Opportunities for Improvement Green River Panels August 2008

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Opportunities

- The company has a world class forming and pressing line
- Access to the most dynamic markets in the world
- The company can differentiate itself by producing a quality product that is cost competitive
- 50% of wood furnish comes from within the company from adjacent sawmill

Opportunities

- A number of issues have to be addressed
- This is not unusual for a new operation
- I have significant experience in the improvement of particleboard operations throughout Australia and in North America
- The following are opportunities for improvement that I have identified from the week visit
  - These are divided into immediate and longer term opportunities

Significant issues

- Dirty raw material
  - Too much dirt is getting into process and causing excessive wear on flaker mill knives & wear plates

Grit in particleboard causes machinability problems once laminated.

It also results in poor quality flake (see over)

It must be eliminated

Significant issues

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- Flaker and PAL screen configurations:
  - There is an inbalance between core and surface flake
    - This is due to incorrect configuration of PAL screen sizes & an inability to optimise the outfeed of the dry refiner due to blockages resulting in an inability to generate enough high quality surface material.
    - The correct core to surface ratio needs to be generated from the PAL screens for the thickest board produced.
    - As board sizes get thinner more surface material is required which is generated by the dry refiner from core “accept” chips
- The fines and larger material generated after the chipper need to be redirected to furnish. The chip screen is sub-optimal.

