High Humidity**
- **Water Spray**
- **Dust**
- **Grease**
- **Dirt**
- **Oils**
- **Extreme Heat**
- **Noise Emission**
- **Excess Vibration**
- **Corrosive Chemicals**

E. Industry regulations

In any industry, there are regulations and regulating bodies that will need to be conformed with. Regulations and standards for food and beverage equipment are especially stringent.

NSF ratings for sanitation safety may require washdown ratings for equipment. Steam jet spray-down presents a danger for electrical and mechanical devices. NSF also may require food sanitation ratings, with materials ratings for food contact, such as food-safe lubrication and hygienic, easy-clean design.

Many foodservice equipment standards are for food and sanitation safety, but NEC, UL, CSA, and ETL are for electrical safety. UL standards include Ingress Protection, electrical safety, and regulatory requirements by the NEC (National Electric Code). CSA establishes Canadian safety and sustainability standards for fire and electric shock risk. Adhering to these regulations ensures the safety of both operators and patrons benefitting from products the equipment produces.

2. Which gearmotors are available to consider?

Now that we have looked over the technical details, we can decide on which gearmotor type is the best fit for the application. Many options are available:

A. DC Motors

1. PMDC Motors

The PMDC (Brushed) motor is the most common DC motor option for foodservice equipment gearmotors. This motor has a simple +/- electrical connection and can be fitted with a controller if speed controllability is needed. Multi offers two PMDC options for gearmotors:

- **Economical** — Cost-effective option. Featuring high starting torque and power density. Best for intermittent duty applications.
- **Precision** — Instrument-grade option. Featuring precision ball bearings, and extended brush life. These motors are suitable for both continuous and intermittent duty.

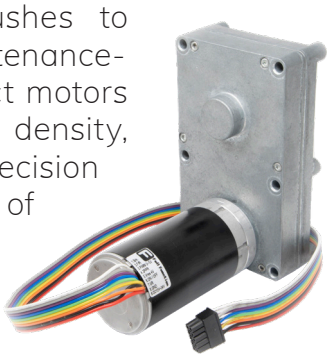
Advantages – Well suited for rugged, high-interval, intermittent duty-cycles, with a high torque-to-inertia ratio. High starting torque for applications that need short bursts of power. Precision motors offer extended life with smooth operation.

Drawbacks – Maintenance needed. With carbon brushes that produce dust, motor lifespan is short and brushes will need replacing. Electromagnetic interference can also be a problem for sensitive electronics. PMDC motors emit more noise than other motor options and are not sealed against dust and moisture.

Applications – Any equipment with intermittent but frequent duty cycles. Food and beverage equipment applications include conveyor toasters, sauce dispensers, coffee roasters, and oil pumps.

2. Brushless DC - BLDC motors

BLDC motors make a great option for retrofits and new designed-in projects. They provide high power density, which is often ideal for food service equipment with compact space requirements. Precision, electronically commutated BLDC motors do not have brushes or common wear parts. Brushless DC motors are quieter, have longer service life, greater power density, and need no maintenance, making them the best option for modernization and new design-in applications. Multi Products offers a single frame size with two integrated driver options and a basic Hall-Effect drive option. Visit https://www.multiproducts.com/custom-motors/custom-brushless-dc-gearmotors/ for more information.



Advantages – Without brushes to replace, they are virtually maintenance-free and quiet. These compact motors boast a long life, high power density, zero EMI emissions, and precision controllability across a range of speeds. With high starting torque and a linear speed-torque curve, they are well suited for either continuous or intermittent duty.

Drawbacks – Rare earth magnets and internal controls makes this a more expensive option upfront. A BLDC motor may make good financial sense in the long run, however, when taking energy savings and service factors into consideration.

Applications – BLDC motors can enable precise and smart control over equipment motion. Applications include conveyor ovens, basket lifters, automated equipment.

3. Stepper Motors

Stepper motors are brushless DC motors that rotate in steps electronically. A relatively inexpensive option, stepper motors offer precise drive control and high torque at low speeds. This often makes stepper motors a great choice for synchronous and high precision operations.

