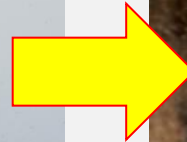


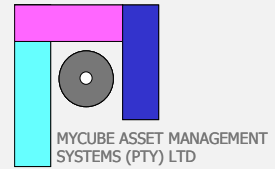
DISTRIBUTOR CALIBRATION



RPF May 2017

Gerrie van Zyl

Scope



- **Introduction**
- **Why do we need Quality Assurance ?**
- **Current major problem - Tramlining**
- **Current Tests and specifications**
- **Why do we still get tramlining?**
- **Proposed adjustment**

Do we really need QA ?



3 - 4 years

Quality can only be achieved
by attention to detail !!!

Reality of current seal projects

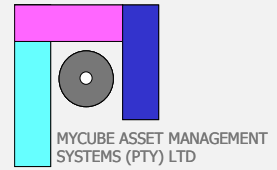
- **NB: All calibrated distributors in RSA ??????**



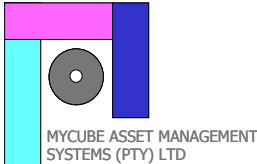
2016 – 2017 ???



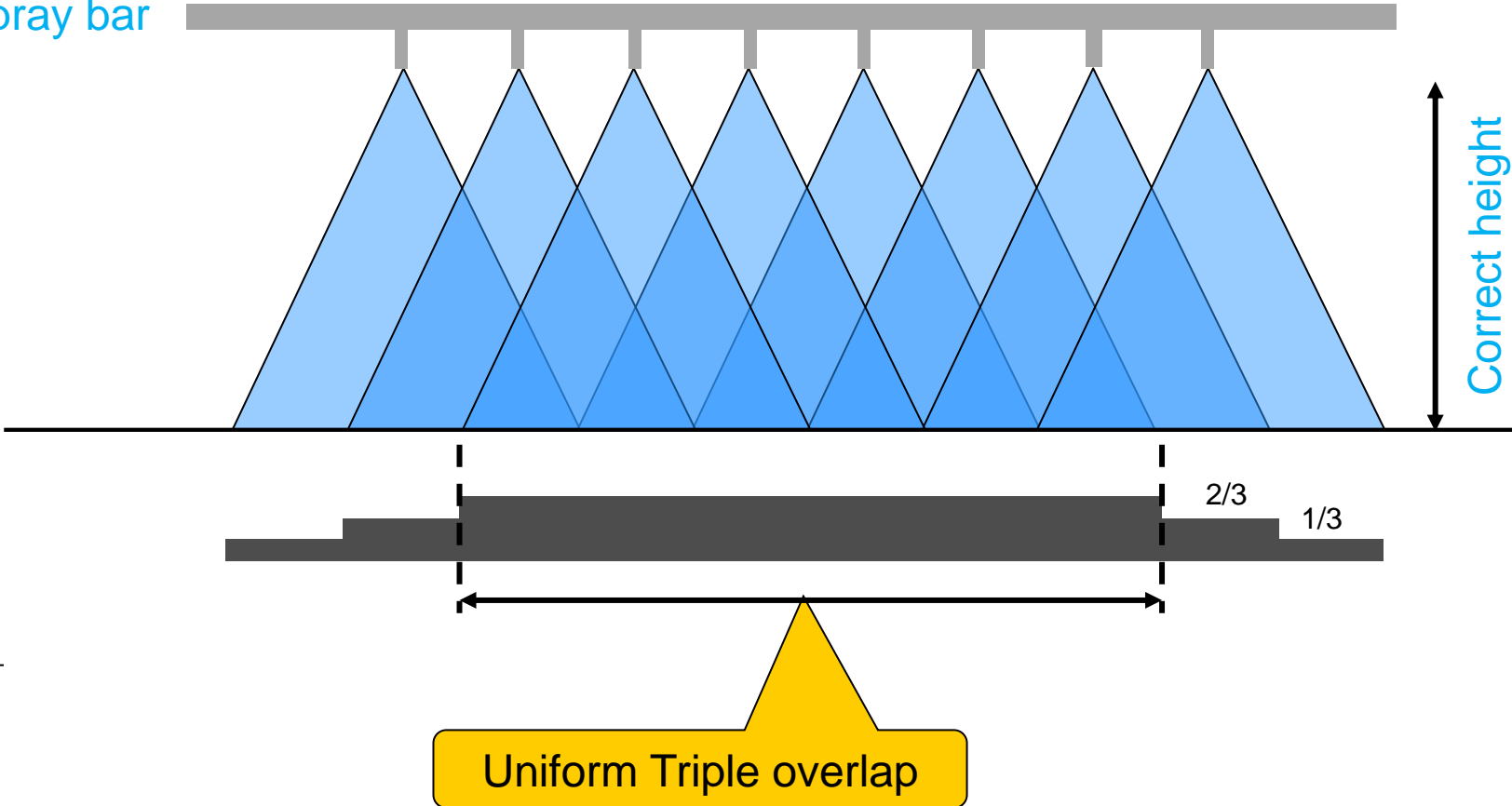
How do we get it right ?



