Tortilla Processing Parameters

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Dough Mixing

- Order of loading is important
- Need proper gluten development
- Need to control dough temperature

Dough Transfer

- Dough pump- More than 8 feet? (2.5 meters)
- Trough hoist/dump
- Dough chunker
- Hand transfer

Divider/Rounder-Function

- Used for hot-press and hand-stretch processes
- Die cut line does NOT use
- Controls raw weights
- Controls production line speed

Divider/Rounder-Controls

- Uniform rounding is critical!
- Avoid doubles
- Avoid foreign material
- Care of equipment
- Safety of operator

Types of Divider/rounders

Piston, sleeve, and drum design

Discharge

Types of Divider/rounders

Extruder divider

Overview

Rounder bars

Types of Divider/rounders

Press divider/rounder

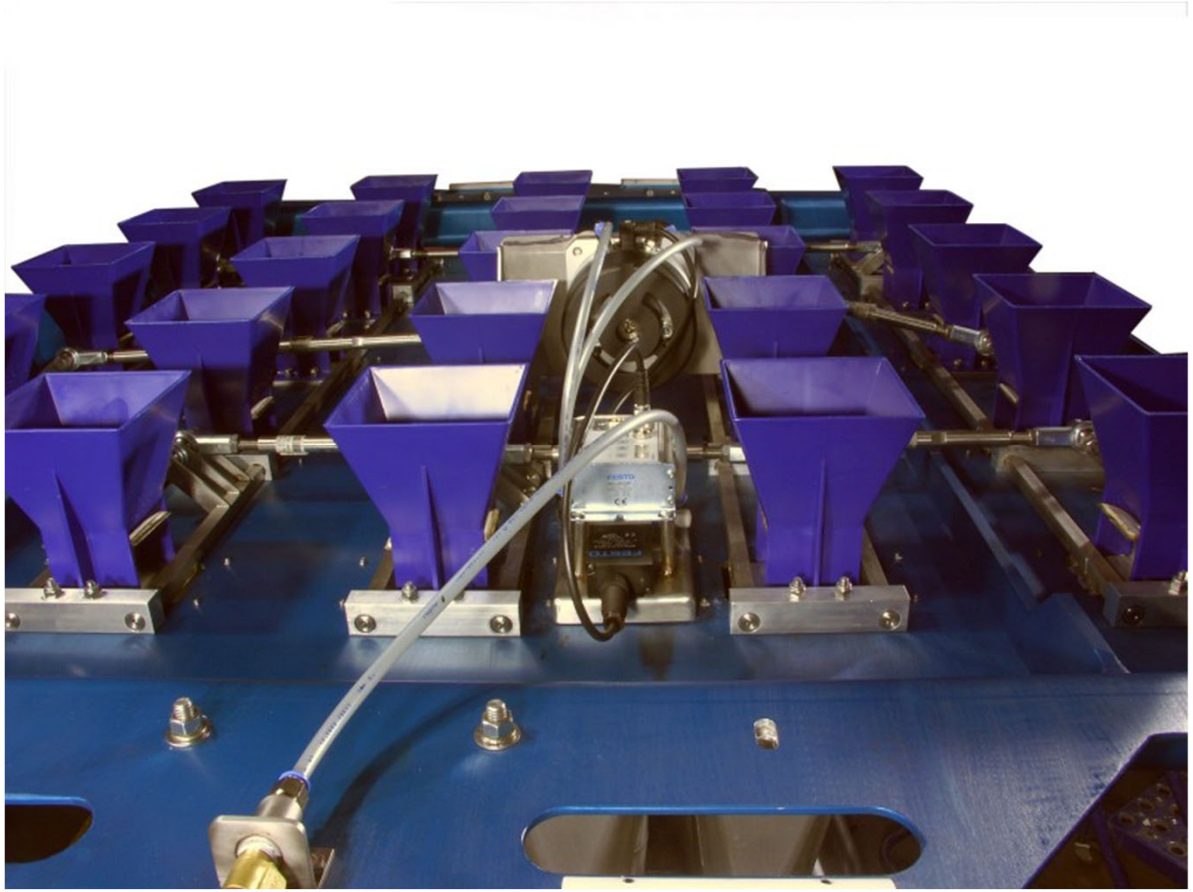
- Divide large piece of dough by hand (example 4 pounds or 1816 grams)
- Flatten as a pizza to diameter of press, and assure the thickness is uniform
- Place in press- divide and round
- Take out 36 pieces per press (example each should weigh 1.78 ounces or 50.44 grams)

