



CPM Lineator & RSM

Remote Roller gap adjustment & roll speed measurement

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Pellet Mills

The heart of the feed mill operations





Current Constraints in Pelleting

- Fast wear of die and rollers due to wrong setting of roll gap.
- High energy consumption during start up of pellet mill to overcome existing load in die cavity.
- Time consuming to adjust gap between rolls and die.
- Unexpected pelleting conditions cause material slip and long downtime.



Benefits

- Savings (Time & Money)
 - Lower electrical demand starting pellet mill
 - By adjusting rolls away from die
 - Ability to move rolls to preset position after pellet mill motor ramps up
 - Reduce costly production stops.
 - Fast return to production following die change or upset condition.
- Safety
 - Roll adjustment without having to open pellet chamber

What is Lineator?

- A remotely controlled, compact designed and pneumatically driven roller adjustment system.
- Ensure quick, precise and safe roller adjustment during pellet mill operation.





Benefits

- Increased Die Life
 - Reduce die/roller wear and cost per ton by eliminating metal-to-metal contact
 - Die and roll gap can be adjusted up to 0.1mm accuracy
- Increased in Pellet Quality
 - With correct roll gap adjustment, more work is done on the meal thus producing better quality pellets (pre-compression)
- Simple Maintenance
 - Quick disassembly and assembly during roller change
- Easy Retrofit
 - Available to fit on most existing CPM Pellet Mill



The Construction

- Features a purely mechanical drive inside the die cavity constructed of stainless-steel material.
- Grease packed and totally sealed.
- Does not have any hydraulics, pneumatics or lubricating oils within the mechanical drive inside the die cavity, ensuring no contamination with mash/feeds.
- Lineator drive powered by air motor, mounted at the rear of pellet mill.
- Unique multiport swivel system, allowing normal shear pin protection.
- Wall mounted touchscreen control panel allowing operators to make adjustment and see the roller gap without stopping pelleting operations.

Definitions for Today

Pellet Quality

- PDI - Pellet Durability Index

Standard K-State tumble method or Holman

It is understood that pellet quality is a broader term than just PDI

Capacity

- Tons per hour – important, but

Net tons per shift/hour is more important



Pellet Mill Jogs = \$

| | <u>15 TPH</u> | <u>20 TPH</u> | <u>30 TPH</u> | <u>40 TPH</u> | <u>50 TPH</u> |
|-------------|---------------|---------------|---------------|---------------|---------------|
| 1 Jog/Day | 1.25 tons | 1.67 tons | 2.5 tons | 3.33 tons | 4.1 tons |
| 5 Jogs/Day | 6.25 tons | 8.33 tons | 12.5 tons | 16.7 tons | 20.5 tons |
| 10 Jogs/Day | 12.5 tons | 16.7 tons | 25 tons | 33.3 tons | 41 tons |
| 20 Jogs/Day | 25 tons | 33 tons | 50 tons | 66.6 tons | 82 tons |

Based on 1 Jog costing 5 minutes of production



Why should we measure Roll Speed?

- Make changes before choke occurs
- See if one roll needs adjusted
- **Decrease jog or down time – Increase production time**