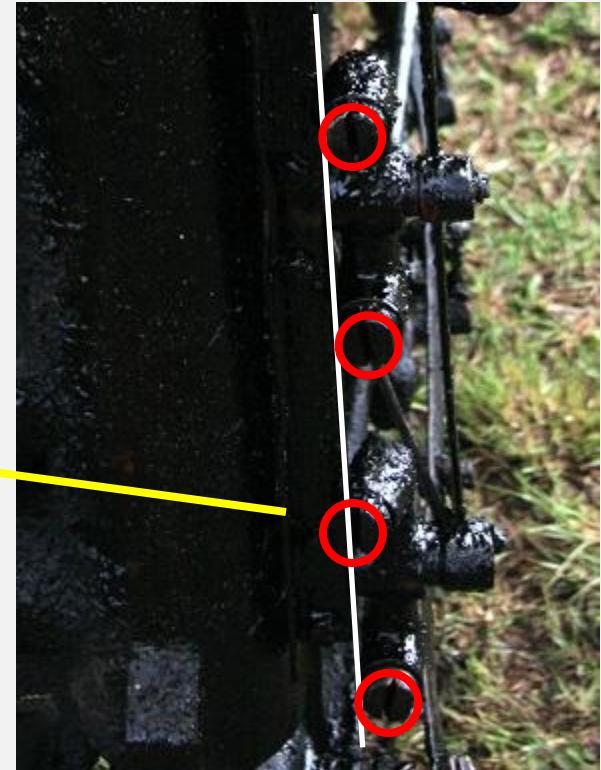
Uniform application rate



Spray bar



Nozzle alignment

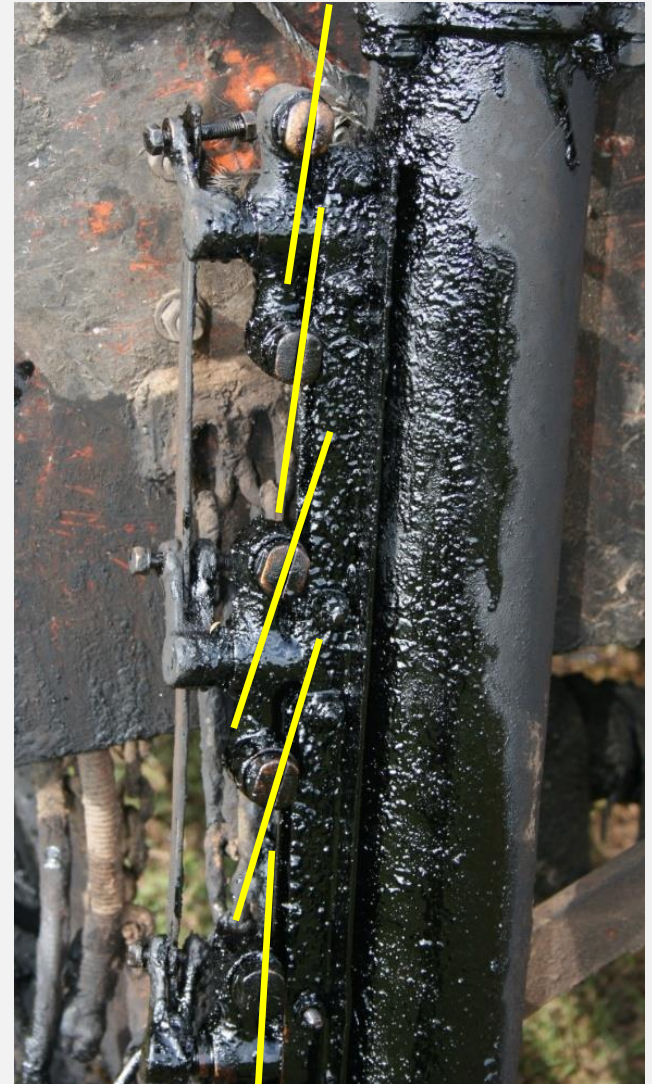


Observed

