Baked goods production
Boosting productivity, safety and reliability
How to increase profitability without compromising quality

Changing consumer habits and tastes means bakeries not only need to produce identical, high volume products, but also smaller batches with shorter delivery times. Variable frequency drives (VFDs) and motors now play an even greater role in adjusting production to meet these challenges.

Tackle diverse safety demands...
- Employees must be protected from hazards, from operating mixers to flour dust risks.

...using best-in-class technology
- Remote monitoring protects personnel from potentially dangerous machinery.
- Advanced functions, like safe torque off, make sure operations come to a safe and efficient stop.
- Explosion-proof motor and drive solutions are certified for safe operation in locations with hazardous gases or dust.

“We must always meet food safety regulations.”

Conform to the latest safety standards...
- Processing equipment must meet strict hygiene standards to avoid any risk of contamination and eliminate food safety recalls.

...with solutions that build trust
- Compliance with high ingress protection standards can prevent product/motor failures in hygienic areas where harsh washdowns and chemical are used.
- Solutions offer end-to-end traceability.

Find the big energy users...
- Using ABB Ability™ Smart Sensors for pumps and low voltage motors helps to spot energy saving opportunities with motors running compressors to fans.
- Focusing on proven, baking and cooling can optimize energy consumption and lower costs by up to 60 percent.

... then unlock the saving potential
- Upgrading to high efficiency VFD/motor packages can reduce energy costs from 20 to 60 percent.
- Higher efficiency class motors are among the most efficient available, contributing to further energy reduction.
- Synchronous reluctance motor (SynRM) can reduce losses by up to 40 percent, bringing optimal efficiency and reliability.

“We need to cut our energy bill and reduce emissions.”

—I need to make plant and personnel safety a priority.”
Productivity improvement

Keep production agile…
- Today, demand is for smaller and larger batches, with more variants, and an ever-shorter time to market.
- Changing constant-speed equipment to provide varying production volumes takes time and money.
- Getting access to the right data and turning it into useful information is difficult.

... with flexible motor-driven solutions
- Wide speed variation is possible.
- Production increase is often achieved without any extra investment.
- Safely interlink processes from production to logistics and warehousing, through fieldbus and built-in sensors.

“We need better intelligence on how production lines are performing.”

Locate the right information…
- Manually extracting plant data is time-consuming and often inaccurate.

... through digital solutions
- Multiple inputs and outputs (I/Os) allow a variety of process information to flow from the VFD to the motor control.
- Fieldbus technology enables process equipment to integrate with plant control systems, giving greater intelligence and better control of production.

Whether you prefer to use your smart device or stand in front of a control panel to get the information you need, a variety of interfaces let you operate your application easily and support the effective analysis of your processes.

Operation and maintenance

Lower operational overheads…
- Operational costs must be controlled without compromising plant or personnel safety, or end product quality.

... through advanced maintenance regimes
- Soft starting avoids sudden shock loading, leading to less wear and tear on gears, belts and the driven machine.
- ABB Ability™ Condition Monitoring services deliver accurate, real-time information about drive and motor events to ensure equipment is available, reliable and maintainable.
- ABB’s global service network and preventive maintenance contracts relieve pressure on in-house teams and increase speed of response to critical issues.

“We need the most reliable products and systems to avoid unplanned shutdowns.”

Eliminate production risks …
- Plant shutdowns are costly, resulting in lost production time, spoiled goods and reputation damage.

... by utilizing smart functionality
- Temperature, load, under/overvoltage protection and warning features within drives help anticipate breakdowns.
- A real-time clock allows timed tracing of faults, so you know what happened and when.
- Stainless steel motors last five times longer than standard motors in washdown environments.
- Robust motors and mechanical power transmission products feature a best-in-class sealing system.
- Soft starters increase reliability in constant speed applications.

“How can I control rising costs?”

“Our production must adapt quickly to meet evolving customer tastes.”
Controlling the details boosts productivity

Every stage of baked goods production can be fine-tuned to improve productivity, lower energy consumption and enhance safety.

1. **DOUGH MIXING**
   Avoid damage to ingredients and ensure personnel safety
   
   **Applications:**
   - Bowl or screw mixers
   - Dosing pumps
   - Belt or screw conveyors
   
   **Benefits**
   - Precise speed/torque control brings consistent mixing and accurate dosing, leading to perfect product texture.
   - Built-in safe torque off protects personnel operating machinery.