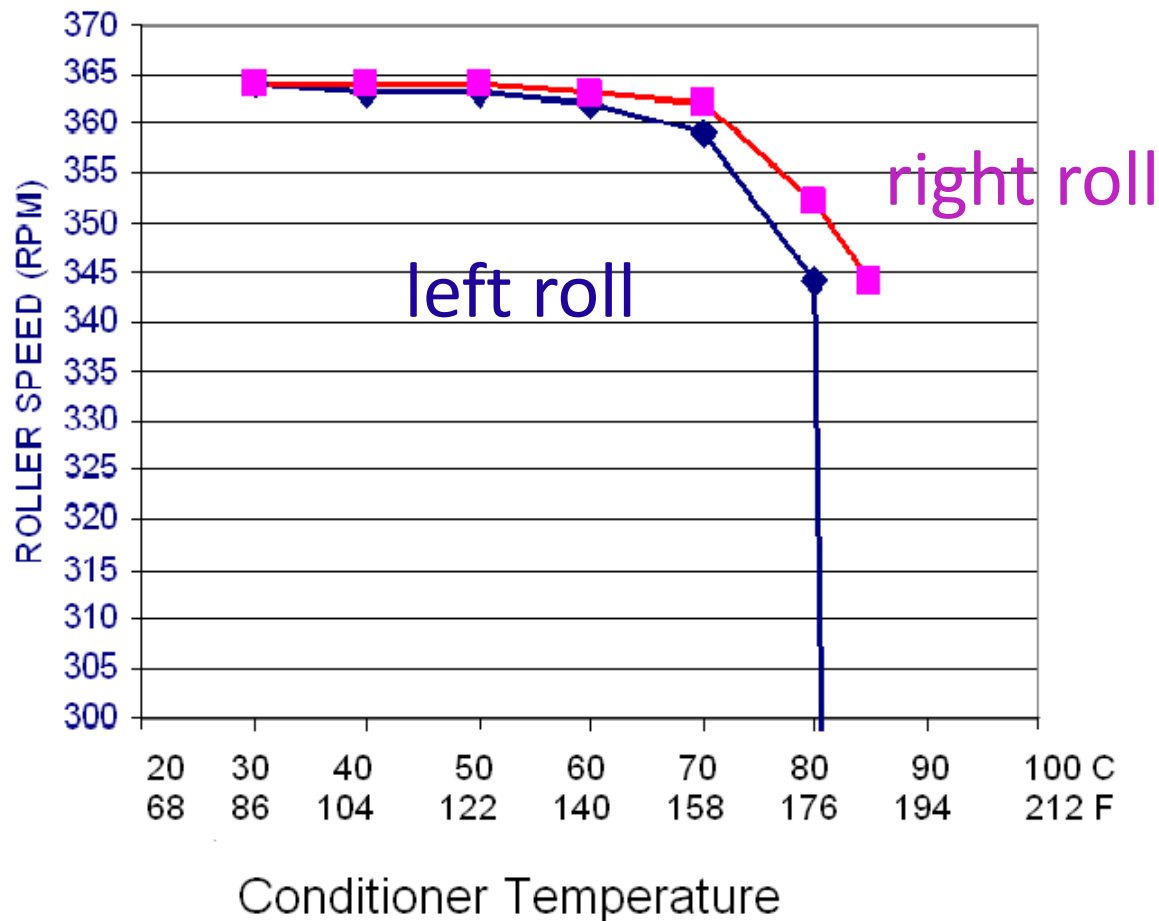


What can make a roll rotate too slowly or stop



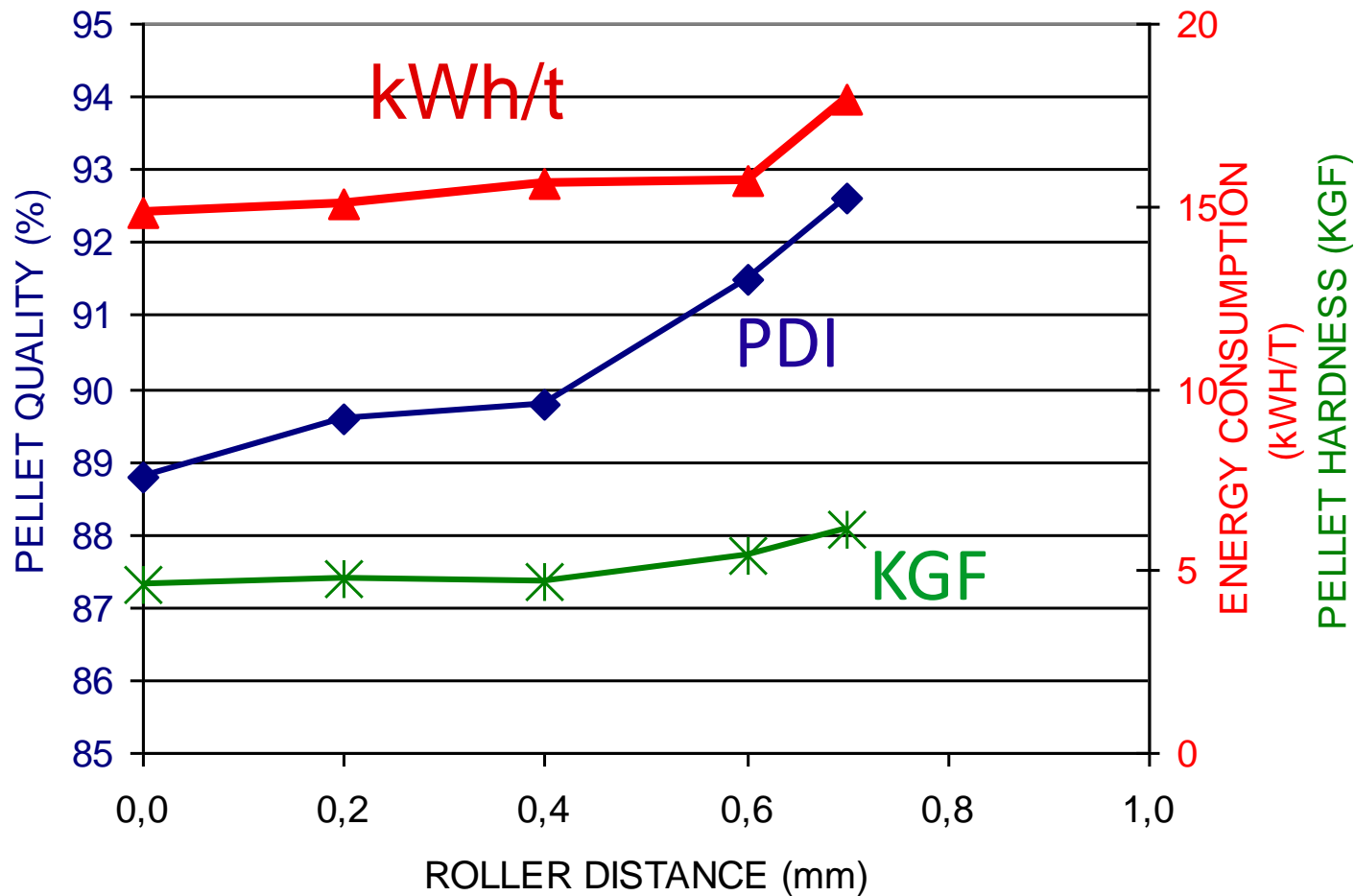
- Increasing conditioning temperatures (moisture)
- Increasing feed rate
- Increasing distance between roll and die