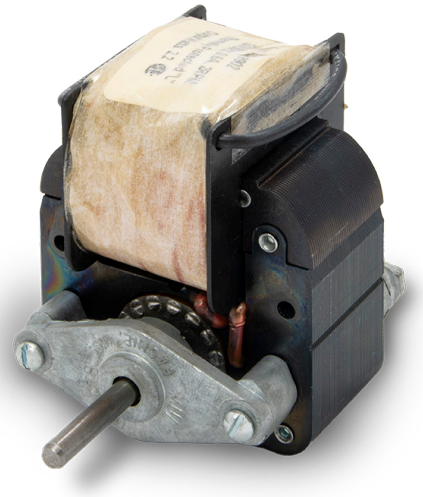
Advantages – They are ideal for applications that require precision speed and position control, due to impressive stopping accuracy and responsiveness.

Drawbacks – Stepper motors have high vibration levels and high heat production, and they do tend to lose a good amount of torque at high speeds.

Applications – Foodservice equipment that needs high precision. Applications can include pancake printers, precise liquid pumps, and automated equipment.

B. AC motors

1. Shaded pole motors



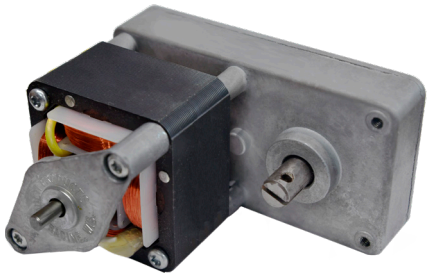
The standard Shaded Pole AC motor is one of the most common single phase AC induction motors. This simple, reliable motor is cheaper in cost, easy to repair, and a solid solution for applications where current draw and motor life are a concern. This type of motor is well suited for constant speed and continuous duty. Running efficiency increases with load, and load variation will not affect speed significantly. You can find more information on our shaded AC gearmotors at https://www.multiproducts.com/custom-motors/custom-ac-gearmotors/

Advantages – Rugged, simple, and dependable gearmotor solution. With no brushes or special parts, these motors are economical and easily produced for high-volume needs. They can be quieter and vibrate less than other options.

Drawbacks – Lower starting torque and relatively low efficiency. They do produce fair amounts of heat, so they are best applied in situations where the load is light or heat can be managed. Shaded pole motors are unidirectional and not reversible.

Applications – Shaded Pole AC gearmotors are the most common option for foodservice equipment due to AC power. Common applications include popcorn poppers, hot dog rollers, confectionary fryers, stirrers, and turntables.

2. Permanent split capacitor (PSC) motors



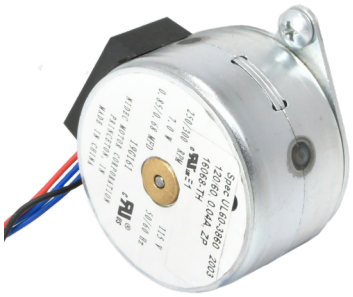
The Permanent Split Capacitor (PSC) motor is an easy to maintain, induction AC motor and produces very little EMI. Similar in construction and operation to a shaded pole, this motor is best in intermittent duty situations that have high torque requirements and moderate electrical efficiency requirements. PSC motors produce uniform torque with a low noise level.

Advantages – The PSC is relatively efficient in comparison to shaded pole AC motors due to its construction. PSC motors produce uniform torque with a low noise level. It is a reversible AC motor.

Drawbacks – When considering using a PSC or synchronous motor, it is important to factor in load for starting torque. These motor options use a capacitor to drive the motor from start until synchronized, so be sure to calculate for the worst-case-scenario voltage and load. PSCs have a low stall torque.

Applications – Foodservice equipment that would be best served by PSC gearmotors are fryer basket lifters, confectionery fryers, and restaurant equipment.

3. Synchronous timing motors



Synchronous timing motors are reversible permanent-split capacitor AC motors, that are similarly constructed to stepper motors. The rotation of the shaft is exactly equal to an integral number of AC cycles. Because of their constant speed, synchronous motors are best used in applications where exact timing is required. Good for continuous or intermittent duty.

Advantages – Consistent speed regardless of torque. Low rotor speed facilitates rapid acceleration, high starting torque, and quiet operation. The synchronous is a reversible AC motor.

Drawbacks – When considering using a synchronous motor, it is important to factor in load for starting torque. These motor options use a capacitor to drive the motor from start until synchronized, so be sure to calculate for the worst-case-scenario voltage and load. Timing motors have a low stall torque.

Applications – Foodservice equipment that would be best served by synchronous gearmotors are vending machines, conveyor toasters, and metering pumps.