Proofing

- Defined as rest time between rounding and pressing (hot press line) or sheeting (hand stretch process)
- Proofing allows more uniform shaping due to reduced dough elasticity
- Need to control time, temperature, and relative humidity of proofing
- Problems if you do not
- Trend to reduce proofing time

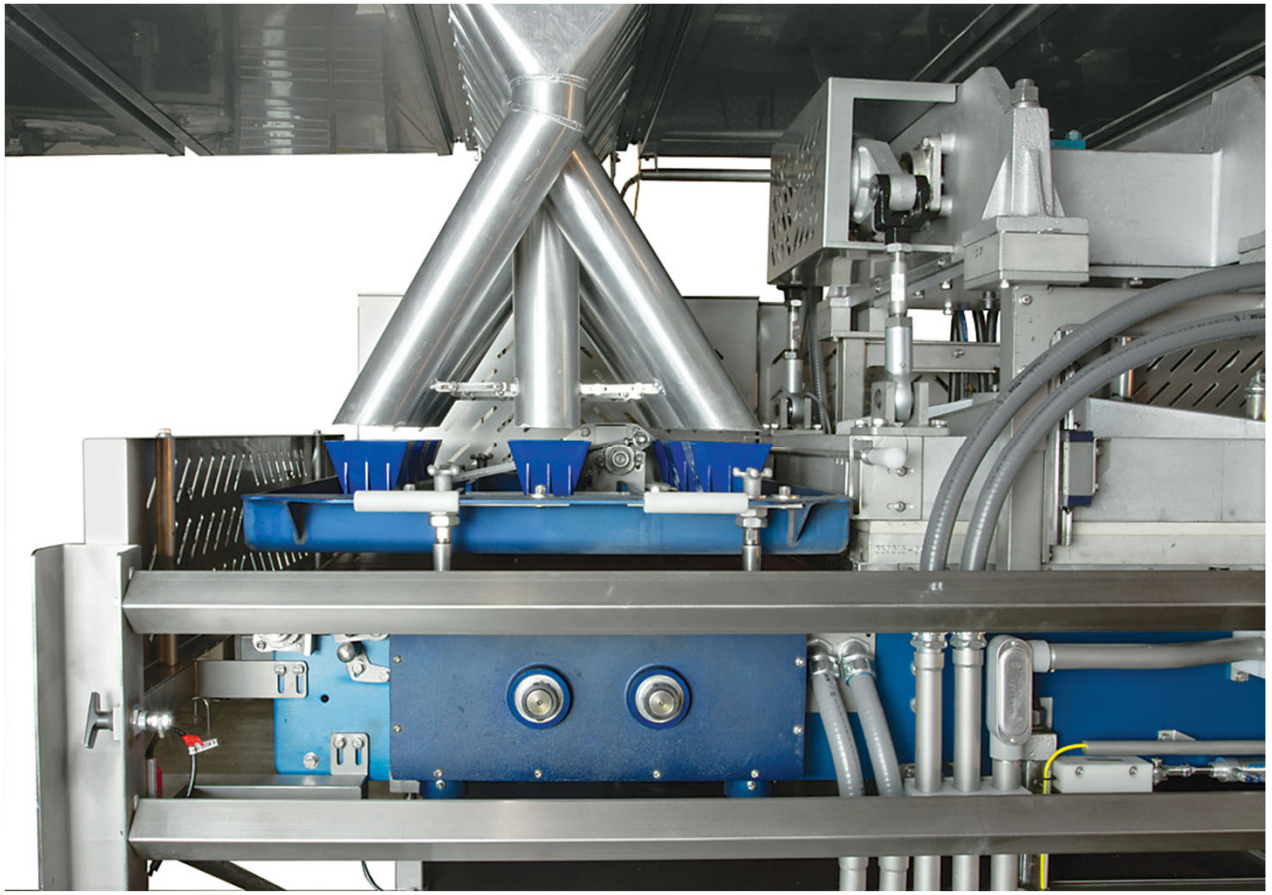
Equipment for Proofing

Press Infeed



Drop Chutes

Cold press to Hot press



Controls at Press- part 1

- Timing of drops (program and proofing conditions)/placement of dough pieces
- Configuration of chutes
- Condition of Teflon belts
- Even-ness of platens
- Even-ness of temperature across platens