What is the relation between roll speed and conditioning temperature?



Influence of Roller Distance on PDI and Power Consumption

Consumption



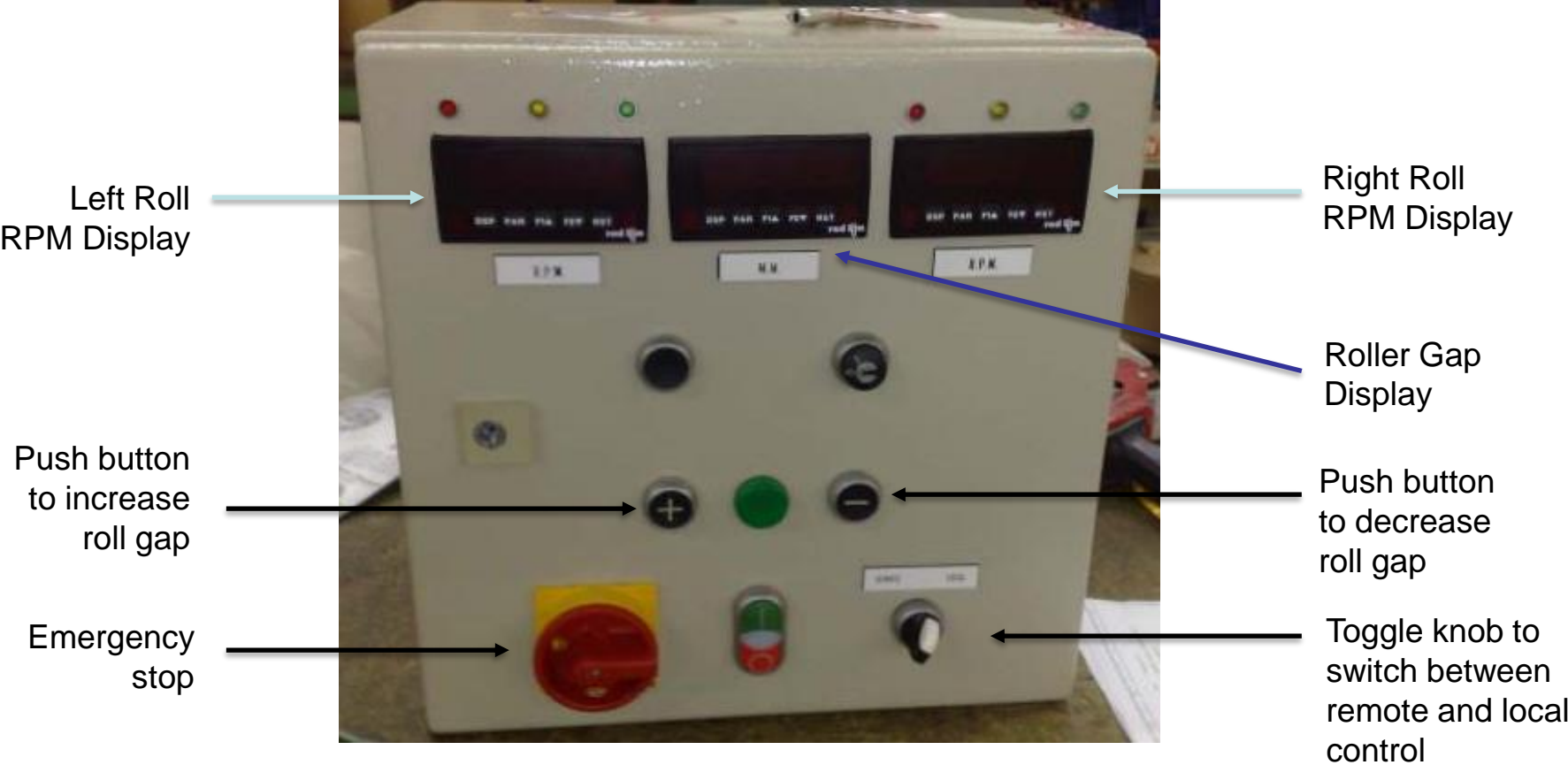
What are the advantages of RSM with lineator?