Significant issues

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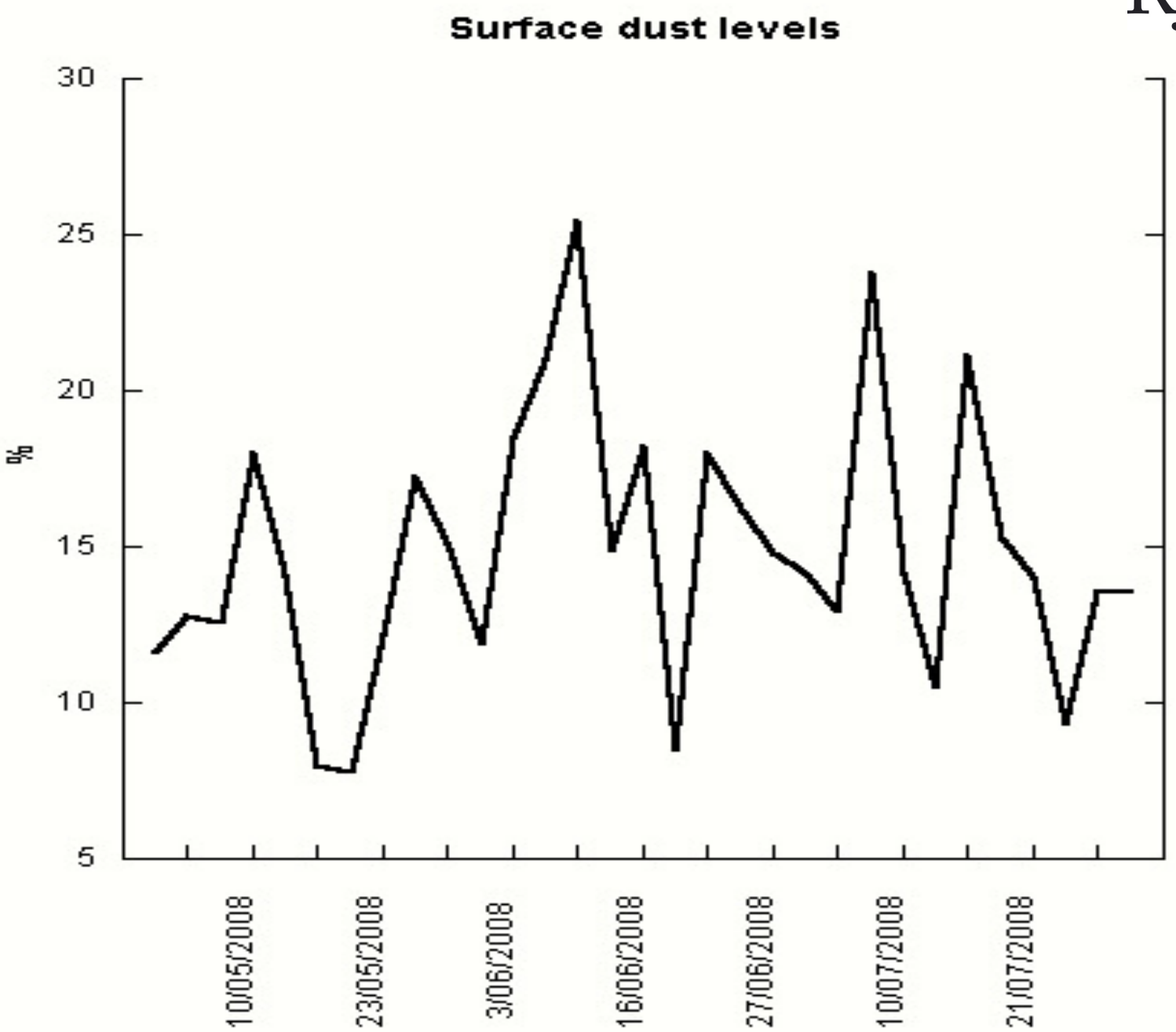
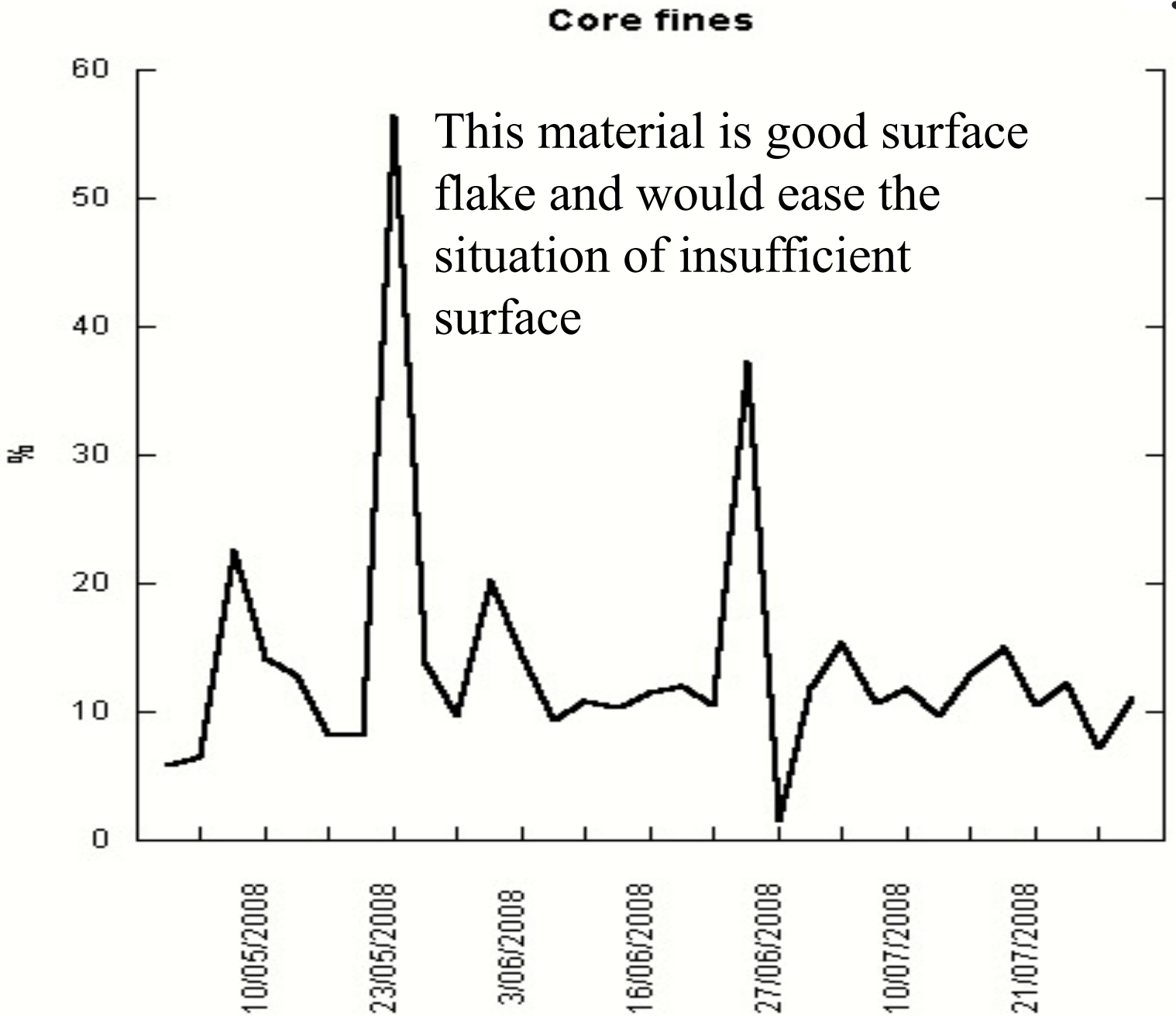
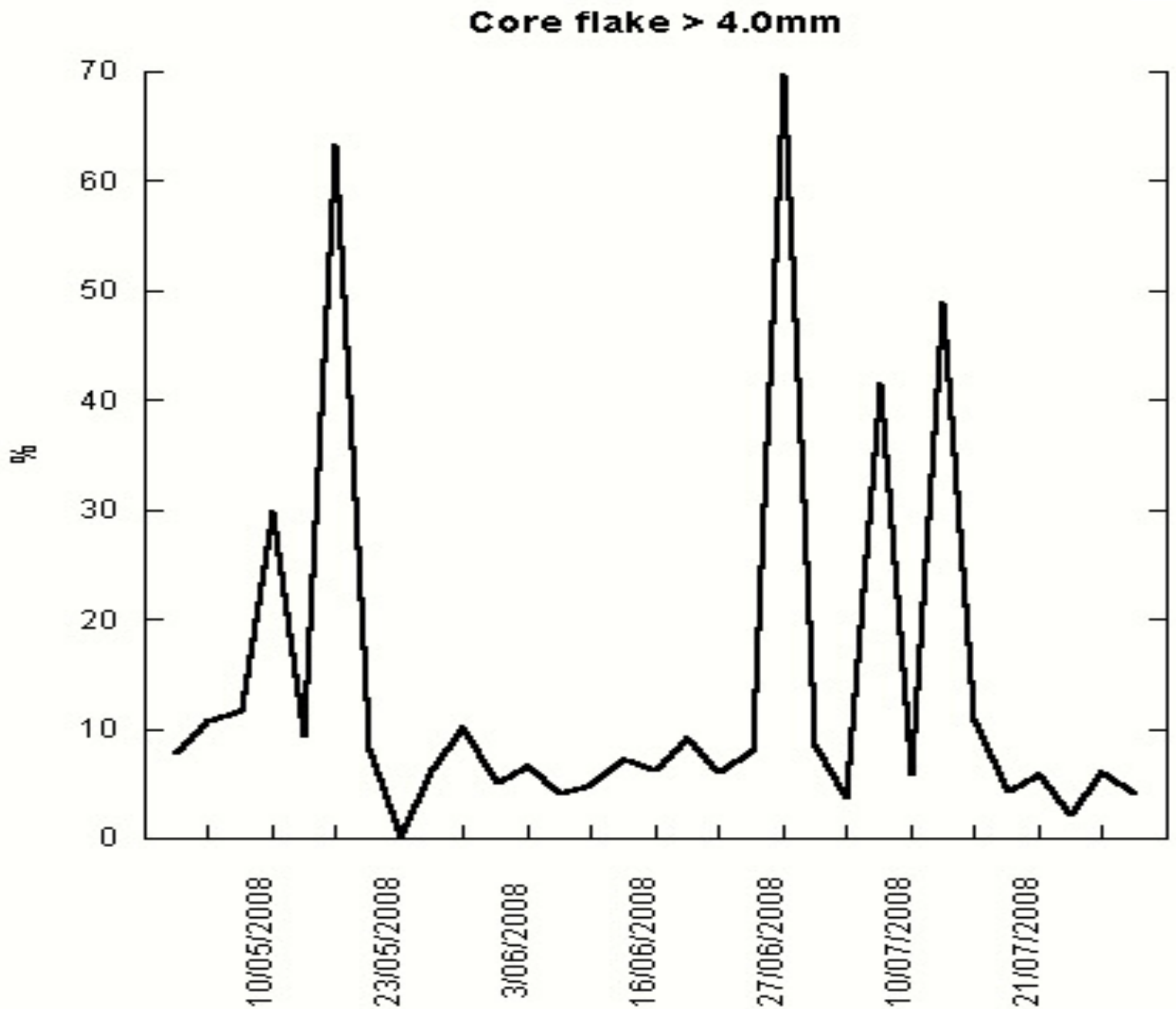
- Flake quality at the blenders:
  - Ex flakers >4mm fraction can vary between 5% - 68% within 12 hrs.
  - Ex screens dust in surface can vary between 0 - 5%
  - Amount of surface flake in core fraction varies between 0-20%
  - This leads to excessive fines in core leading to excessive resin usage and low bending strength and lack of surface material.
  - This can also result in excessive dust in surface which causes dust and glue spots.