Controls at Press- part 2

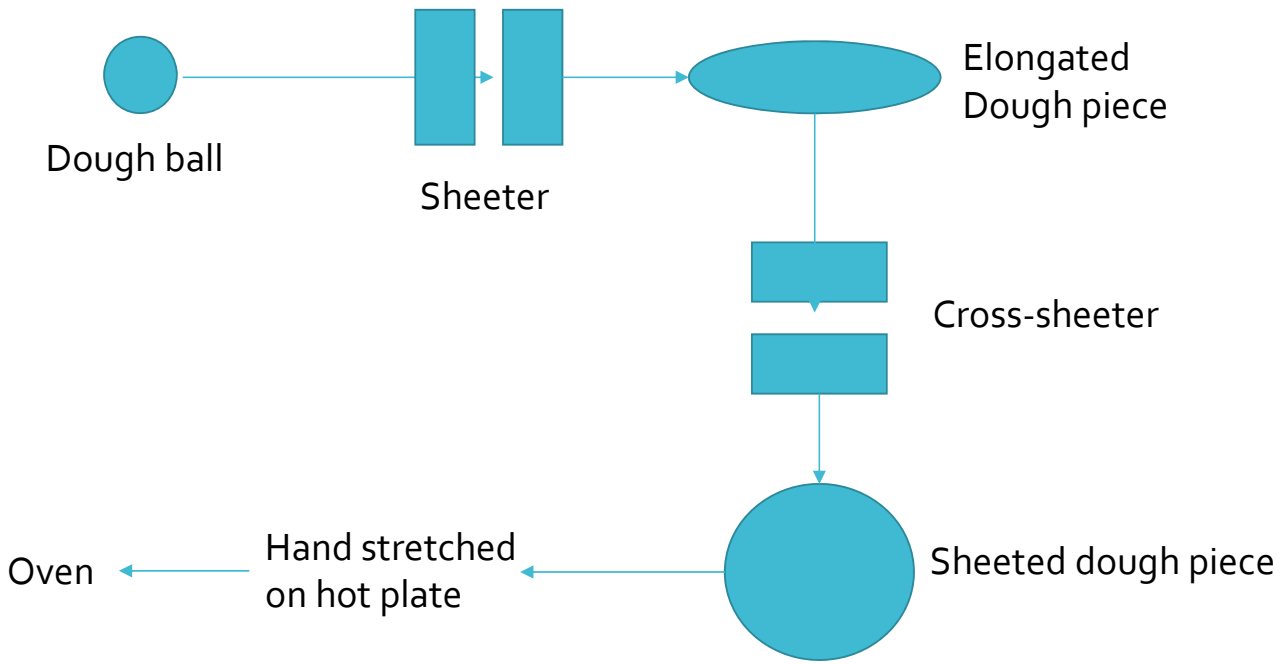
- Press pressure (600 to 1400 psi)
- Top and bottom press temperature: (375 to 425 F or 191 to 218 C)
- Press dwell time (0.8 to 1.3 seconds)
- Quality of transfer to oven
- Is it the machine or the dough?

Press Discharge/ Oven Infeed

End of makeup process

Hand Stretch Line

- After Divider, rounder, and proofer



Controls on Hand Stretch

- Amount of dusting flour
- Roundness of dough less critical
- Speed and gap between sheeting rollers
- Even-ness of gap between sheeting rollers
- Temperature of hot plate
- Skill of stretchers
- Method of feeding oven

Die Cut Line

How a Die Cut Line Works

- Dough is NOT divided and rounded
- The large dough is sheeted little by little to arrive at a desired thickness
- A rotating die will work like a cookie cutter to cut the desired shape of the tortillas.
- The trim is returned to the dough hopper
- There will be trim on the sides as well as between the die cuts

Die Cut Line Controls- 1

- Speed of dough belt
- Amount of dusting flour/dough consistency
- Speed and gap between sheeting rollers
- Even-ness of gap between sheeting rollers

