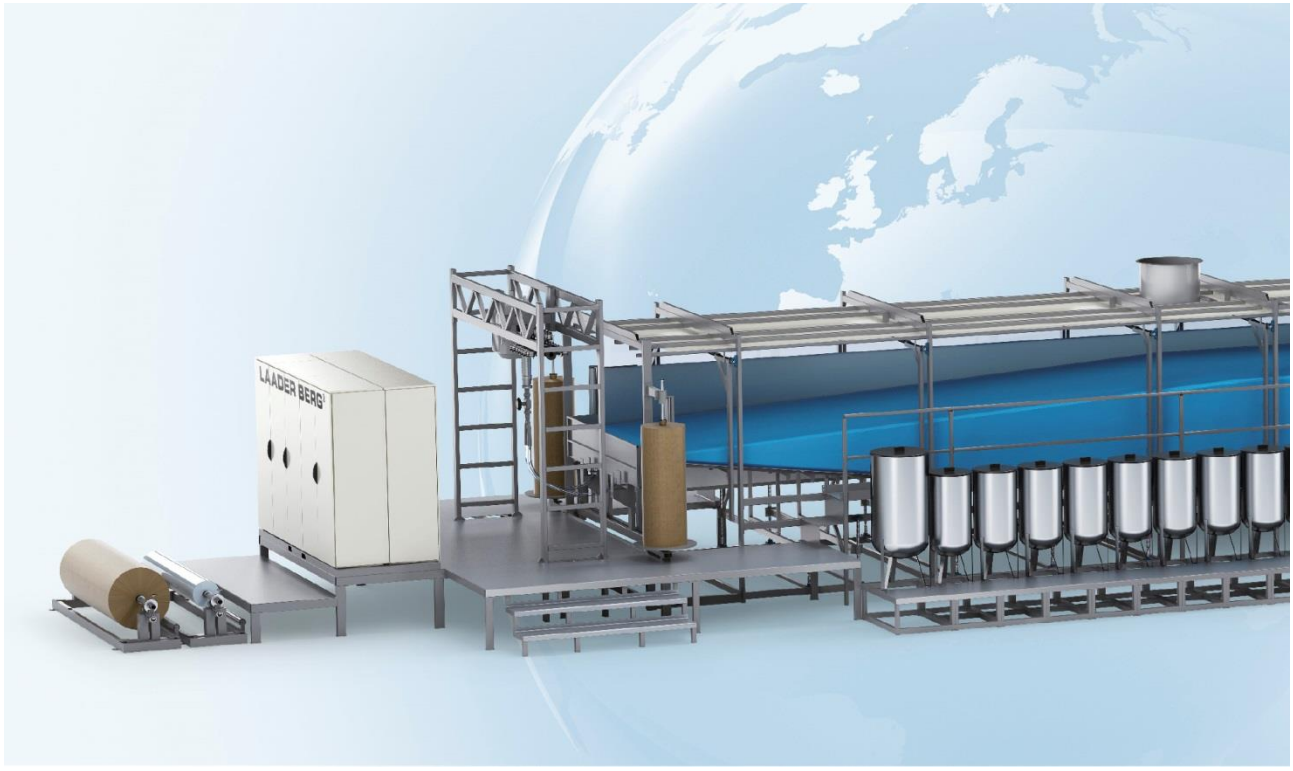
LAADER BERG®

World Class standard with Maxfoam™

Troubleshooting

Troubleshooting Guide For Slabstock Foaming



THE WORLD'S MOST USED FOAMING MACHINE

Revision 2010

Phone: +47 70 17 74 00 • post@laaderberg.com • www.laaderberg.com

TROUBLESHOOTING GUIDE

This trouble-shooting guide covers faults that can occur on low pressure slabstock foaming machines, conventional as well as Maxfoam machines. Not all of the described recommendations will have the same effect on conventional as on Maxfoam machines and verse visa.
Some faults can be rectified whilst the machine is running, but for others it is best to stop production and use time to go through the problems and faults to be able to do the best correction.

