Fixed and Flexible Standards

Flour Tortillas

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Objectives and Definitions

Why Fixed Standards?

- Consistency and Quality
- Labeling
- Control of costs
- Support of S.O.P.s

Why Flexible Standards?

- Changing conditions
- Problem prevention
- Problem correction
- Application of knowledge and experience

How to Approach the Tortilla Process?

- Formulation and Mixing
- Makeup process
- Baking, Cooling and Packaging

Flour Tortilla Formulation

- Flour (from wheat)- 100%
- Water- 53 to 60%
- Salt- 1 to 2%
- Shortening- 7 to 15%
- Baking Powder- 0 to 1%
- Additives (mold inhibitors, emulsifiers, enzymes, gums, acids, dough relaxers, flavors)

Which of these are flexible?

Changing conditions

- Quality of Flour
- Temperature- Summer vs. Winter
- Supply Chain- Ambient, refrigerated, or frozen, consistency of temperature
- Shelf life required

Production Flow Chart

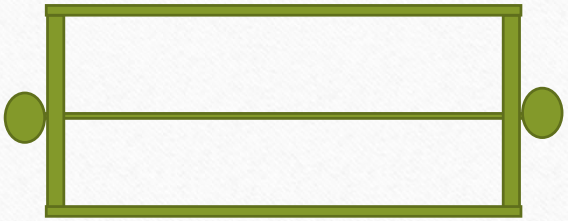
Mixing

Makeup processes

Hot Press OR
Die Cut OR
Hand stretch

Baking/Cooling

Horizontal Mixer



Other mixers

- Spiral- Bowl moves in same direction as agitator
- Vertical- Hook attachment, planetary motion

Objectives of Dough Mixing

- Assure compliance with formulation
- Uniform incorporation of ingredients
- Hydration of dry materials
- Development of gluten protein
- Control of dough temperature
- Support of production rate

Factors that Affect Mixing Time- Machine

- Speed of mixer (RPM)
- Design of mixer
- Refrigeration system?

Other Factors that Affect Mixing Time

- Flour strength
- Particle size of dry materials
- Amount of shortening
- Amount of dough relaxers

