The Effects of Track Stability on Point Systems; Page One

- Voiding

Track stability through points is very important, probably the most common cause of point failures is voiding or the effects of voiding.

Voiding causes the switch rail to ride unevenly on the slide chairs, this will either slow the points considerably or completely disable them if associated with dry slides.
Even if Schwihags are fitted voiding will prevent the rollers from operating as designed and the points will fail sooner or later.
If the points are mechanical, voiding will make them become extremely heavy to move.
Voiding is the term used where the ballast bed underneath the points is inadequate and will cause the track to drop into a void or individual timbers may be affected.
Where the switch rail is not riding on the slide chairs this is known as 'Hogging'.
The rectification of voiding is by lifting and packing or kangoing requiring return visits or by permanent repair using a tamping machine, however, the hire of a tamper can be expensive and therefore manual packing is the preferred method.
The lifting and packing method is done by using a super-elevation gauge and slewing jack, and using small chippings to put under the timbers to create a firm bed.
A return visit to repack is highly likely several times to ensure an even and firm bed after several trains have run over the points.
Kangoing is the best manual option, as this pushes existing ballast firmly under the timbers and is less likely to require a return visit.
Voiding will affect many things, such as severe wear on parts including the bending and distortion of some S&T equipment such as detection rods especially on any fitted 998 detectors.
A common S&T fault caused by voiding is a term called 'blobbing', this is where point equipment bouncing will cause the detection to break momentarily with the passage of a train and will make any signal that relies of the point detection revert back to red, this could be on another line with the potential to cause a 'SPAD'.

Figure 1: Switch rail not sat on slide chair in closed position.

Figure 1a: Wet beds caused by voiding (where water is 'pumped' up to the surface by bouncing).

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The effects of voiding may become apparent but may be caused by 'sleeper indentation', this is where the chairs become loose and embed themselves into the sleeper, this will cause the track to bounce and simulate the effects of voiding.
The only solution to this is to renew the sleeper. (See below).

Figure 2: Indented sleeper and sunken chair.

- Gauge issues: 'Gauge Indifference'

The gauge is very important and is something that must be checked prior to fitting or setting up S&T equipment on points.

Gauge indifferences throughout the length of the points can cause major problems when trying to set up the drive (machines only) or the facing point lock.
The switch rail is manufactured along with the stock rail together and are installed as one complete unit, this is to ensure they are a true fit with one another.
If this is compromised then it can cause the points to fail, for instance, if the switch rail fits up at the second chair because the gauge is tighter there than at the front chair and therefore it is stood off over the front chair, the points may fail to lock (see figure 2).

Figure 3: Switch rail stood-off 2mm at front when closed.

This is becoming quite common and can especially be a problem with clamplocks and mechanical points as these have less pressure to close the switch rail than machine operated points.

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The gauge indifference can be the result of several things, such as incorrectly drilled sleepers, roadspread, uneven/poor rail grinding or even incorrectly fitted stretchers in which the stretchers may be preventing the switch rail from fitting up.
Re-gauging of the points is necessary (i.e: new sleepers), or temporary packing may be used, this is either 'web liners' behind the chairs to alter the gauge or temporary S&T fender shims *(for points fitted with fender only),* available in 1mm & 3mm sizes to enable the point blade to fit up at the front better.
The maximum allowable packing for web liners is 5mm & for fender shims is 3mm.

- Gauge issues: Wide gauge/Tight gauge

A wide track gauge should be avoided at all times, but with wooden timbers the stretching/deterioration of the wood due to age, atmospheric conditions and the amount of traffic is a common factor and will attribute to causing a wide gauge.

A wide track gauge at the front of the toes on points may not always be caused by defective sleepers.
The orange nylons that are fitted beneath the Pandrol clips play an important role when fitted to the sleepers in front of the points. If the nylons are displaced, either during installation or over time the points can become wide at the toe - see below.