2. **DOUGH FORMING**
   Precise product transfer reduces waste and improves quality
   
   **Applications:**
   - Belt conveyors
   - Rollers and extruders
   - Stamping and cutting machines
   
   **Benefits**
   - Swift and repeatable movement between stamping, cutting and shaping leads to consistent quality products and less waste.

3. **DOUGH PROVING**
   Obtain perfect product texture with precision temperature control
   
   **Applications:**
   - Belt conveyors
   - Convection fans
   
   **Benefits**
   - Controlling air temperature, humidity and flow through fan control improves the texture, quality and consistency of products passing through the prover and oven.

4. **BAKING**
   Gain control over the ovens - the biggest energy consumer
   
   **Applications:**
   - Belt conveyors
   - Convection fans
   
   **Benefits**
   - VFD fan control efficiently circulates air flow to regulate temperature and moisture, leading to shorter baking times. This results in less oven use and typically 20 to 60 percent energy saving.
   - SynRM motor/drive package able to withstand very high ambients while providing reliable and efficient operation.
PACKAGING
Products are rapidly transported using synchronized conveyors

Applications:
- Belt and spiral conveyors
- Feeders
- Seaming and closing machines

Benefits
- Long spiral conveyors and speed-controlled belt conveyors in packaging areas have their speeds coordinated using VFDs and motors. This creates a smooth, seamless transfer of products between stations.

FREEZING AND COOLING
Increase the energy efficiency of compressors and improve conveyor control

Applications:
- Belt, screw and spiral conveyors
- Refrigeration compressors
- Water pumps
- Fans
- Cooling towers

Benefits
- Replacing throttle valve pump control with VFDs and motors ensures correct compressor speed, saving up to 60 percent energy costs, while ensuring the correct cooling temperature.
- Cooling towers benefit from longer uptime, lower maintenance costs and greater throughput.
- Soft starters are available for those machines with a high starting current, running constantly at full speed.
Unlock the potential in your applications

Across all motor-driven applications the use of variable frequency drives and high efficiency motors brings three consistent benefits: energy saving, improved productivity and greater safety.

**Energy saving**
A variable frequency drive (VFD) saves between 20 to 60 percent in energy costs compared to a throttled control system. Depending on application power and speed range, users can choose between an induction motor or a synchronous reluctance motor (SynRM) to save the greatest amount of energy. Meanwhile, using VFDs for compressor speed control delivers constant pressure, thereby saving energy and reducing pipe leaks.

**Improved productivity**
Directly controlling cooling water temperature through PID control yields product quality benefits as temperature spikes are avoided. Using direct drive motor technology with cooling towers, makes for easier maintenance as the gearbox, bearings couplings and shafts are no longer required. Soft starters result in up to 60 percent reduced stress and improved reliability. For conveyors, best-in-class bearing sealing system and robust motors and VFDs brings lower maintenance and increased process uptime.

**Better food and personnel safety**
Paint free motors avoid paint flakes contaminating ingredients. Stainless steel washdown motors and gearboxes and Ultra Kleen bearings, meet stringent hygiene standards and conform to IP69 ingress protection. VFD safe torque off removes risks to staff working with high torque machines. ABB Ability™ Smart Sensors for motors, bearings and pumps enable remote monitoring of performance, thereby removing the need for personnel to interface with potentially live machinery.

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<th>Feature</th>
<th>Benefit</th>
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| **Chiller / compressor** | - Built-in harmonic mitigation  
- Fewer and smoother starts  
- Highly efficient motor and drive package  
- Clean power network avoids Utility penalties  
- Reduces maintenance costs  
- Saves energy and money  |
| **Cooling towers** | - Eliminate gearbox, cooling system, driveshaft, couplings and bearings  
- Reduces maintenance costs  
- Improves reliability  
- Lowers system noise  |
| **Conveyors** | - High precision control and repeatability  
- Soft starts via VFD  
- Reliable hygienic design in stainless motors, gearboxes and bearing  
- Move baked goods uniformly and synchronize with other conveyors e.g., for the oven ensuring goods arrive in tact and on time  
- Reduces operational costs by eliminating high peak starting loads  
- Avoids drivetrain damage  
- Improves food safety and process reliability  
- Minimizes maintenance, cleaning and equipment replacement  |
| **Mixers** | - Variable speed offers variety of mixing options together with efficient motors  
- Precise speed and torque control  
- Increases range of baked goods  
- Improves health and safety  
- Thorough mixing leads to correct dough texture  |
| **Pumps** | - Dedicated software detects foam build up inside pipes  
- Avoids cavitation, leading to improved end-product quality  |
| **Fans, provers, ovens** | - Replaces mechanical damper  
- Precise oven fan temperature  
- Improves performance and loading  
- Avoids motor oversizing  
- Reduces baking times  |
01 Programmable drives: Program your dough recipe’s speed and torque requirements to safeguard ingredients for a consistent dough texture.