Dough Chunker

Types of Divider/rounders

Piston, sleeve, and drum design

Discharge

Types of Divider/rounders

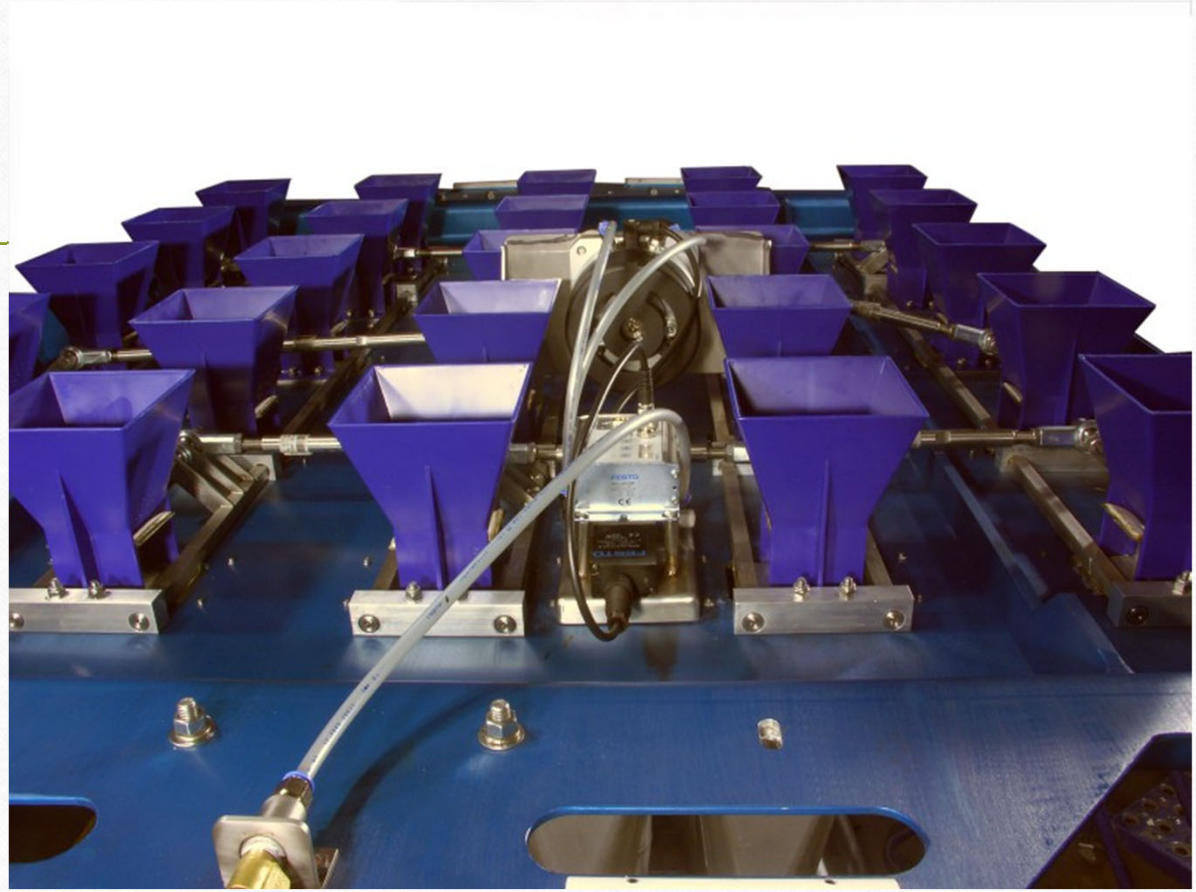
Overview

Extruder divider

Rounder bars

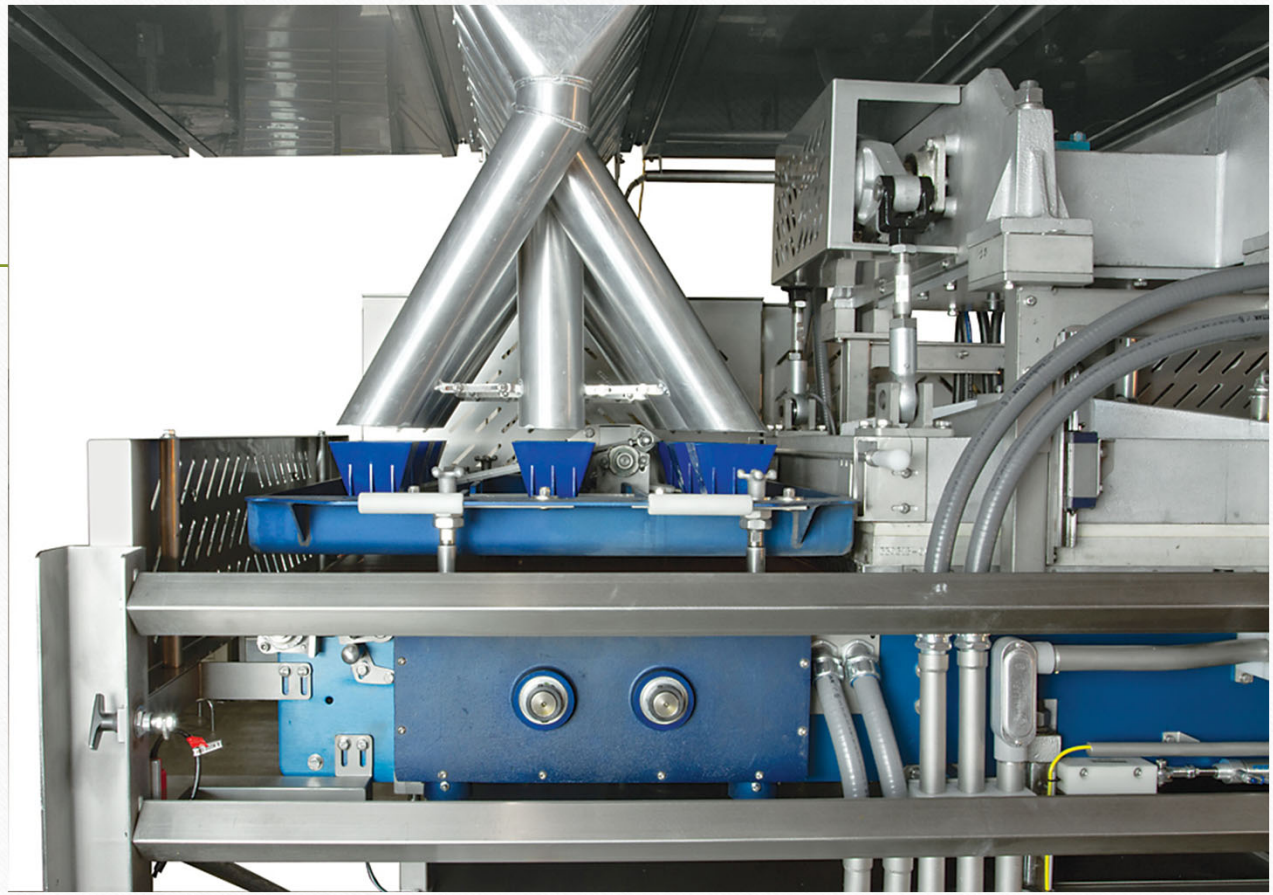
Equipment for Proofing

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

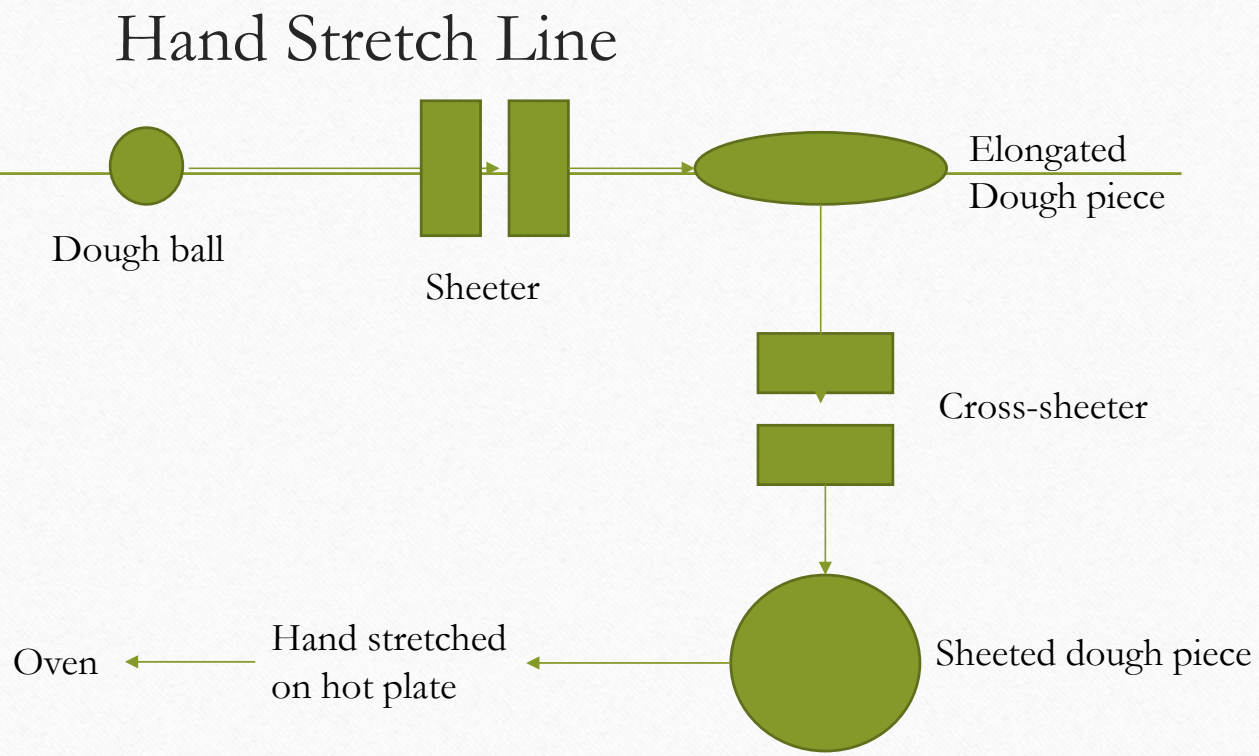
Controls at Press- part 2

