

# Batch plant modernisation

*Batch plants require repair and modernisation. Douglas D Burgoon\* offers advice.*

**B**atch plants are modernised to accommodate glass production increases and/or product quality improvements. It is easier to modify a batch plant at furnace rebuild time, but they can be modernised during a campaign without interrupting production. They can be repaired during a campaign, but it requires more planning and effort.

A scope of work for batch plant cold repair should be developed alongside that for furnace rebuilding. Some important considerations are as follows:

## General

- Clean raw material silos
- Replace dust skirts/vent bags
- Replace dust collector bags
- Rebuild gear-boxes for mechanical equipment
- Rebuild/rewind motors for mechanical equipment
- Replace all cullet chutes and diverters
- Replace compressed air components.

## Bucket elevators

- Replace:
- Gear boxes, shafts, bearing/seals, and pulleys
  - Belts and splices
  - Buckets.

## Conveyors

- Replace:
- Gear-box, shafts, bearings, seals and pulleys

- Idlers
- Belts and splices.

## Turnhead

- Replace:
- Rotor bearing
  - Swivel chute
  - Plunger seal.

## Feeders

- For screw type, replace gear-box and bearing/seals
- For vibratory type, replace feeder liners and re-tune feeders.

## Cullet crusher

- Replace:
- Jaw plates, rotary drums or impact bars
  - Wear plates
  - Drive belts.

## Mixer

- Replace:
- Bottom and side liners
  - Plows and paddles
  - Wall scrapers
  - Gear-box and drive belts.

## Pneumatics

- Have pressure vessels recertified as safe pressure vessels
- Replace pneumatic valves and associated filter regulator units
- Reline or replace elbows and spool pieces.

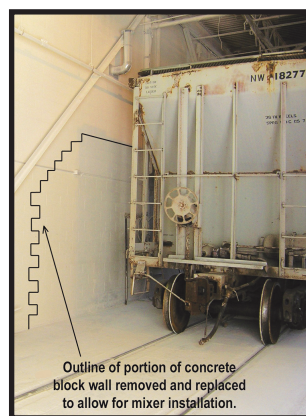
## Control system

- Check all limit switches and sensors
- Recalibrate all scales and check scale repeatability
- Evaluate repair versus new control system.

## Special considerations

### The mixer

Where a furnace is rebuilt with greater melting capacity, it needs more mixed batch. If the batch plant must operate more than 16 hours



▲ Fig 1A. Building modifications to install a new mixer in the batch plant.

per day, it needs more capacity and this usually starts with a bigger mixer.

Mixer replacement requires planning. The major problem is getting the mixer inside the batch plant and into position (see **Figs 1A** and **1B**).

## Modernise scales

Consider replacing mechanical scales with a modern load cell-digital electronic type. Typical scale sensitivity is in the 1:1000 graduation range; for example, 1000 lbs. by 1 lb., 2000 lbs. by 2 lbs., etc. This can be increased up to 1:10,000 graduations; for example, 1000 lbs. by 0.1 lbs., 2000 lbs. by 0.2 lbs., etc but needs the resolution of the weigh feeders to be examined and revised.

Maximising scale performance is very important. TECO recently replaced a three-furnace batch plant with a new one with sensitive electronic load cell scales. **Fig 2** shows the glass density variation for each furnace 30 days before batch plant switchover and 30 days after start up. Tighter control of glass density increased product pack efficiency.

## Automatic micro ingredient weighing

Eliminate manual premixing of microingredients with a



▲ Fig 1B. New 4 cubic yard mixer replacing 3 cubic yard unit.

diluent. Today, the colourant ingredients can be automatically handled and controlled and automatic scales can work satisfactorily as low as 10 lb. by 0.001 lb. range. (See **Fig 3**.)

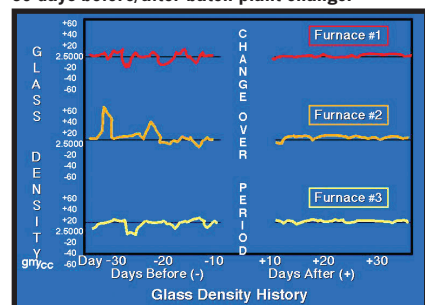
## Total weight check scale

A total weight check scale pays for itself, many times, if it prevents just one off-tolerance batch from getting into the furnace. Check scales can be added to the weighed batch surge hopper, the mixer or the mixed batch surge hopper in that order of preference. The support structure for the hopper or mixer must be altered so the installation is free of erroneous forces. Load cells can be successfully added to pneumatic transporters or blender/transporters with careful installation of the pneumatic piping and electrical conduit. TECO has installed check scales on mixers and pneumatic vessels with repeatability of  $\pm 2$  lbs. (See **Fig 4**.)

## Control system

Evaluate replacing the control panel with a modern one. Control systems usually last 5-10 years, after which spare parts availability gets to be a problem. Also, a new control system will have new software with automatic weighing algorithms. The TECO system contains special algorithms to minimise feeder jogging.

▼ Fig 2. Glass density history 30 days before and 30 days before/after batch plant change.



# Batch PLANT

## Process alterations during production

Batch plant modification done while maintaining production requires thorough planning to assure continuous mixed batch delivery. Some useful practices in this regard are:

### ■ Spare storage:

Use a spare silo, or portable storage such as super sacks, rail hopper car, etc to store mixed batch.

### ■ Electrical switchover:

It is best if control system changes are made during furnace rebuild time. If that is not possible, a switching network must be installed. Every input and output must be switched to allow the existing control system to function while the new control sys-

tem is debugged. TECO switched over a five-furnace control system while the glass plant maintained normal production.

### ■ Storage capacity increase:

A batch plant should be designed to accommodate additional raw materials storage in a simple, easy manner. It should be predetermined where the additional silos will be located and how these new raw materials will be weighed and mixed. The original design must provide extra positions on the raw material distributor.

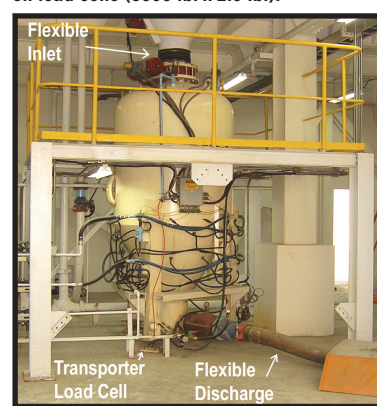


► Fig 3. Automatic micro scale system (20 lb. x .002 lb.).

## Additional furnaces:

Make basic plans for future production requirements, such as number of furnaces and types of glass produced. The aim is to establish the ultimate number of mixed batch delivery loops that will be required. The diverting and delivery equipment need not be installed, just the space provisions for the future.

▼ Fig 4. Blender/Transporter check scale on load cells (5000 lb. x 2.0 lb.).



## Conclusion

Batch plant upgrading should be a basic part of every furnace rebuild programme and can be done during a campaign. Including provisions to accommodate future batch system requirements can minimise future construction work and complications.

TECO has the experience and wherewithal to be of assistance in planning batch plant modernisation programmes. It has designed and built 16 new batch plants and modernised 65 over the past 35 years.



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