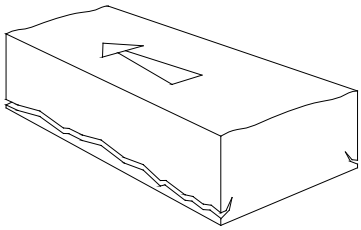
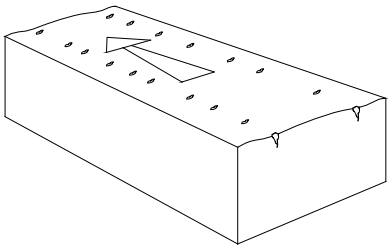
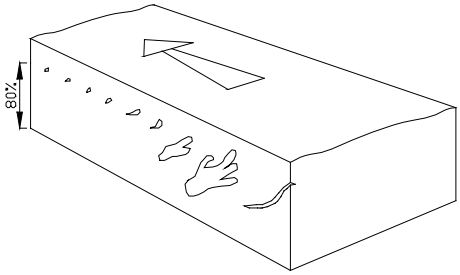
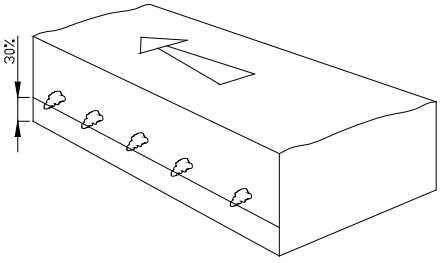
FAULT	DESCRIPTION	RECOMMENDATION
Boiling	Large bubbles appear and burst at the surface.	Check silicone quality and output. Check tin catalyst quality and output. Reduce amine catalyst concentration. Check for contamination with silicone or grease lubricants.
Collapse	Foam rises and then falls.	Check silicone quality and output. Check tin catalyst quality and output. Reduce amine catalyst concentration. Look for possible contaminants in foam system.
Crazy balls	Small bubbles moving rapidly under foam surface.	Increase mixer speed. Minimise splashing on lay down.
Flashing/sparklers	Excessive effervescence of top surface of rising foam.	Decrease TDI Decrease silicone concentration. Decrease amine catalyst Increase tin catalyst. Look for errors in metering. Decrease component temperatures.
Smoking	Excessive TDI vapours from surface of the foam.	Look for errors in metering of foam components, Check especially TDI, polyol and water output. Reduce TDI output.
Sticky spots	Local areas of wet, imperfectly mixed ingredients.	Check for lead/lag conditions. Increase mixing efficiency. Check component tank level. Look for system contaminants.
Creeping cream Line	Cream line tends to move back to the pour point.	Speed up conveyor. Increase conveyor angle. Lower amine catalyst level.
Undercutting/ Under running	The liquid reactants flow under the already rising foam mass.	Speed up conveyor. Decrease conveyor angle. Increase catalyst levels.

FAULT	DESCRIPTION	RECOMMENDATION
Moon craters	Small pits or pockmarks on the block surface. Splits on and beneath the foam surface.	Reduce trapped air at lay-down. Minimize splashing at lay-down. Lower mixer speed and/or air injection. Increase tin catalyst and/or lower amine catalyst provided that foam cells are open enough. Check silicone quality.
Coarse foam	Foam is composed of large cells.	Check silicone level and activity. Increase mixing speed/ increase air injection.
Dead foam	Foam has low resiliency and closed cells.	Reduce tin catalyst. Reduce silicone level. Try to run finer cell size.
Slow curing	Build-up of polymer strength is too slow. Foam is too weak and too sticky for cutting. Foam block is dimensionally unstable when leaving the tunnel.	Increase amine and/or tin catalyst. Look for errors in metering of water/TDI/polyol/tin. Check for catalyst deactivation. Raise component temperatures. Improve mixer efficiency.
Poor fingernail	Foam recovers slowly when indented with a sharp object	Improve foam air flow by decreasing tin catalyst and/or silicone levels. Attempt to run finer cell size. Improve the curing conditions.
Friable/loose	Foam is crumbly and does not build polymer-strength.	Look for errors in metering of tin/polyol/TDI/water. Decrease TDI output. Check on reduced tin activity. Check polyol reactivity. Increase mixing speed/efficiency.
Friable skin	Skin is soft and flakes off at the touch.	Increase, change or check activity of amine catalyst. Increase component temperatures. Look for contaminants in system.
Scorching	Discoloration and loss of properties in foam core. High internal temperature during curing.	Check TDI/water/polyol outputs. Check for contaminants. Reduce the block size.
Odour	Finished foam has undesirable odour.	Try to use other amine catalysts. Use less-odorous formulation additives. Give the foam time to degas.
Tacky block surface	Surface of the foam block remains sticky for prolonged time.	Increase total catalyst levels. Check block storage conditions. See “slow cure”
Zigzag splits (tin splits)	Crumbly zigzag splits throughout the foam block or on sides.	Increase tin catalyst concentration. Check for reduced tin catalyst reactivity. Check tin catalyst output. Check TDI and water output. Increase silicone level.