- 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

- 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

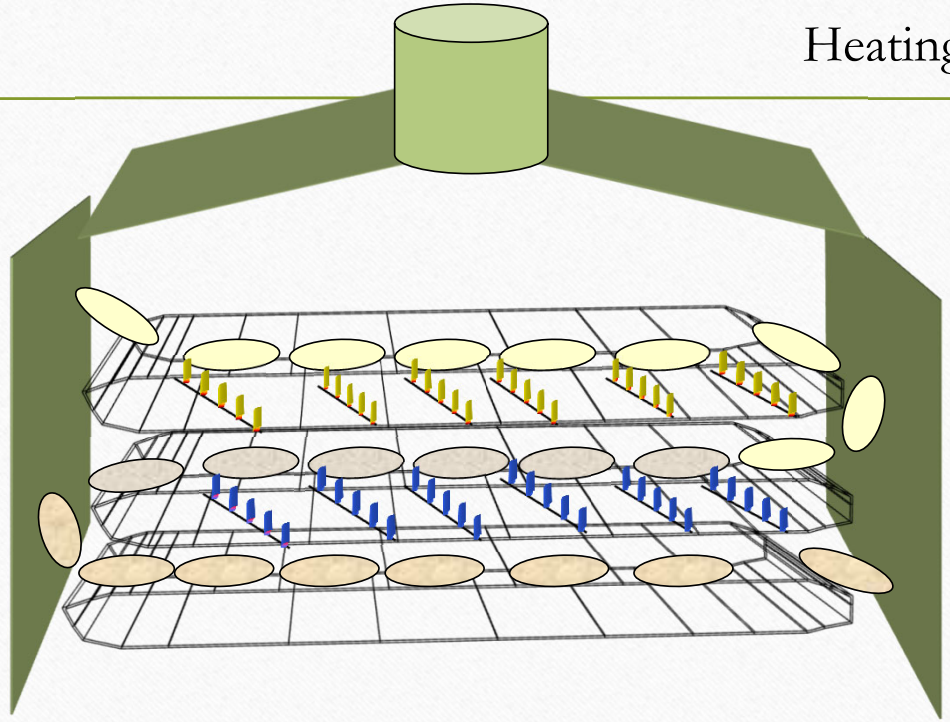
- Slatted metal: more conductive heating, more retention of moisture- commonly used on first or first and second pass
- CB5: faster dissipation of heat- commonly used on third pass.