02 Maximize process uptime: Drives play a major role in enhancing the performance of the forming, rolling, stamping, seeding and setting stages.

03 Precise speed control: Each conveyor speed can be adjusted separately and synchronized to each other to make the conveying process seamless.
Features and functions that benefit bakeries

Drives, soft starters, motors, gearing and mounted bearings all play a vital part in keeping your production moving. Choosing the right feature for the right environment is essential in ensuring an optimized production.

Variable frequency drives

Energy efficiency
- Monitors indicate cost of energy in local currency, kWh and CO₂ emissions that help control operating costs.

Reduced noise
- Reduce motor noise of a machine by adaptive switching frequency control thereby protecting staff health and safety.

Low harmonics
- Built-in active supply unit and integrated low harmonic line filter eliminates supply disturbances that could trip production.

Fieldbus compatible
- Information as diverse as oven temperature to dough recipe in mixers can be fed to the VFD to adjust motor speed and torque. Through fieldbus comms, the VFD can talk with plant monitoring systems to provide detailed insight into productivity performance and quality control.

Functional safety
- Safe torque off (SIL3) brings applications, like mixers, to a safe stop.

Repeatability
- Conveyor speed can be constantly adjusted to ensure a consistent and repeatable flow of baked goods at each step of the process.

Softstarters

Built-in bypass
- At full speed, bypass is activated thereby reducing heat generation from internal losses. Bypass reduces system complexity and size, saving time and money during installation.

Harsh environment use
- IP66 keypad and softstarter’s coated electronics provides ultimate protection in dusty or wet environments, ensuring uninterrupted production.

Flexible communication
- All major communication protocols, including built-in Modbus-RTU, enabling operation in local and remote control.
NEMA & IEC motors

Dry zone
• Easy to clean and install.

Dust ignition protection
• Aluminum/ cast-iron for explosive dust areas.

Higher efficiency
• NEMA Premium and IEC higher efficiency class motors offering the lowest total cost of ownership.

Hot temperatures
• Cast iron/ aluminium, coated with a multilayer epoxy surface treatment to operate up to 194°F with 100 percent humidity.

Washdown/Hygienic area
• A complete line of IP69 Foodsafe stainless steel encapsulated motors in NEMA or IEC designs. Hygienic designs ensure our motors can withstand high pressure cleaning for increased reliability.

Drive and motor packages

Synchronous reluctance motor (SynRM) and drive
• Synchronous reluctance motor and drive package helps save energy on processes across the bakery. In addition, these motors are able to withstand very high ambient temperatures up to 120° C / 248° F.

Cooling tower packages
• An integrated solution that removes the gearbox and driveshaft from cooling towers reduces energy use, vibration, noise and maintenance costs.

ATEX compliant drives and motors packages
• Tested and certified motors and drives for potentially explosive atmospheres, which provides people and plant safety according to global regulations.

Gearings and bearings

Grip Tight ball bearings
• Suitable for fans, the bearing locks to the shaft concentrically and, through the entire bearing bore, minimizes vibration.

E-Z Kleen coated insert ball bearings
• Ideal for bakeries, the bearing has either a stainless steel or reinforced polymer housing with a corrosion resistant, coated insert.
• Factory-filled with food grade grease, the bearings are designed to provide extended life in harsh washdown conditions.

Ultra Kleen stainless steel insert ball bearings
• Bearings feature a 100 percent stainless steel insert and are factory-filled with food grade grease.
• A patented sealing system creates four areas of protection to keep contaminants out and grease in.
From the factory floor to the cloud and beyond

ABB Ability™ Condition Monitoring for powertrains optimizes the performance and efficiency of rotating equipment. It enables full transparency on all parameters for drives, motors, mounted bearings and pumps.