FAULT	DESCRIPTION	RECOMMENDATION
Gross splits	Large vertical or horizontal separation in the block.	Increase tin catalyst or check for reduced activity. Decrease amine catalyst. Increase silicone or check for reduced activity. Decrease water level. Check all mechanical factors.
Heavy skin	Thick skin of high density.	Increase total system catalysis. Increase TDI content. Heat block surface.
Low catalyst Tolerance	Foam exhibits excessive sensitivity to changes in tin catalyst concentration.	Increase metered volume of catalyst by using diluted version. Look for errors in metering of all components. Decrease amine catalyst. Decrease or use lower activity silicone.
Relaxation	Block rises to maximum height, then settles back.	Increase silicone level. Check output. Increase tin catalyst. Check output. Reduce amine catalyst level. Reduce stirrer speed and/or air injection.
Shrinkage	Block shrinks during curing.	Decrease tin catalyst. Decrease silicone level. Increase mixer speed/ check air injection. Check for contaminants in the system. Decrease TDI index. Increase amine catalyst. Lower component temperatures. Enlarge mixer outlet nozzle.
Voids/ pin holes	Small voids randomly distributed throughout the foam.	Increase tin catalyst concentration. Increase the cell size of the foam. Reduce air injection, decrease mixer speed. Increase silicone or check for reduced activity. Decrease component temperatures. Check for contamination with silicone or grease lubricants. Check the pump filters, clean and renew systems as required. Clean mixer chamber. Clean manifold. Clean tube from mixer. Clean trough. Any old foam particles will absorb chemical mix which will react and degas and can make pinholes.
Bottom cavitation	Block has closed cells, bottom is eaten away.	Reduce tin catalyst. Check for metering errors.
Bottom skin densification	Layer of denser foam at bottom of block.	Increase silicone level or check for reduced activity.
Stratification	Irregular density throughout the block.	Look for errors in component metering. Check mechanical factors.

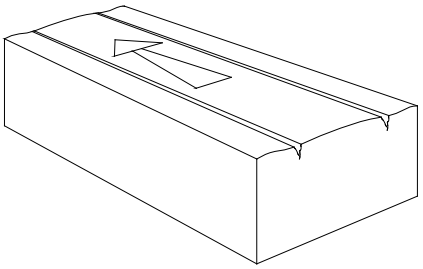
FAULT	DESCRIPTION	RECOMMENDATION
Striations	A distinct line of unusual cell structure.	Increase mixing. Check injection needle. Check distribution of pigment. Check for foam build-up. Look for contamination. Clean mixing head. Minimize splashing at laydown.
Poor tensile strength, Weak foam	Tensile values lower then normal.	Check TDI/water/polyol output. Reduce cell size (see coarse cells). Low (very low) TDI index Check catalyst filters.
Poor elongation	Elongation values lower than normal.	Check TDI/water/polyol output. Reduce TDI index
High compression set	Compression set values higher then 10%.	Decrease tin and silicone levels. Utilize TDI index between 105-108 Use co-catalyst system. Improve curing conditions.
Low load bearing Values	Formulation produces lower load-bearing values than desired or expected.	Increase TDI index. Check for errors in output of water/TDI/polyol.
High load bearing values	Formulation produces higher load-bearing values than desired or expected.	Look for errors in output of water/TDI/polyol. Decrease TDI index.
Small side splits	Small diagonal separations at the corner of the block	Increase tin catalyst. Increase TDI content. Increase silicone or check for reduced activity. Check all mechanical factors.
Splits	Splits in the foam, associated with a normal cell size and open cells.	Tin catalyst too low, or tin deactivated. Check output and adjust. Compare the catalyst from production machine against standard, freshly opened material by making foams in the laboratory. Conveyor speed too slow. Increase conveyor speed or reduce the total output. Polyol and/or TDI temp too low. Check and adjust the temperatures of the material streams. Silicone level too low. Make laboratory test, and adjust the silicone level as indicated by the lab. test. Incorrect amine catalyst blend ratio. Compare the catalyst blend from the machine against standard material by making foam in the laboratory. Reduce the level of the blowing catalyst.