C. Gearmotor reducers

A reducer/gearbox regulates speed and torque of the motor. Usually through gearing housed in a case, the motor input speed is reduced and torque is increased. As we have covered, finding the right gearing ratio from input to output is determined by how much speed and torque your application requires, as well as your location and spatial considerations.

1. Standard parallel shaft gear reducers

Manufactured in the USA, standard zinc die-cast gearbox housings designed with industry standard mounting patterns. Gasketed enclosures for environmental protection available. Permanently lubricated with synthetic gear grease, and NSF rated optional for food-safe applications. Hollow, thru-shaft, and dual extension output designs. To see all available designs visit https://www.multiproducts.com/custom-motors/

Multi Products Standard Parallel Shaft Gearboxes

2. Planetary & in-line compact gear reducers

Designed specifically for the Precision and Brushless DC motor lines. Our in-line compact gearboxes are quiet and versatile for equipment that needs a gearmotor with a small form factor.

In-line – Cost-effective and provide engineers with greater flexibility for low-duty applications. Best for when space is at a premium. Low backlash gearing. Low life cycle costs. Stocked solutions are available immediately.

Planetary – Especially efficient, they are suitable for continuous and intermittent operation. The right gearbox allows for a smaller motor, footprint, and increases the economic efficiency of the entire system. Zero gearing backlash. Suitable for servo and positioning applications.

Multi Products Compact Gearmotors

3. What to look for in a supplier.

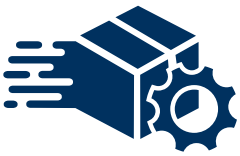
You've decided what kind of motor you need for your foodservice equipment. Now, where should you buy it? Here are some things to think about when selecting your supplier:

- What is this supplier able to provide, overall?
- Will my business improve with these services?
- How healthy is this supplier's business?
- Does this supplier have a proven track record?
- What is the product cost?
- What will the lead time be?
- What sort of experience does this supplier have in my industry?
- Is their engineering team experienced?
- How responsive are they to their customers' needs?
- Do they offer standard and custom solutions?
- How are their logistics solutions?
- Are they able to adapt to changing situations/needs?
- Are they easy to contact?
- Do they have access to the latest technology?

Multi Products Company offers all the advantages of a one-stop supplier...

- Shortened lead time
- Shortened cycle time for finished products
- Local supply sources
- Quality control, with visibility & responsiveness
- Engineering assistance & conception-through-production partnership
- Variety of shipping solutions
- Communication is streamlined. When problems arise, as often happens with custom products, communication loop is smaller and more efficient.
- Turnaround is quicker – manufacturing process starts as soon as you need it to
- Design and production happen in the same place – consolidation means more communication and lower cost.
- Product fit is better, internally within the mechanism and in your application (especially with custom solutions).
- More opportunity for supplier to understand your business and offer solutions.
- Easier to adapt to changing needs, whether due to environment or discoveries in the field.
- Having minimal defects in the manufacturing process reduces waste and increases efficiency within the organization.
- ...and more:



4. Multi Products Company - Your Partner. In Motion.

At Multi Products Company, we strive to be an ideal supplier for your electric motor and gearmotor needs, from conception to production. That's why high quality, attention to detail, on-time delivery, and quick lead times have been the pillars of Multi for over 60 years. As a customer-focused, adaptable supplier, we understand all the stages of the motor supply process and are ready to assist at every turn. We are committed to being the partner you can count on. The next step in finding the best fit for your product is just a consultation away.

- **Customer Hospitality** – We know you have lots of options when it comes to gearmotor solutions. Our goal is to be the gearmotor supplier and strategic supply chain partner you can count on, every time.
- **Tailored Engineering** – We can meet most any sub-fractional gearmotor requirement. Let us match your unique application needs with one of our custom gearmotors.
- **Rapid Response** – Our lead times are 25% shorter than the industry standard, and typically 20% shorter than our competition. Standard lead time is 4-6 weeks, but in urgent situations we act FAST, even within 36-72 hours in special cases.
- **Customized Supplier Relationship** – If a source of high quality gearmotors is all you are looking for, we are happy to supply. However, Multi Products offers more than just motors. As with our gearmotors, you can choose to customize the level of supplier relationship you want with Multi Products. We can be involved at multiple levels in your products, projects, and business model. Some of the services we offer: Design and Engineering, Component Sourcing/Evaluation, Contract Manufacturing, and Warehousing/Logistics support. We will share your plan, vision, and strategy for the growth of your organization.