Figure 4: Correctly installed nylon

Figure 4a: Displaced nylon

Even with defective sleepers there are still tolerances to follow, these are 1430-1438mm for vertical rail and 1433-1441mm for inclined or bull head rail.
A soleplate MUST be fitted to all points on the first timber. This is a legal requirement and ensures that the gauge will be kept within tolerance to some degree.
The effects of a wide gauge will cause all points to fail, by either loss of detection or failure to lock.
It will also become a major factor is causing Flange Back Contact (FBC) and an increased Residual Switch Opening (RSO).
These will cause huge amounts of stress on the stretchers especially at the rear and also on the backdrive.
S&T instruction TRK/1202 (setting up of fixed stretchers) relies heavily on the track gauge being within tolerance.
The switch opening will increase and could make the setting up of the detection and FPL impossible.
A severely wide gauge should **NEVER** been compensated by the packing out of S&T equipment.
A tight gauge will also carry implications for S&T equipment, such as, again, failure of detection and failure to lock.
It will also reduce the switch opening and this may make setting up of detection and FPL difficult, and may also introduce FBC (reduced FWC).

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- Crippled Switch Rail

A crippled switch rail has very similar effects of by those above caused by gauge indifference, but is much harder to cure or compensate.

A crippled switch is basically a switch rail that has become severely distorted and shaped 'like a banana' this could be caused by several factors including a run-through in which a train/on-track machine (OTM) has continued unauthorised whilst the points were closed in the wrong position and the train/OTM wheels have prised them open, or the switch and stock rail were incorrectly handled during installation or in fact incorrectly fitted stretcher bars (the rail may return to its original designed position if the stretchers are removed depending on the length of time they have been fitted).

The cure for a crippled switch rail is usually replacement, but depending on severity, the stock and switch rail could be grinded and re-profiled.
A crippled rail occurring after the S&T equipment has been fitted may cause the points to fail, but fitting S&T equipment to a existing crippled rail will be extremely difficult especially on Clamplocks.

- Dipped Joints

Dipped joints (DJ's) will primarily only cause problems to points systems when they are very close to the operating mechanisms, usually within 2-3m away.
The vibrations from DJ's can be quite severe and may cause the detection to 'blob'.
Lifting and packing either by shovel or Kango's is the immediate preventative measure.
The picture below is of a dipped joint – notice the left-hand rail has a wear spot caused by the train wheel hitting it hard.

Figure 5: Dipped rail joint (this is an IBJ and has shattered the insulated 'T' piece in the centre).

- Slide Chair Gaul

Slide chair gaul is not very common but is still a cause of points faults.
This type of defect in its severity will prevent the switch rail from fitting up at certain points or along the entirety of the switch blade.
It is usually caused by a twisted switch blade digging into the slide chairs or a switch blade constantly closing with the passage of a train if the RSO is particularly large or no backdrive is fitted.
The cure after it has occurred is to grind the slide chairs or to replace the nylon baseplate tops (if these are fitted), and then to prevent it happening again.

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Pictured below is a chair affected by 'gaul' in the first stages.