FAULT	DESCRIPTION	RECOMMENDATION
Splits	Splits in the foam, associated with an abnormally fine, broken cell structure.	Excessive air in the mix. Check material streams for entrained air and repair leaks. Stirrer speed too high. Reduce stirrer speed in stages observing the effect on the foam structure. Exit nozzle from the mixer is too large in diameter. Reduce mixer nozzle diameter in stages to the effect on the foam.
Closed cells/ Low air penetration	Closed cells, shrinkage with normal foam structure.	Tin catalyst level too high. Reduce output of tin catalyst in 5% or 10% steps, observing the effect on the foam structure. Temperature of polyol and/or TDI too high. Adjust the temperature of the chemicals to standard process temperature. Incorrect amine catalyst blend ratio. Check the catalyst blend from the machine tank against standard catalyst blend, by making foams in the laboratory. Reduce the level of polymerisation catalyst as indicated by lab. test. Wrong TDI blend on machines with mixed isomer feed system. Check metering rates of 80:20 and 65:35 TDI Streams and adjust.
Closed cells/ Low air penetration	Closed cells, shrinkage with abnormal coarse foam structure.	Stirrer speed too low. Increase stirrer speed in steps and observe the effect on the foam structure. Mixer exit nozzle has too small diameter for the output. Increase the mixer nozzle diameter in stages, observe the effect on the foam structure.
Low block	Reduced block height of low density foam associated with high curing temperatures/ scorching.	Shortage of methylene chloride. Check output and temperature of blowing agent stream. Blowing agent must be free from vapour bubbles and air locks.
Low block	Reduced block height accompanied by increased TDI vapour released at block cut off.	Shortage of water for primary blowing. Check water output at operating pressure. Check feed tank level and the filter and valve into the pump.
Sink back	Excessive sink back of the foam after cell opening.	Insufficient tin catalyst. Check pump output. Check catalyst activity by making foam in the laboratory. Abnormally fine/open structure. Stirrer speed too high or air injection too high. Check under Splits above. Incorrect amount of tertiary amine catalyst. Check the catalyst blend by making foam in the laboratory

FAULT	DESCRIPTION	RECOMMENDATION
Bottom corner Splits		Full rise position to close or on the fall plate. Reduce amine. Reduce fall plate length. Increase conveyor speed. Increase total output.
Chimney in top skin		1 – 2” wide splits positioned over the inlets of the trough, the depth of the splits are approx. 4” Increase silicone level. Increase tin. Check for excess of air.
Footprints Build up splits		After 15 –20 minutes slight marking is visible at 80% of the block height, the marks become deeper, The so called handprints or footprints occur and after A short while deep splits can be seen. In general these splits occur with: Higher densities. Foam without blowing agent. Where a 3500 mol. Weight polyol is used. With a too long dwell time in the trough. To cure the problem: Increase the total output or use a trough with smaller volume. Aim for a theoretical dwell time of approx. 19-29 seconds. Change polyol type, either a 3000 or a 4000 mol. weight.
Small side skin splits		Small side skin splits which are concentrated at a level of approx. 30% of the block height, the splits are not too deep. These splits are caused by too high silicone level. Reduce the silicon level by 10 to 15%

FAULT	DESCRIPTION	RECOMMENDATION

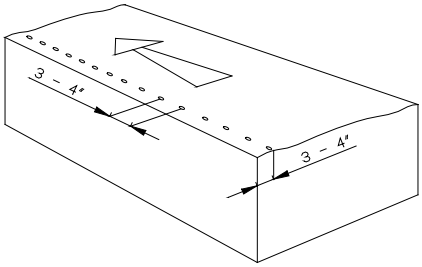
Excess of flow



Two deep grooves on top of the block.
These grooves are caused by an excess of flow on the fall plate. The liquid in the centre flows faster then the side paper and this results into a shear action, which gives cell collapse in the areas where the grooves are.

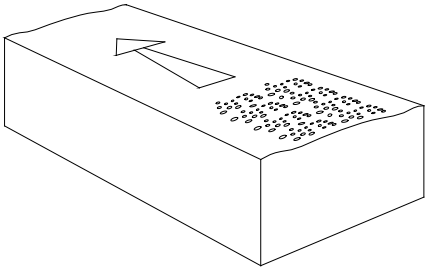
Raise the amine level by 5 to 10%, this will increase the viscosity.
Reduce the angle of the first fall-plate section.
Increase the air injection, finer cells reduces the flow on the fall-plate.

Shoulder holes



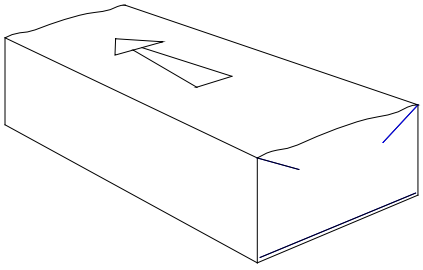
When the Maxfoam process runs alright in general at the point where the foam blows off, tiny holes appear of approx. 5mm on the shoulders of the block.
If these holes appear, the foam has very open cells.
On blowing agent blown foam, sparkling blisters appear all over the full width of the top surface and again this is a guarantee for open foam.