Die Cut Line Controls- 2

- Gradual reduction of dough thickness (50%/pass)
- Use of cross rollers?
- Use of relaxation belt? 
- Condition of dies
- Amount of trim/handling of trim

Good Control of Makeup Process

- Consistent diameter tortillas
- Consistent weight of tortillas
- Even spacing in oven/oven is full
- May wish to adjust mixing time and temperature to gain improved performance in makeup
- Sufficient process tolerance

Press Discharge/ Oven Infeed

Ovens used in the tortilla industry

- Direct-fired
- 3 passes (tortilla bakes on one side twice)
- Baking surfaces- slat metal and CB5 belting
- No forced convection

Options for ovens

- Infra-red burners?
- Quality of insulation
- Use of damper

Flour Tortilla Oven- External

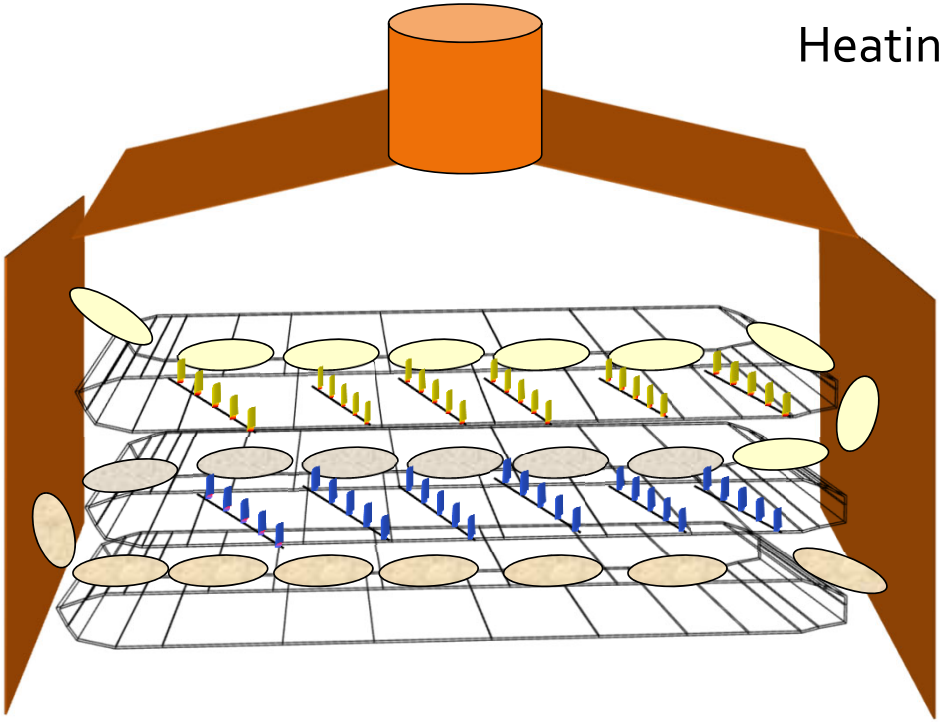
Type of oven belting

- Slatted metal: more conductive heating, more retention of moisture- commonly used on first or first and second pass
- CB5: faster dissipation of heat- commonly used on third pass.
- Need sufficient baking on first pass to release from metal slats on transfer to second pass!

Oven Controls

- Temperature- average 450 F or 232 C
- Heat load (burners working)
- Time- 25 to 35 seconds
- Relative humidity

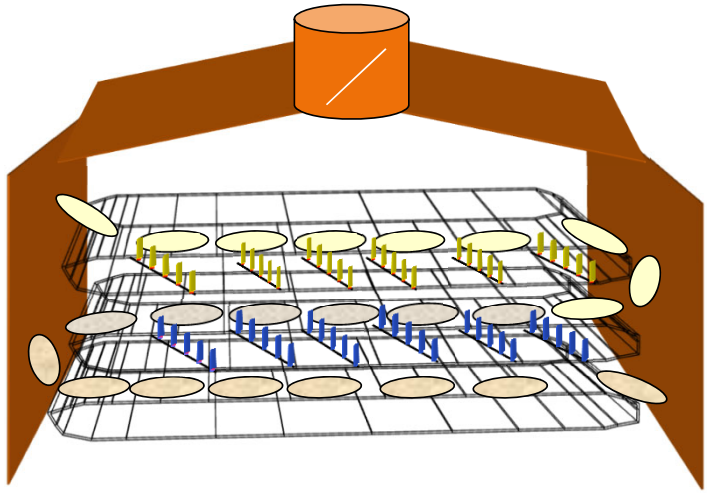
Flour Tortilla Oven- Internal



Heating by Conduction

Damper impact

- More open: more heat loss, more moisture loss
- More closed: more heat retention, more moisture retention