- Need sufficient baking on first pass to release from metal slats on transfer to second pass!

Oven Controls

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

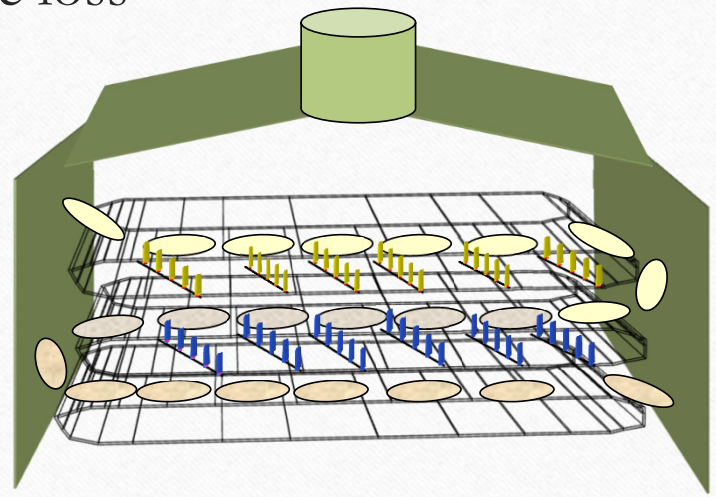
Flour Tortilla Oven- Internal

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

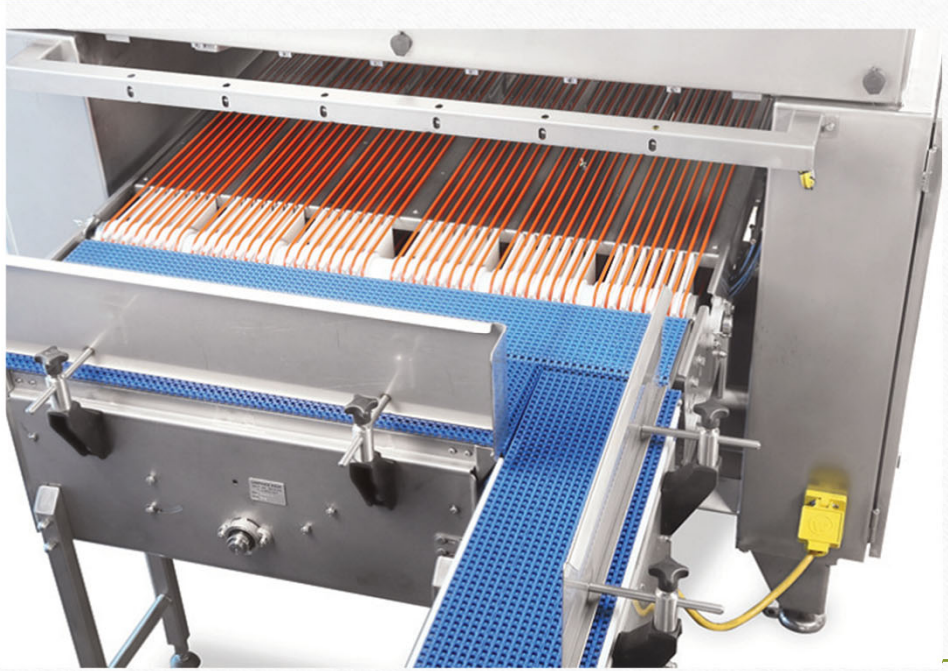
Cooling process

- 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)