Closed cells

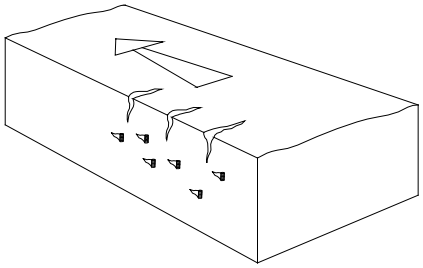
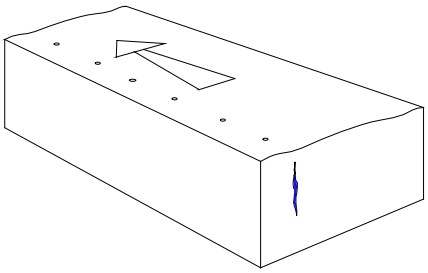
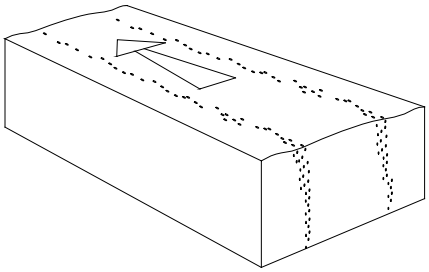
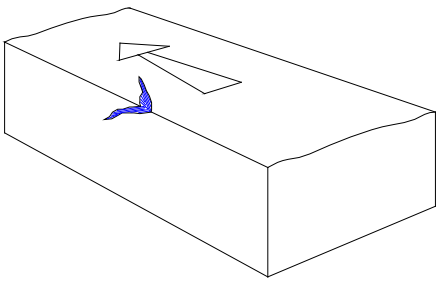


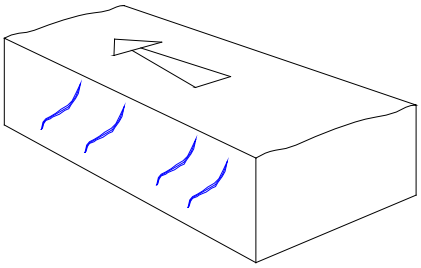
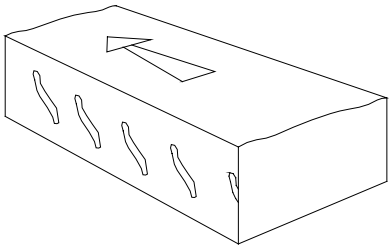
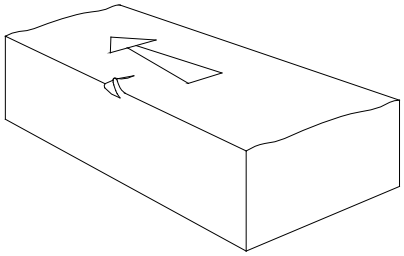
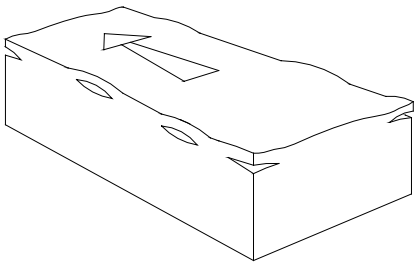
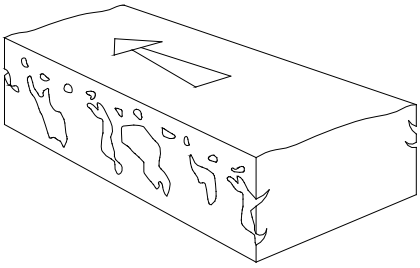
The top surface of the block is covered with a large number of warts, witch do not blow off, this is an indication that the foam is closed.
Reduce the tin level.

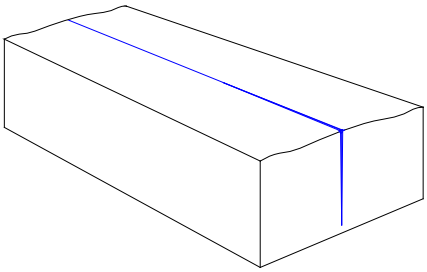
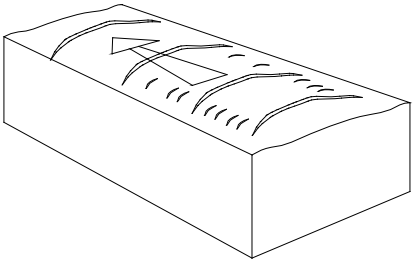
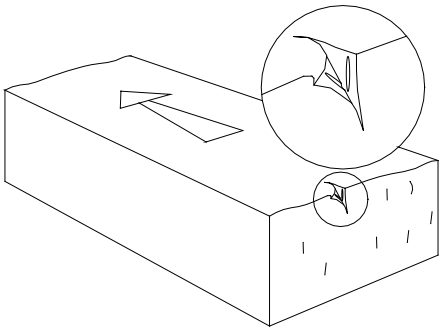
Ruptured foam