- “Zero” position both rolls
- Increase pellet mill capacity output/shift hour
- Optimize steam addition with each formula
- Optimize pellet quality by pre-compression
- Increase pellet mill stability and control
- Increase service life of dies

- It is an ABS system for Pellet Mills -



Roll Speed Measurement with Lineator Standalone Controller



CPM Pellet Mill Controller

The screenshot displays the CPM Pellet Mill Controller interface. At the top left is the CPM logo. The top right shows the time 05:18:29 PM and date 01/16/2018. The main area features a process flow diagram with components: Hopper Bin, Feeder (STOP), Top Conditioner (STOP), Bottom Conditioner (STOP), and a motor. Flow rates are shown as 00.00 T/Hr, 00 Hz, 000.0%, 000.0 °C, and 000.0 A. Two flow control valves, FCV 1 and FCV 2, are also indicated. On the left, there are status indicators for Lineator Auto On (green) and Lineator Auto Off (red), and a circular gauge for Roll Speed RPM (-999) and Roll Gap (-9.99mm). A QUICK DUMP button is located near the motor. On the right, a Control Setting table is visible. At the bottom, there is a PRODUCTION TIMER with fields for 0000HR, 00MIN, and a RESET button. The interface is in AUTO MODE, with an Alarm Sample 1 notification and a start button.

| Control Setting | |
|-----------------|-------|
| Bulk Density | -9.99 |
| Tonnage | -99.9 |
| Top Cond | 000.0 |
| Bottom Cond | 000.0 |
| Bottom Cond | 00.0 |
| Load Amp | 000.0 |

