

# Mixers

## Key Business Issues:

- Mixer Torque control
- Energy – kW/kg feedback per mix
- Dough consistency and repeatability
- Variable time mix
- Recipe control

## Equipment Used:

- Variable speed drive
- Modular PLC enables easy connectivity
- HMI visualisation and adjustment of mix
- Q-Safety integrated into the controller



*Control of mixer speeds and energy directly relates to the dough structure properties.*

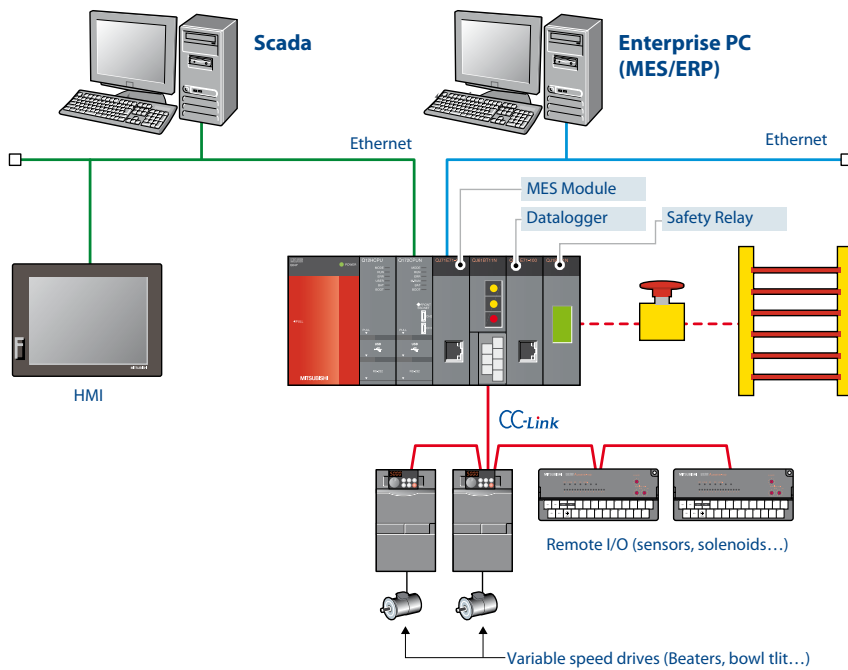
## Improving dough quality

Mixing of the dough is probably the most important event in the bakery, it is where the creative process begins, and is where the quality of the final product is significantly affected by the mixing methodology. Control of mixer speeds and energy directly relates to the dough structure properties.

Utilising Mitsubishi's advanced variable speed drives has had proven results in improving the quality of the dough from the mixer. Energy during the mixing process can be continuously monitored and fed back into the efficiency and quality metrics.

Recipe and batch control are used for reproducing consistent mixes. Accurate weighing and ingredient management are vital to repeatable product quality. Information such as mix time, energy used and time under vacuum (for Campden Process applications) are recorded as part of Mitsubishi's overall equipment effectiveness (OEE) reporting. Track and Trace techniques can also be applied at this stage to provide each batch with a unique ID which can be transferred to the downstream parts of production as it moves through the process.

The control system needs to be able to manage the above requirements whilst maintaining the flexibility of batch size and other adjustments of the mix. Mitsubishi's Human Machine Interface (HMI) and visualisation technologies allow local operator feedback and fine tune adjustment when needed.



Typical control hierarchy for mixer applications



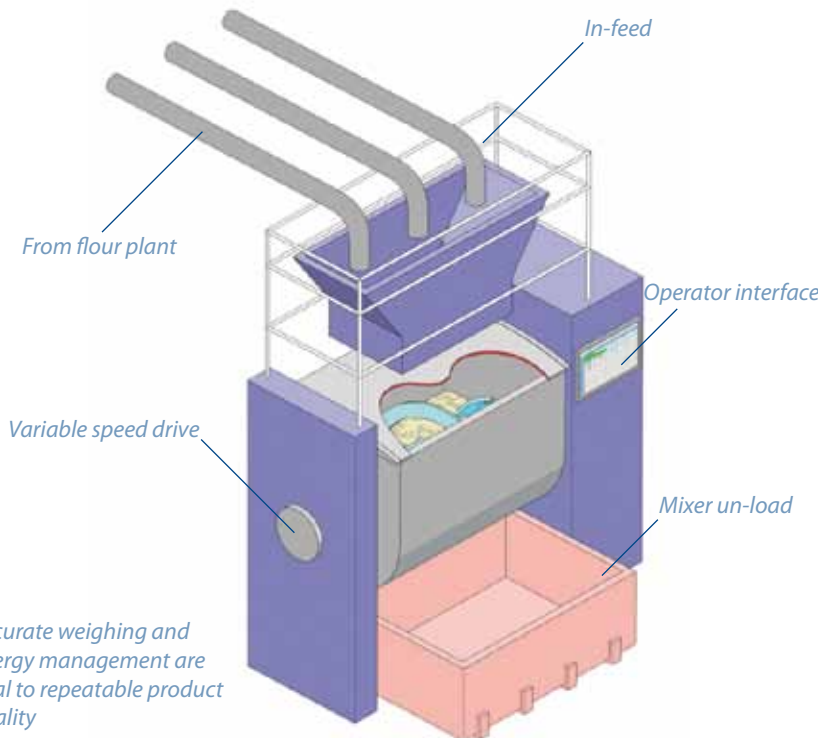
Dough mixing and handling are the critical processes for product quality. Good monitoring and management can also lead to significant energy savings

## Monitor energy usage

The profile of the mix is managed through the control system enabling it to be synchronised into the rest of the production process. It is often important to be able to delay the mix or hold it in a low speed mode before the unload, this requires energy monitoring so the dough is not over mixed and discarded as waste.

Due to the nature of the process, safety systems need to be integrated into the overall control strategy. This can be done by using Mitsubishi's innovative safety solutions.

Applications have included CC-Link and other open networks that form the basis of the main I/O control strategy as well as allowing direct control and monitoring of the motor drives. This has enabled energy usage to be easily monitored across the plant.



Accurate weighing and energy management are vital to repeatable product quality

### Mitsubishi Automation System Solutions:

- Accurate repeatability of the mix recipe
- Control of energy input to the mix via variable speed drives
- Profiling of the mix
- Waste reduction
- Reliable manufacturing