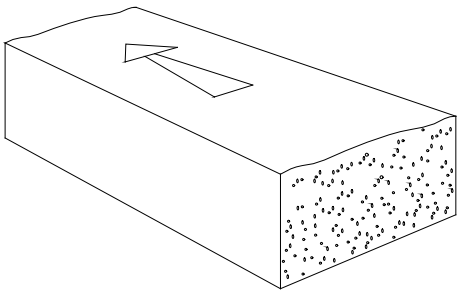
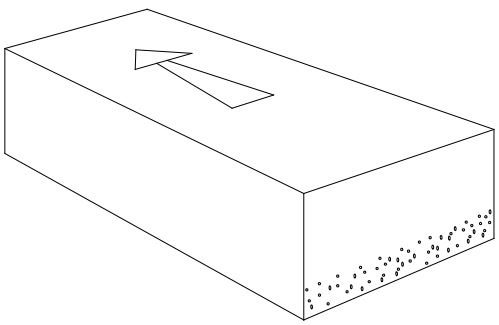


Foam with low tensile strength.
On soft low density foams, witch are blown with a High amount of blowing agent, it can happened that parallel to the bottom, a line of ruptured material can be seen. The tensile strength of the foam in this area is low and the foam can easily be split by hand.
Also in the top corners under an angle, the same line of ruptured material can be seen.
The foam is extremely open, increase the tin level.

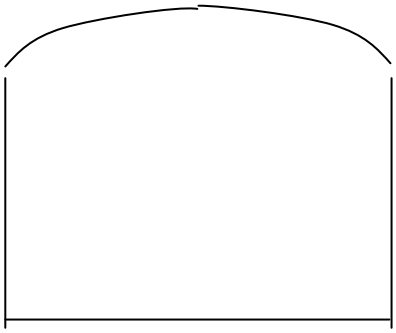
FAULT	DESCRIPTION	RECOMMENDATION
Mechanical splits		Vertical splits in the side skin. At the top the splits are approx. 2 –3" wide and they run down to approx. 50% of the block height. The side skin has very coarse appearance and rolled material can be seen. These vertical splits are caused by too low speed of the side paper, so the block runs faster than the side paper, the brake tension may be too high or there is too much friction between paper and the side wall. Check the paper running.
Clogged flexible		Vertical splits occur at one side in the cross section of the block. There may be too much build up on the trough lip. One of the flexible from mixer to trough may be clogged. Dirty trough inlets. Folded PE film in trough traps foam that start to gas in the trough. PE film to long over the trough lip, should be 10mm longer than the trough lip.
Air holes		The cross section may be covered with smaller or Lager air holes, they can be caused by the following: Excess of air in polyol or TDI. Air leakage through mixing head, seals or flexible. Build up material, which is left in mixing head, trough or flexibles. Incorrect setting of mixing head pressure. Too high temperature on blowing agent.
Shoulder splits		Shoulder splits pointing upwards into the direction of the mixing head. In combination with footprints this may be so called build up splits. If the full rise position is too far over the end of the Fall-plate, this type of splits will also occur. Increase the amine Reduce the conveyor speed. Reduce the total output.

FAULT	DESCRIPTION	RECOMMENDATION
Inclined splits		Inclined splits approx. 6 to 8” long on half height of the block. The conveyor speed may be too low, increase speed.
Inclined splits		Paper synchronisation splits or slow speed splits.
Shoulder split		Full rise too far down from fall-plate. Increase amine. Extend fall-plate. Reduce speed.
Side splits		Too much build up in the trough. Go over to another amine. Increase total output. Reduce trough volume.
Side splits		Trough build up. Reduce the reactivity of the formulation. Reduce the amine. Change type of amine.

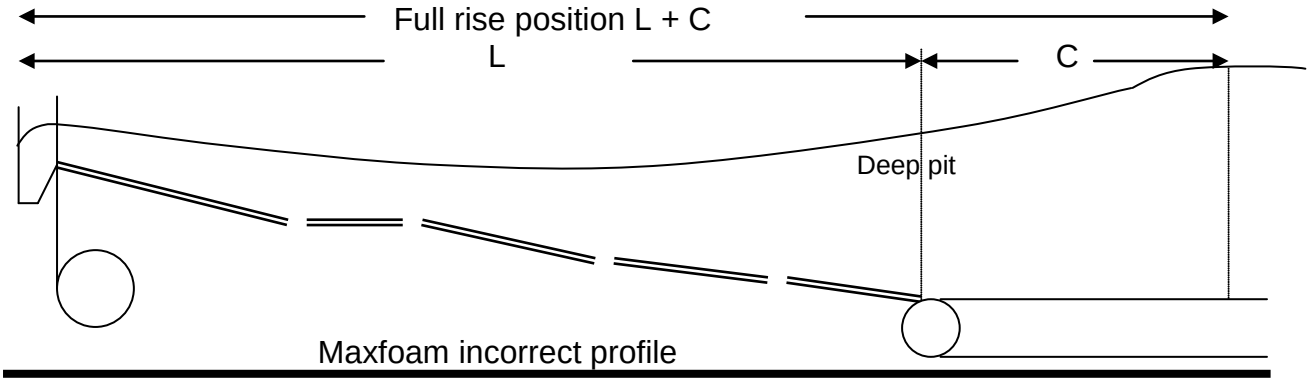
FAULT	DESCRIPTION	RECOMMENDATION
Centre split		Lump in the centre of the top skin. Vertical line of densified material in the centre of the block together with a small lump onto the top surface. This is caused by a low viscosity of the mass at the top of the trough. Increase the amine level. Use a lager trough.
Horizontal holes		Horizontal holes underneath the top skin. On the top surface of the block a waving pattern can be recognised. The curved lines move into the top surface and underneath the top, horizontal holes (approx. 1” diameter) can be found. The waving pattern indicates that there is too much flow on the fall-plate. Increase amine level. Use a lager trough. Lower the angle of the first fall-plate section.
Splits out from a shiny bubble		Increase the mixer speed Increase the Stannous Octoate Increase the Silicone Increase DABCO 33LV (the hardening amine) Decrease A1 / DMEA (the blowing amine) Only one change at the time Uncontrolled air is entering the mixing head and the foam has not hardened enough to stand the pressure that is inside these bubbles.