Poor flake geometry is having a negative effect on MOR property.

Difficult to maintain consistent core to surface flake ratio


Surface dust levels
%
30
25
20
15
10
5
10/05/2008
23/05/2008
3/06/2008
16/06/2008
27/06/2008
10/07/2008
21/07/2008


Core fines
This material is good surface flake and would ease the situation of insufficient surface
%
60
50
40
30
20
10
0
10/05/2008
23/05/2008
3/06/2008
16/06/2008
27/06/2008
10/07/2008
21/07/2008


Core flake > 4.0mm
%
70
60
50
40
30
20
10
0
10/05/2008
23/05/2008
3/06/2008
16/06/2008
27/06/2008
10/07/2008
21/07/2008

Significant issues

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- Blending inefficiencies:
  - Insufficient chiller water capacity means blenders are running too hot and resins are being partially cured prior to forming/pressing.
    - This causes an overuse of resin and reduces board physical properties.
    - Blender needs to be set up correctly
    - Resins are being cured in the blender causing downtime due to blender cleaning conducted on a daily basis
      - This stops the blender from being correctly set-up i.e. horn to shell distance resulting in poor blending and resin overuse.
  - Outfeed flaps need to be directly controlled to optimise blending.

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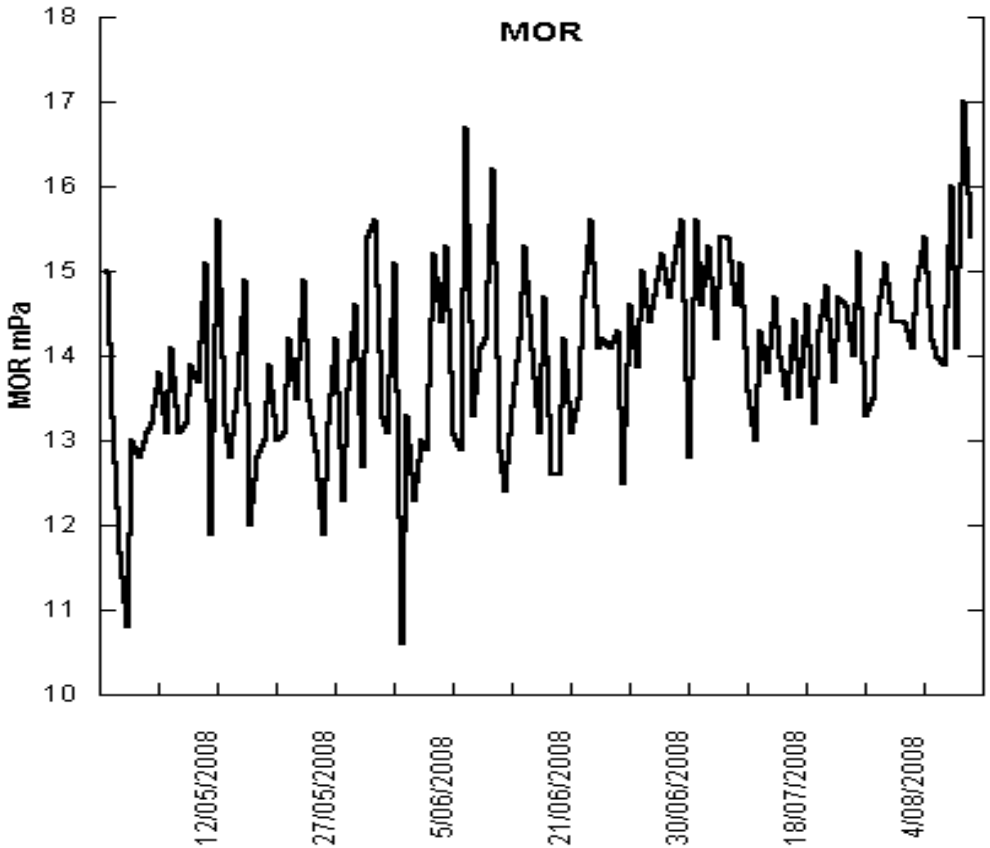
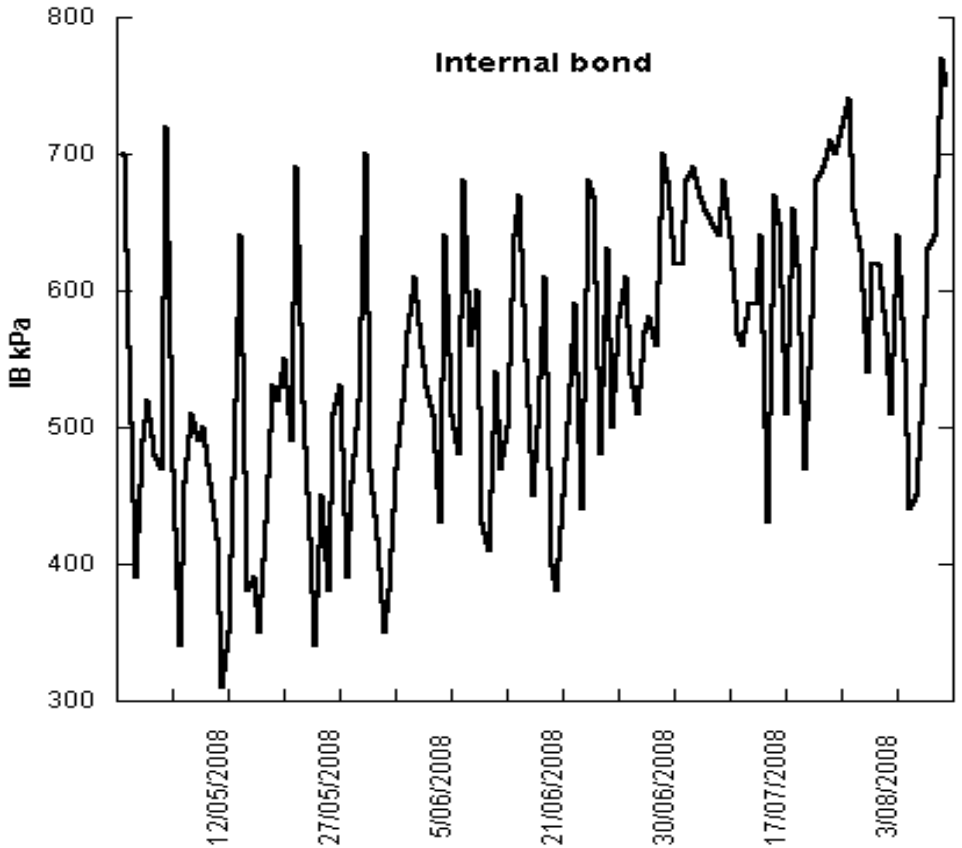
Significant issues