Heating by conduction

- Conduction= Heating by contact.
- The transfer of heat is very efficient
- Fast way to cook a thin product
- More moisture retention in product
- Must flip product to cook on both sides

Other Methods of heat transfer

- Convection: Heating by air movement- more rapid color development on area not in contact with surface, more even color, more moisture loss
- Radiation: Heating by waves (like the sun)- less efficient

View inside oven

- Even spacing?
- Smooth transfers?
- Consistent blue flame?
- Degree of “pillowing”
- % of burners on

Oven discharge

- Toast marks
- Degree of “pillowing”
- Spacing on discharge belt

Reducing pillowing

- Amount and type of leavening
- Mixing time and temperature
- Floor time
- Conditions at press- temperature and dwell time
- Damper settings
- Heat load- % of burners on

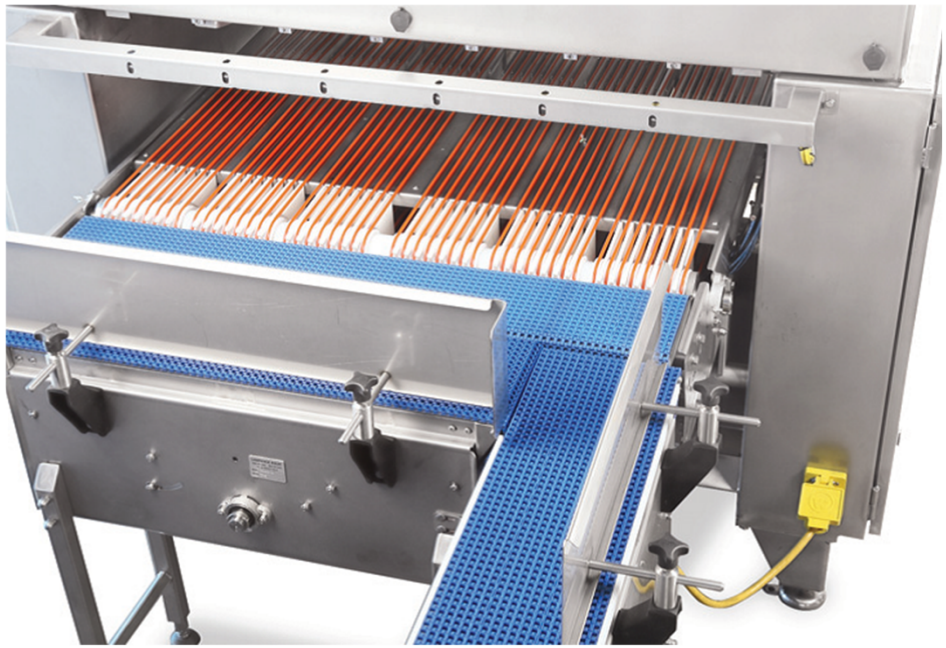
Cooling process

- Purposes: Equilibration of moisture, reducing temperature to acceptable level for handling and mold control.
- Industry average= 3 to 5 minutes with minimum of contact
- Lack of cooling- faster mold growth, more sticking
- Too much cooling- dryer product, less rollabililty
- Control of temperature and RH of area
- Might want to measure bacterial/mold count in area

Packaging process

- Product inspection
- Counterstacker
- Horizontal bagger or Horizontal form-and-fill
- Bag closing options
- Coding options
- Metal detector
- Shipping options

Inspection and Counterstacker



Horizontal bagger

Measures of success

- Product weight and count
- Product moisture
- Production yield
- Accuracy and legibility of codes
- Product and warehouse temperatures within 10 F (6 C)