FAULT	DESCRIPTION	RECOMMENDATION
To much air bubbles		Increase the mixer pressure Check that the air injection needle or nozzle is ok. Make sure that the air is injected into the chemical stream through the needle and not passing outside the rubber seal for the needle. Reduce the air injection flow. Remove all build-up material which is left in the mixing head, the flexible hoses and the trough. Blocked or not cleaned filters will give too much restriction and thereby under-pressure in the pipe line. Under-pressure releases air from the chemicals. The chemicals (Polyol, TDI and catalysts) can absorb a large quantity of air and when under-pressure is applied to the chemicals, an enormous development of air bubbles take place and it will take a long time (48 hours for polyol) before large air bubbles are dissolved into the liquid again Check the Polyol pipes, it is important that you are using 4” pies and 6” filter before the pump, and that out from the pump all changes of pipe dimension is done with conical pipe parts, and only long bends are used. Be sure that all pipes have an angle up streams to the mixer. If the pipes are going up and then down again and then up again on the way up to the mixer, air could be trapped inside the pipes on the highest position. Check that the Polyol is not splashing into the tank when the pump is running on recirculation. Do not run the pump too long on recirculation before foaming. Be sure that no air could follow into the pumps due to vortexing of the liquid. That can happen especially for thin liquid as for TDI, water and MC if the outlet on the tank is situated in the bottom. It is advisable to fit a baffle plate over the hole in the tank in order to prevent the liquid vortexing through the pump.
Too much air in bottom of block.		Too high temperature on the blowing agent makes it gas (boil) too early, reduce the temperature. 14 centigrade can be too high, reduce to 10 centigrade. Too high temperature on the polyol or too high temperature in the trough makes the blowing agent gas too early. Be sure that you are using Methylene Chloride which is suitable for use in foam production.

DOMED PROFILE

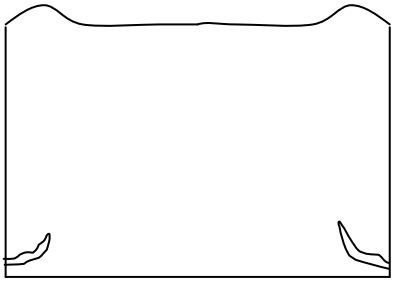


Full rise to far down conveyor
Incorrect flow pattern.