Nozzle angles



Observed

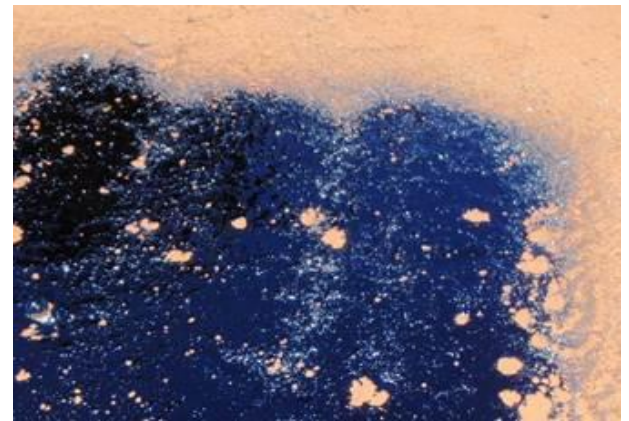
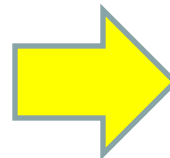
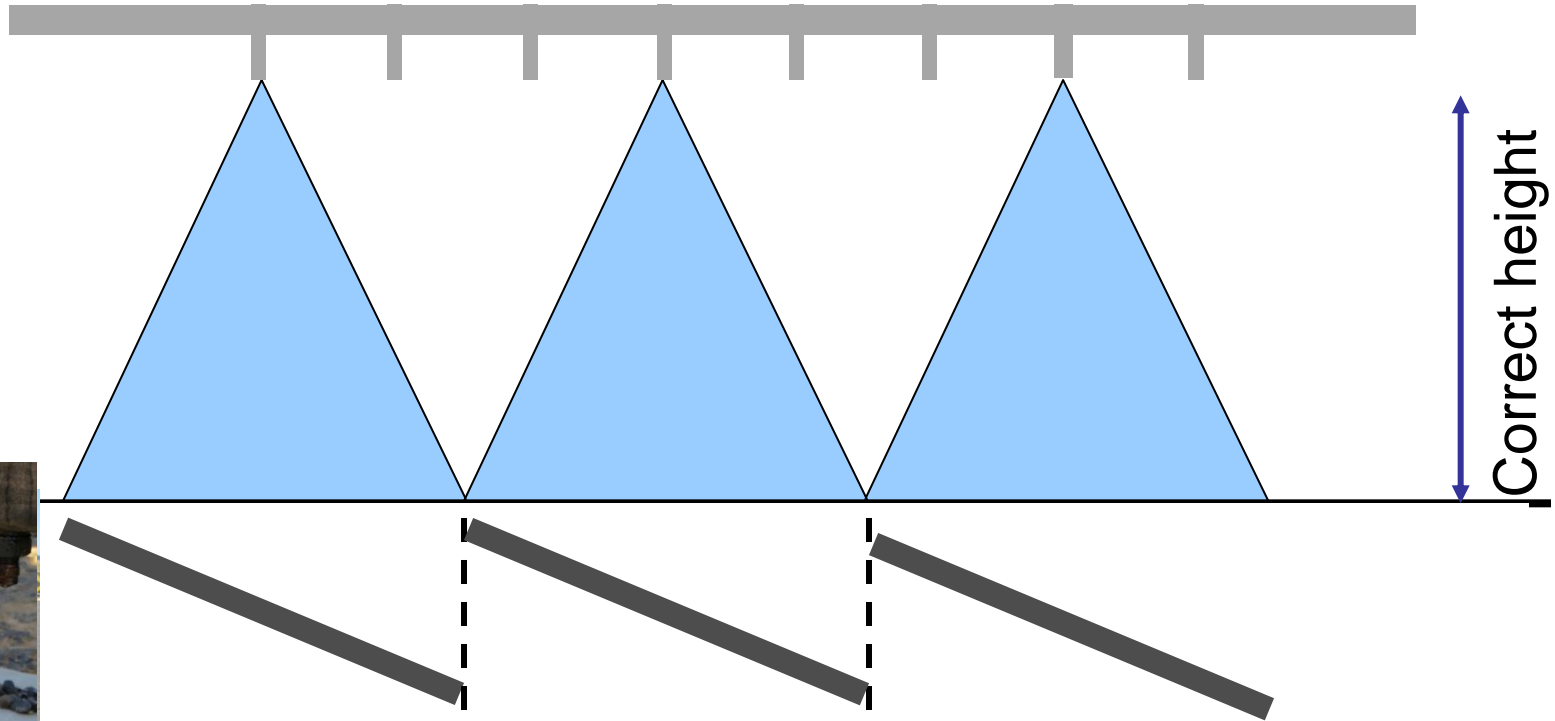