Intelligent powertrain
The powertrain is equipped with sensors and cloud connectivity and can consist of motors, drives and mechanical components including bearings, couplings, gearboxes, and pumps.

Turning data into valuable information
ABB Ability™ enables you to monitor both onsite and remote assets and collect data from the VFD’s built-in sensors and data loggers, as well as from smart sensors fitted to motors, bearings, and pumps. This data can be used to evaluate efficiency of operation as well as diagnose conditions to ensure appropriate decisions are made.
Accessing data for analytics
Detailed information can be extracted into a company’s own portal and systems page. Dashboards give full transparency so that you can take actions that lead to less downtime, extended equipment life, lower costs, safer operations and increased profitability.

Gain a digital advantage
Ensuring that the right person is provided the right information at the right time brings:
• Appropriate response to production challenges, minimizing operating costs and product waste.
• Greater insight into various aspects of the bakery process improves quality and reduces variations, errors and waste.
• Lower risk of production failure.
• Change maintenance from reactive to predictive.
Keep production running

From spare parts and technical support to cloud-based remote monitoring solutions, ABB offers the most extensive service offering to fit your needs. ABB and its local partners form a service network at your doorstep and help you to maximize performance and ensure uptime and efficiency throughout the life cycle of your assets.

Even before you purchase a drive, motor, bearing, or softstarter, ABB’s experts are on hand to offer technical advice from dimensioning through to potential energy saving solutions.

When you’ve decided on the right product, ABB and its partners can help with installation and commissioning. They are also on hand to support you throughout the operations and maintenance phases of the products life cycle, providing preventive maintenance programs tailored to your bakeries’ needs.

ABB will ensure you are aware of any upgrades or retrofit opportunities. By registering your drives and motors with us, our engineers will proactively contact you and advise on your most effective option.

All of which helps maximize performance, uptime and efficiency throughout the lifetime of your powertrain.
Agreements
Comprehensive bundling of relevant services into one contract to suit your needs.

Advanced services
Gain the unique ABB Ability™ digital advantage through data collection and analytics with advanced services.

Extensions, upgrades & retrofits
Up-to-date systems and devices with the best possible performance level.

Technical support & repairs
Quick and accurate response during emergencies and efficient support during planned production breaks.

Spares & consumables
Authentic, high-quality ABB spares and consumables with quick delivery.

Installation & commissioning
Highly-trained and reliable installation and commissioning experts at your service.

Engineering & consulting
Resources who can provide ways to identify and improve the reliability, usability, maintainability and safety of your production processes.

Training
Comprehensive and professional training either at ABB or your site.

Global service network 24/7

“I need operational excellence, rapid response, improved performance and life cycle management.”
With you, wherever you are in the world

Partnering with ABB gives you access to some of the world’s most innovative technology and thinking.

**Global reach**
ABB operates in over 100 countries with its own manufacturing, logistics and sales operations together with a wide network of local channel partners that can quickly respond to your needs. Stock availability is good, with short delivery times for many products backed by 24-hour spare parts delivery.

In addition, we work closely with baked goods producers to develop custom products, services and solutions to help standardize processes across multiple sites and streamline your supply chain.

We have seven global R&D centers with more than 8,000 technologists and invest $1.5 billion annually on innovation.

**End-to-end product portfolio**
Alongside its variable frequency drives, motors, soft starters, bearings and couplings, ABB’s automation offering includes a wide range of scalable PLCs, a selection of HMIs, instrumentation and robotics. With functional safety options, from built-in safe torque off to safety PLCs, you can readily implement safety requirements.
ABB’s offering includes:

- **End-to-end power and automation solutions**, from power distribution, raw material receipt, to process and machine control to end of line packaging
- **Power protection and power quality solutions** to safeguard equipment and processes
- Industry leading **robotic automation solutions** that improve your speed-to-market, provide flexibility and simplify packaging
- A complete range of **protection, connection and wire management solutions** that withstand harsh environments and extreme temperature swings, and provide the reliability needed for continuous operations

**Streamline sourcing**

ABB’s end-to-end product and services portfolio streamlines your sourcing and purchasing activities and standardizes production across multiple sites, saving you money on spare part inventories while reducing maintenance costs.