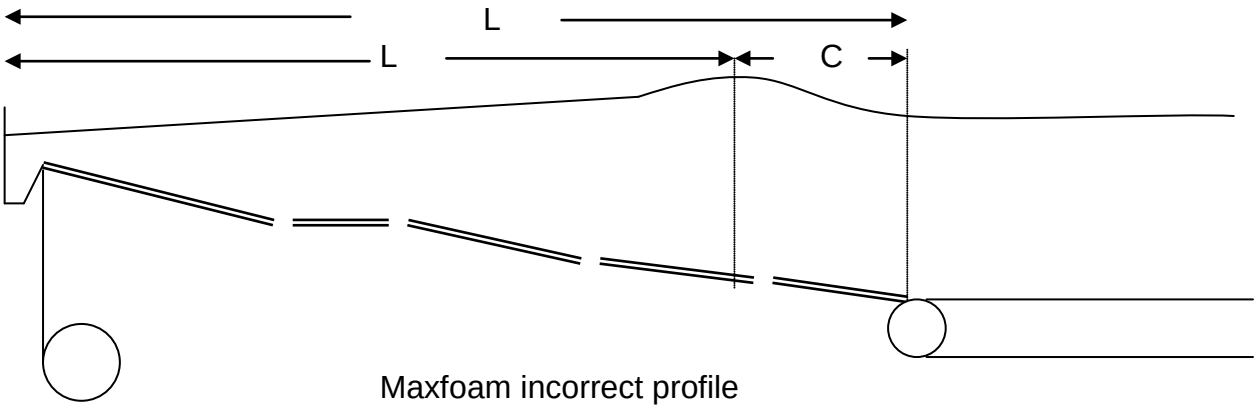
Maxfoam incorrect profile

CONCAVE PROFILE



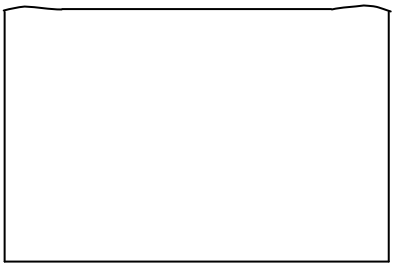
Bottom corner split:
The full rise is on the fallplate
Full rise to close to trough.

Reduce the amine or
Reduce the fallplate length or
Increase the conveyor speed or
Increase the output

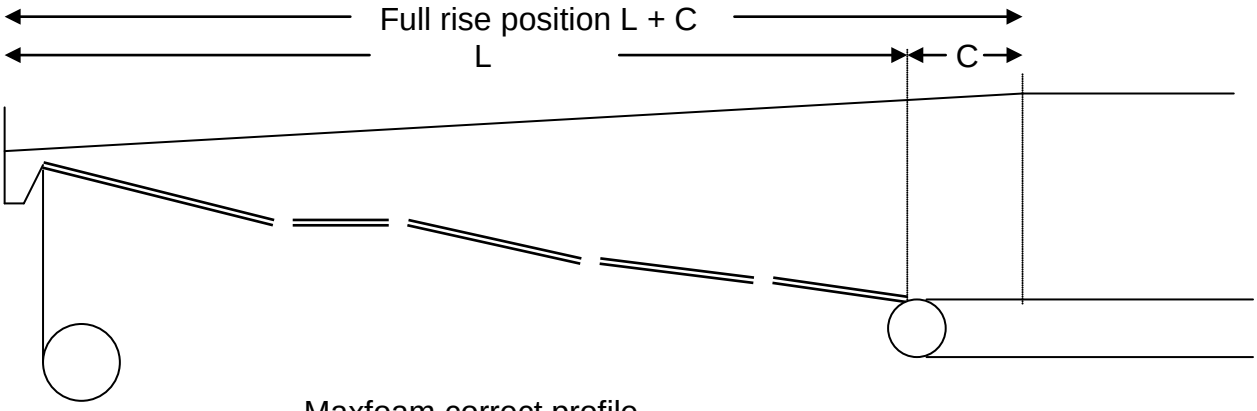


Maxfoam incorrect profile

MAXFOAM PROFILE



Rectangular profile
Correct profile.



Maxfoam correct profile

LAADER BERG Online

To meet our customers need for updated information and always improving our service to the marked, we will continue to develop services and in depth information over the Internet. We recommend you to visit **www.laaderberg.com** to be updated about the latest news and achievements.

Languages
At www.laaderberg.com we will continue to publish in depth information on several languages. As a start you can choose between English, French, Spanish and Chinese. More languages will be added over time.

Return of Investment calculation
Based on years of customer experience and the latest Maxfoam™ technologies achievements we are now providing ROI calculations. The ROI calculations presents payback times and investments for different foaming technologies, based on your company yearly production volume.

Online Service-desk
With more than 450 plants delivered all over the world, in daily operation, we provide our customer with the best personal service in the industry.

Online assistance
With the latest computer technology we can remotely log on to your Maxfoam™ Computer System and monitor the foaming process, analyze log files, and assist you in fine tuning the setup of formulations and foaming-runs.

FAQ, Tip, Tricks and Traps
To assist our customers to improve and develop both products and production process, we have categorized the most frequently asked questions, and our recommendations. Even though our customers are very skilled and devoted to the art of foaming, we have over time experienced that there are alternative solutions that could be beneficial and worth sharing. Likewise we are also pointing out traps that it's easy to fall into, and how to avoid doing these mistakes.

Trouble shooting
Our service and technical staff are always available to support you. We are constantly sharing our trouble shooting experience. This information is categorized and makes it easy for you to search by categories for finding solutions.

Contact

Visit address:
Langrabben 14
N-6013 Aalesund
Norway

Post address:
P.o.box. 9514 Flisnes
N-6047 Aalesund
Norway

Phone: +47 70 17 74 00

E-mail: post@laaderberg.com

LAADER BERG®
World Class standard with Maxfoam™
www.laaderberg.com