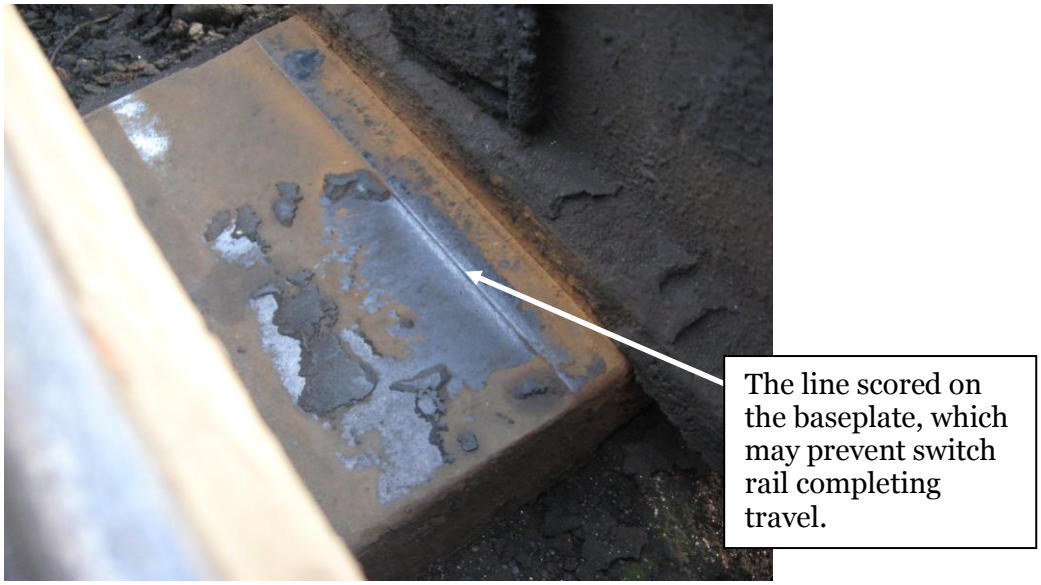

Figure 6: Chair Gaul

Specific faults on machine operated points caused by Pway defects:

- Voiding

Slow machine, distort drive, detection & lock rods, wear out lock blades, severe vibration will wear out other parts in machine or 998 detector if fitted, cause loss of detection momentarily ('blobbing').

- Tight gauge

Will induce more stress on the drive & will lead to cracked/broken stretchers/shoes, may bend drive rod & lug, may wear out lock blades as the 1.5mm clearance could be lost.

- Wide gauge

Will cause points to fail to lock, will increase FWC and introduce FBC and increase RSO & put added pressure on stretchers and backdrive to cope.

- Switch Creep

(Where one rail leads the other – tolerance is up to 12mm).
Will distort stretchers and shoes increasing risk of fracture or break, will cause rods to become bent and may cause false detection, will force machine detector and lock blades to enter machine abnormally which may jam and stop machine from operating or slow it considerably.

Specific faults on Clamplock operated points caused by Pway defects:

- Voiding

Will cause blobbing, will wear out adjustable cam follower and adjustable cam on open side, may cause microswitch contacts to wear out prematurely, decrease gap between thrust bracket and tie bar and jam (and could cause track circuit failure).

- Tight gauge

Will reduce switch opening and may stop detection from making as cam followers will drop off the cams (open side), will fail FPLT (will lock with 3.5mm gauge inserted).

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- Wide gauge

Will prevent points locking as body is getting further away, again due to postioning of cams/cam followers it may prevent detection, will increase FWC and RSO.

- Switch Creep

Will increase stress on shoes and stretchers, if points are diamonds it could completely throw out the angle and the points will totally fail to move (the positioning of the switch rails in relation to the stock rail is vitally important on switch diamonds), will cause the drive lock slide to enter body abnormally and may fail to lock.

- Lipping *(for both types of operating systems)*

Lipping is caused by the metal of the stock rail edge being flattened and bent over and down the inside of the stock rail causing the switch rail to fail to fit up. In severe cases it can actually bend over the switch rail when closed and jam the points closed preventing it from opening.
It is usually more severe when the points are only used in one position and the open side will become more worn on the top of the stock rail.
The cure is to grind off the lipping using a hand angle grinder or for severe lipping by rail mounted stone grinder.
Prevention is to regularly grind the stock rail and keep it within its intended profile.

The condition of the permanent way is vitally important to S&T equipment, the majority of points failures is either points failing to fit up, failure to detect or lock due to Pway issues.
If the points are working OK on arrival when you are called to them due to an earlier failure, you must be absolutely sure the Pway is not the primary cause if the points require adjustment, as the points WILL fail again if you adjust the points to compensate for poor Pway.
If you suspect a point failure is down to a specific Pway problem, this must be stated on the fault report and sorted by the Pway dept BEFORE the fault is booked in order.
REMEMBER: NEVER install packing to compensate for an extremely wide gauge, this may lead to a derailment.

E N D

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