Nozzle setting



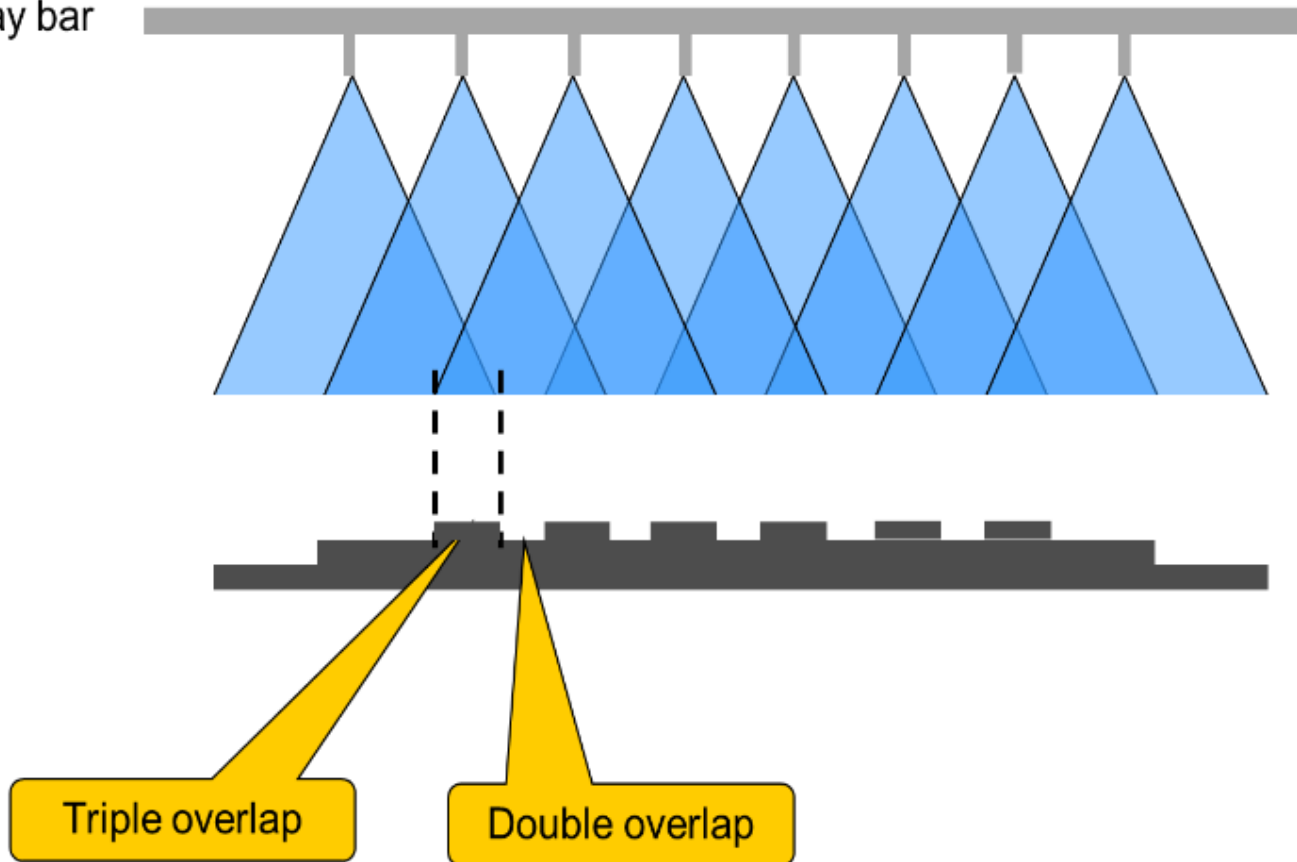
Check bar height

Spray
bar



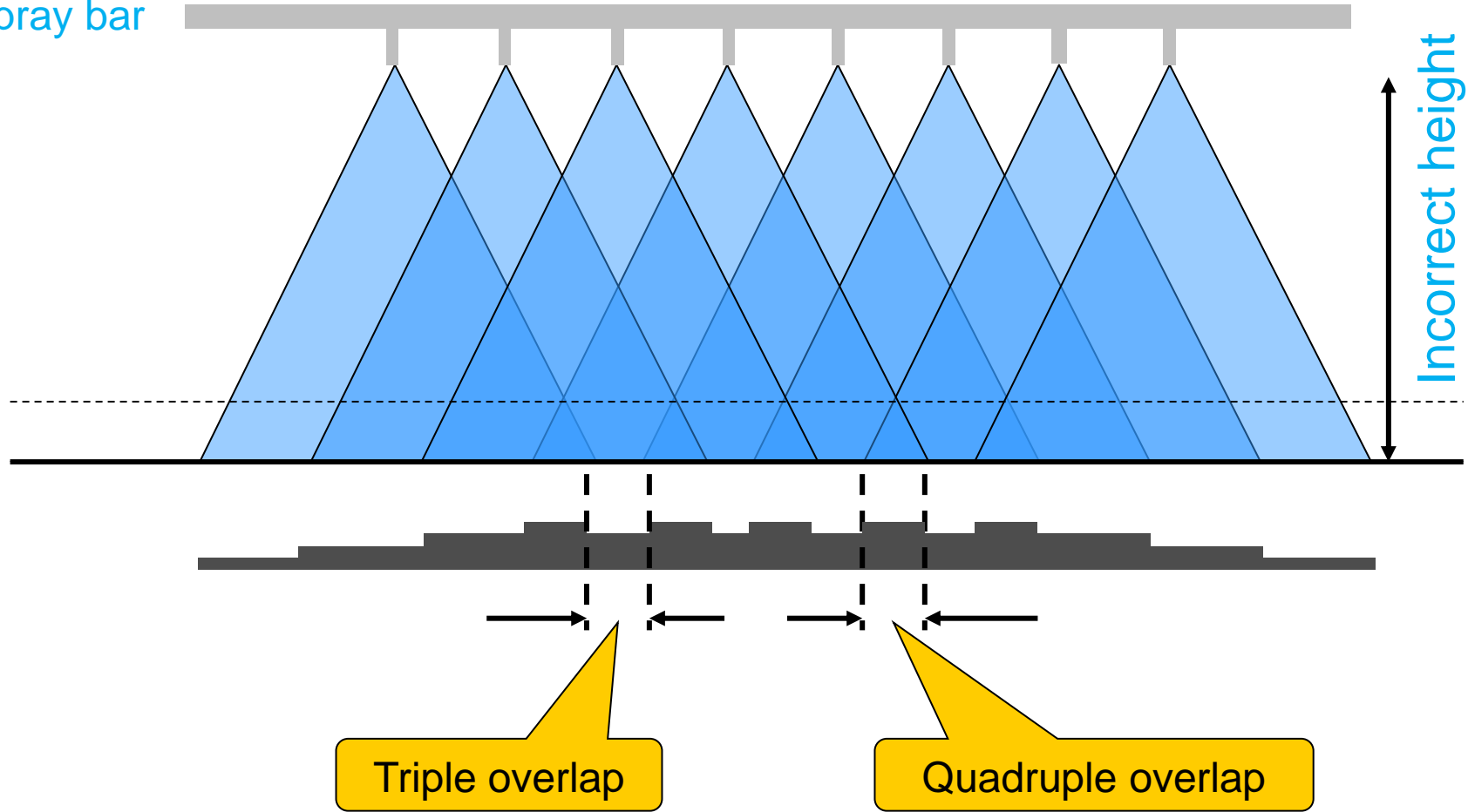
Spray bar too low

Spray bar



Effect of too high spray bar

Spray bar



Effect of too low pressure

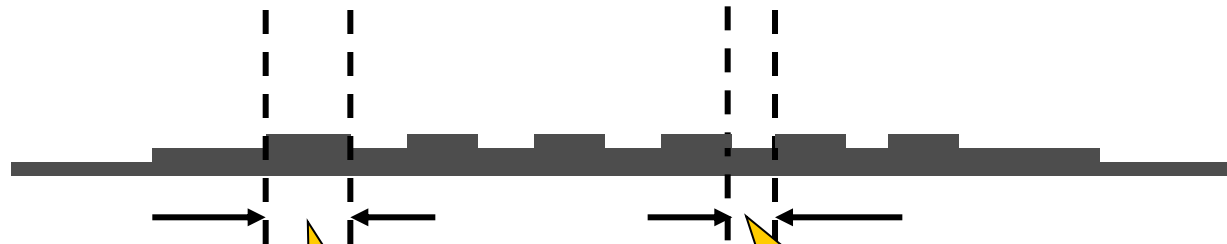
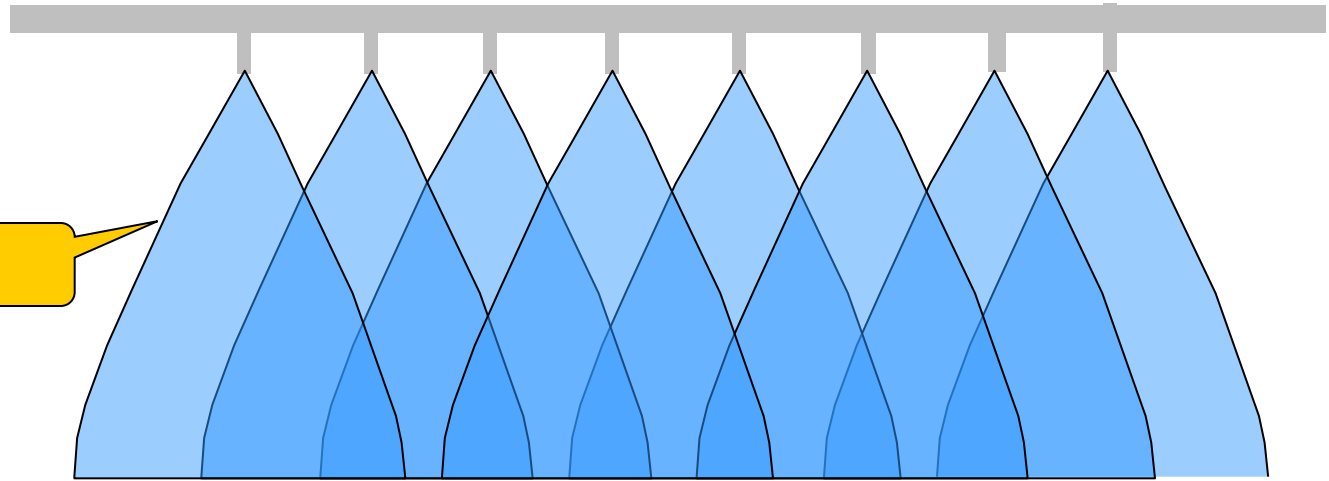
Spray bar

Poor fan

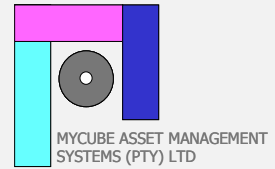
Correct height

Triple overlap

Only double overlap



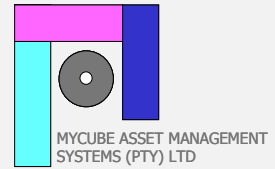
Current SANS 3001



SANS 3001 forms part of a set of tests for annual certification of a binder distributor as fit for purpose, and includes the following:

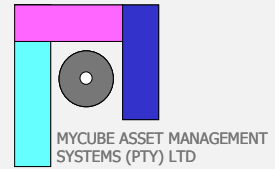
- a) validation of a dipstick (see SANS 3001-BT21);
- b) power and road speed (see SANS 3001-BT22);
- c) pump system performance (see SANS 3001-BT23); and
- d) spray bar transverse distribution (see SANS 3001-BT24).