- Board properties exhibit too much variability:
  - IB's are generally acceptable, even too high
  - MOR's are generally borderline.
    - This is due to poor flake geometry





Significant issues

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- Sanding/sawing productivity:
  - Master boards ex press should be to the maximum size that the saw can handle i.e. 6m.
  - Boards going through the calibrating sander should be but to but, a solid ribbon of board being sanded.
  - There is a lot of opportunities to increase productivity through the saws
    - Don’t stop line when unloading packs.
    - Saw infeed conveyor needs to return in upper position enabling next board to be immediately ready.
    - Need to use plastic staples on WIP board to minimise thumbtacks destroying sander belts.
  - Need to set up testing protocols i.e. board dimensions & sanding quality

Immediate improvements

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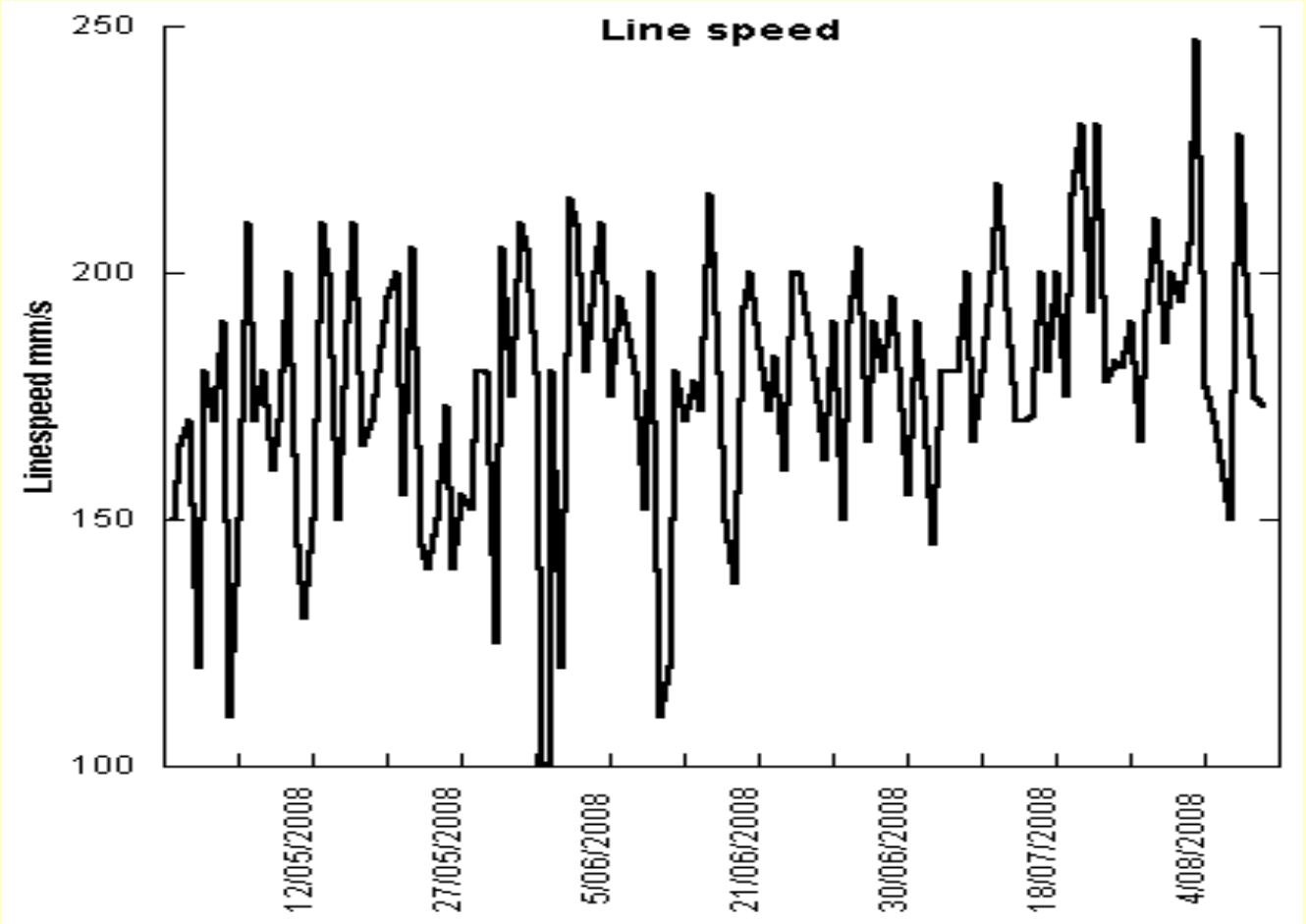
- The logyard should be kept cleaner to minimise dirt coming into process
- Chip disc screens are under capacity and a lot of good quality furnish is being wasted
- Flaker mills;
  - New wear plates & increase knife projections to 1.0mm
  - Collect data time knife change +0, +3, +6 & +9hrs for me to do an analysis on correct knife changing protocols and PAL flake screen configuration
- Reconfigure PAL flake screens to correctly balance core: surface and remove dust & grit on basis of above I will provide advice on screen sizes