Contact us for a consultation

OUR SALES TEAM - YOUR PARTNERS. IN MOTION.

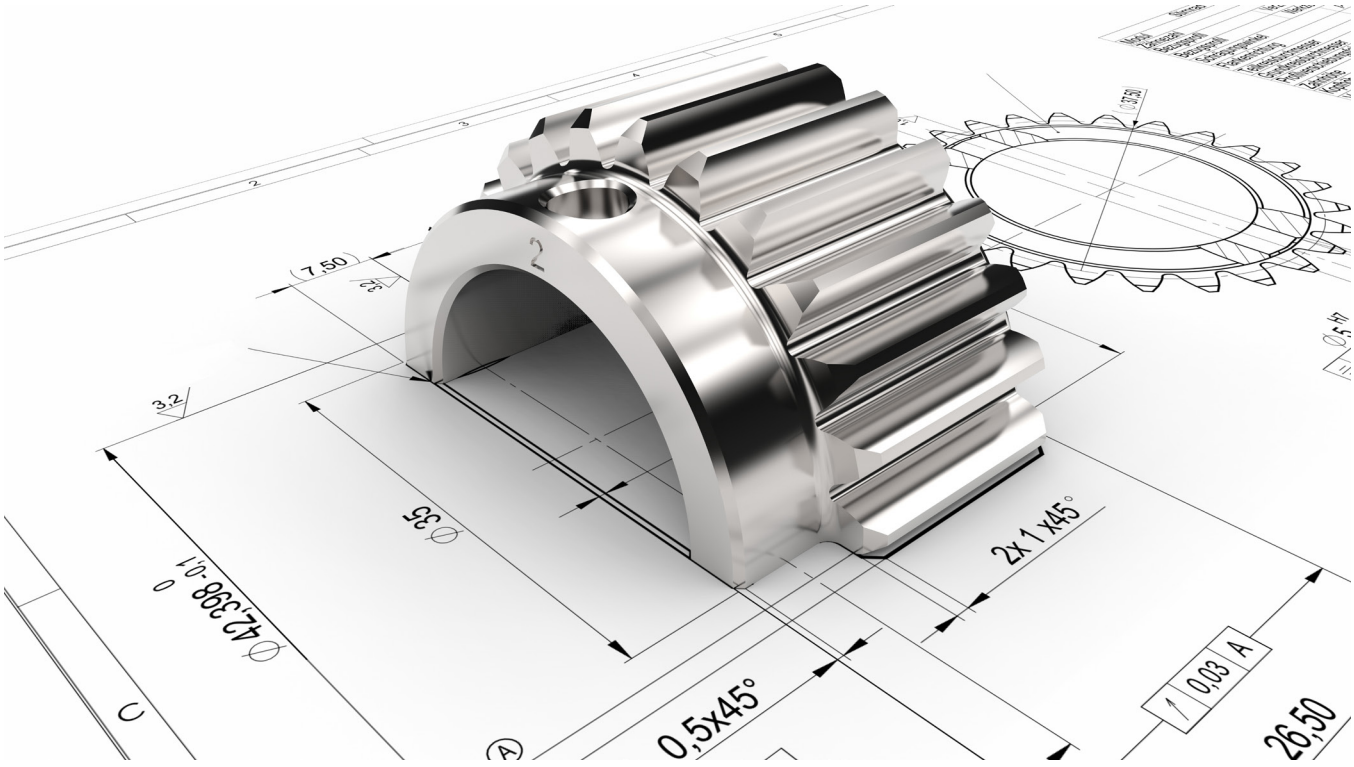
Mark Patzke - President — mpatzke@multiproducts.com (262) 554-3700 ext. 225

Ron Pleuger - VP of Sales and Marketing — rpleuger@multiproducts.com (262) 554-3700 ext. 222

David Blake - Manufacturing Engineer — dblake@multiproducts.com (262) 554-3700 ext. 227

Dennis Rockwell - Engineering Manager — drockwell@multiproducts.com (262) 554-3700 ext. 229

Vincent Patzke - Sales and Marketing Manager — vpatzke@multiproducts.com (262) 554-3700 ext. 231



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5301 21st St.
Racine, WI 53406
Toll Free - (877) 444-1011
Office - (262) 554-3700
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