Interval, who, where?



- **SANS 3001-BT20:2010** Edition 1
- At an intervals of not more than **12 months** the vehicle shall be tested as described in SANS 3001-BT21, SANS 3001-BT22, SANS 3001-BT23 and SANS 3001-BT24.
- The testing shall be **carried out by employees** of the vehicle owner and all results shall be observed and recorded by a **representative of an accredited independent testing organization**.
- The employees shall be responsible for conducting the tests in a safe manner. The tests may be carried out at the **owner's depot or at an approved testing facility**.

Certificate



The **certificate shall be issued by the independent testing organization** after each successful procedure, indicating that the vehicle is fit for purpose and shall contain the following details:

- a) the name of owner;
- b) the name of independent testing organization;
- c) the make and model of vehicle;
- d) the vehicle registration and VIN numbers; and
- e) the date of testing.

The reports from the individual tests shall be attached to the certificate

- **Power**

- Must be able to reach 300m/min (18 km/h) in 2 sec

- **Speed**

- Increments of 60m/min to 300m/min
- Road speed indicator must be within 5%

- **Spray Bar height**

$$H_{SB} = \text{ROUND} \left\{ \left(\frac{1,5N_{SP}}{\cos N_A \times \tan 0,5F_A} \right) \right\}$$

where

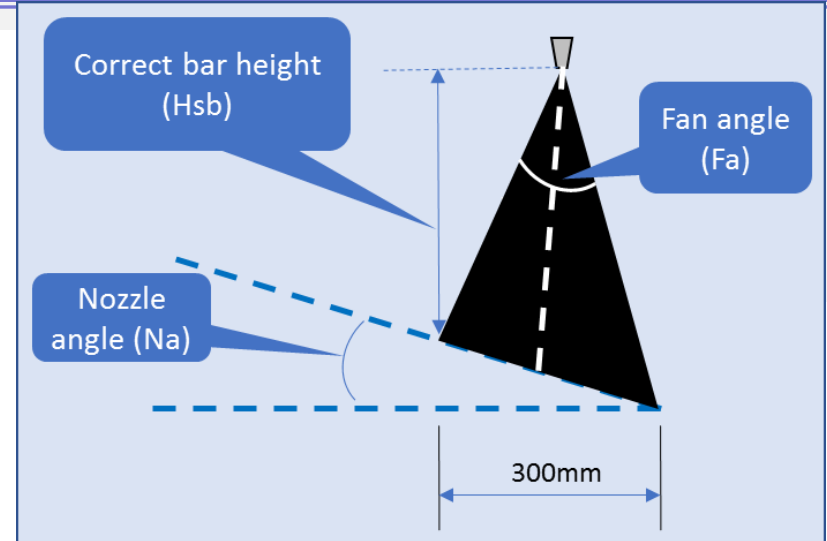
H_{SB} is the spray bar height from nozzle tip to road surface, expressed in millimetres (mm);

N_{SP} is the nozzle spacing, expressed in millimetres (mm);

N_A is the nozzle angle to the spray bar axis, expressed in degrees;

F_A is the fan angle of the nozzle, expressed in degrees.

NOTE For most distributors (nozzle spacing 100 mm, nozzle angle 30°, and fan angle 80°), H_{SB} is taken as 210 mm.