Immediate improvements

- Implement correct blender setups:
  - Install new chillers
  - Correctly set paddle and horn angles
  - Set correct distance between horn and blender shell
  - Correctly set outfeed flap pressures
- Forming station
  - At each stop over 15min, check and clean screens. This will reduce dust spots dropping off the screens causing glue spots.
- Increase master panel size to 6m to improve sanding/sawing productivity

Immediate improvements

- Operating conditions and delegations of authority.
  - There needs to be consistent operating conditions i.e:
    - line speeds, resin loadings, temperatures etc.



Immediate improvements

- Rebalance calibrating sander to achieve even surface spreads at formers (saving of 7% surface flake) using the router test method to measure depth of sander cut
- Increase master panel size
- Butt to butt sanding of board
- Modifications of saw loading conveyor required
- Outfeed bins at saw when unloading stops sanding line. There is a huge potential to improve sanding/sawing productivity and this will be needed if line is to perform at 200,000 cubic metres per year
- Use plastic staples instead of thumbtacks as the latter will destroy sander belts and the former wont.

Immediate improvements

- Laboratory:
  - Flake data ex knife mill collected by lab staff should be fed back to production in order to optimise knife changes
    - This can be done ex drier and drier m.c. measured at same time
  - Resin C of A data should be plotted:
    - Viscosity, gel times, solids content, temperature at despatch (must be lower than 20ºC)
  - When making a product only need to collect samples every 6hrs. Currently over-sampling, very expensive.
    - Data should be plotted and made available to production
  - Flake data ex screens should be collected twice per shift
  - Need to do gel times on resin mix at blender to determine adequacy of hardener addition. This is more important than carrying out tests on raw resin in the lab

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Longer term improvements

- Explosion vents need to be placed on all dry cyclones, bag houses and dry flake bunkers, especially after dry refiner.
- In longer term should investigate Firefly/Halon system given the amount of drag chains in use in the process.
- Need to measure density profile of the board so as to optimise resin recipes and press profiles
- Need to undertake a suction system audit plant wide. Improved suction will improve performance of dry refiner.

Longer term improvements

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- Introduction of a moisture resistant board using melamine fortified UF resins.
- To consume all sander dust and fine material at furnace may have to put water load into drier.
- Need to institute formaldehyde analysis for board or regularly get board tested for formaldehyde
- Need to test for surface grit levels especially if board is to be laminated
- Make board to E1 and super E1 formaldehyde standards

Opportunities; how I can add value

- At 200,000m resin spend is US$11.5m. With my technology on wetting physics and ability to increase blending efficiencies I can save the company US$2m per year on resin expenditure alone.
- Set up technical systems to ensure plant is run to full potential
- Train key personnel in technology of particleboard and how to run process
- Optimise machine settings.
- Suggest improvements to operation
- Set up meaningful process measuring and control systems
- Ensure suppliers of resins have processes in control
- I have access to technology that is unique in world to enhance the efficiency of the process
- With my knowledge of paper impregnation and laminating I will be able to assist the company in this direction.

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