PRODUCTION TIMER: 0000HR 00MIN RESET

start Alarm Sample 1 AUTO MODE



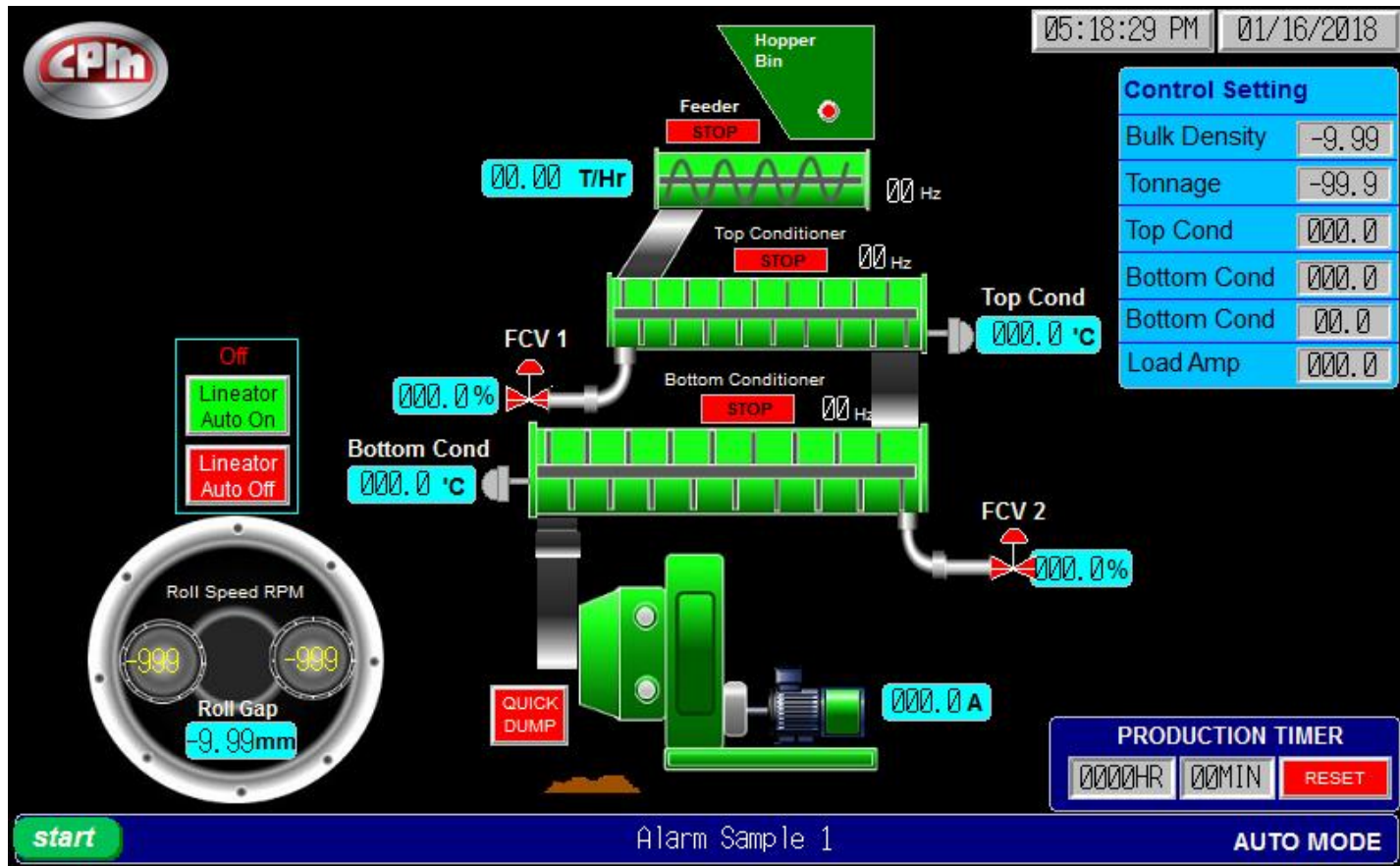
Summary

- Goal is net tons/shift of good quality pellets
- Conditioning, formulas, die spec's, etc. are all major components on optimizing pellet quality and capacity
- Roll Speed Measurement along with the lineator is another tool to further optimize pellet mill performance and feed mill production





Lineator Integration with CPM PMC + RSM





Technical Data

Table 3-2. Lineator Technical Data

| | | |
|--|---|--|
| Air Requirement | Air Pressure Supply to Regulator | 10 Bar (160 psi) Maximum |
| | Air Pressure Supply from Regulator | Refer to Table 3-1 . |
| | Air Quantity (at operating Lineator only) | 0.93 M ³ /min. (33CFM) for 3000, 7000, and 7800 Lineator 1.25M ³ /min. (44 CFM) for 7700 & 7900 Lineator |
| Lubrication Requirement | Grease | 2 gr/h at maximum 5 bar (70 psi) grease pressure. (Refer to Section 3.8, "Lubrication," for manual grease instructions.) |
| | Automatic Greasing | Apply pressure relief valve to limit maximum grease pressure to 5 bar (70 PSI). (Refer to Section 3.8, "Lubrication," for manual grease instructions.) |
| Control Panel | | Verify that input power used matches voltages shown in schematics and solenoid nameplate. |
| Space Requirement at Pellet Mill Rear Side | 3000 Series Pellet Mills | DWG. 300-5008-A |
| | 7000 & 7800 Series Pellet Mills | DWG. 300-5003-A |
| | 7700 Series Pellet Mills | DWG. 770-5010-C |
| | 7900 Series Pellet Mills | DWG. 790-5006-A |



Thank You