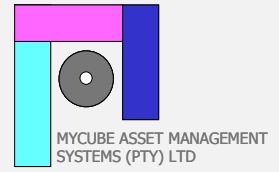
- **Pump output consistency**
 - Set to 150 l/min/m (4.2m spray bar width)
 - Discharge per 30sec for 3 min
 - Allowable difference (Max-Min) =0.7 l/min/m

Transverse distribution (Bucket Test)

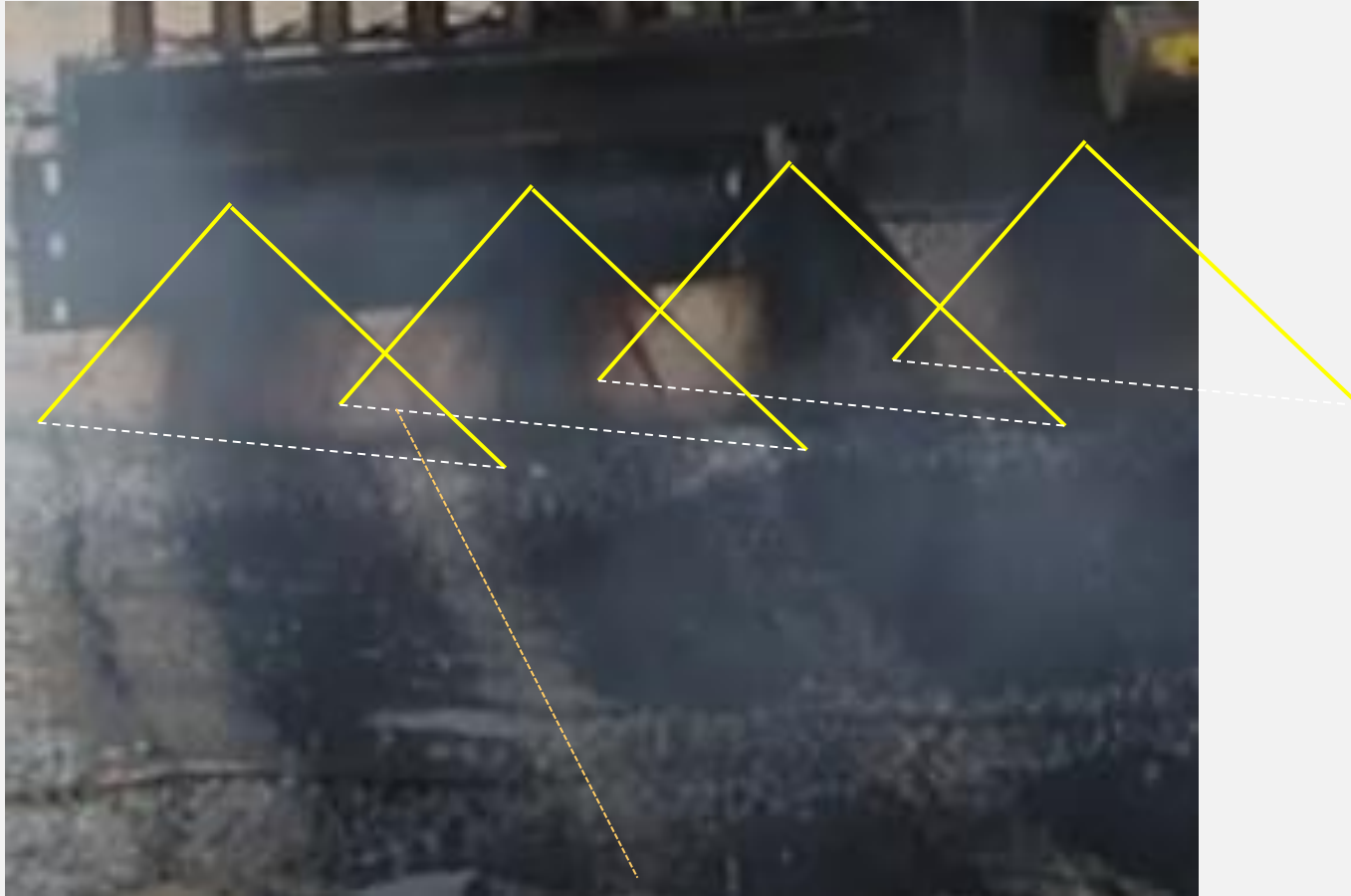
- Uniform discharge per 3 nozzle sets (Each nozzle vs average)
 - 5 % for emulsions, cutback, or penetration binders;
 - 7 % for polymer binders; and
 - 10 % for bitumen rubber
- Mean of left-hand and right hand bar sections vs mean of centre (5%)
- Mean of left-hand vs mean of right hand bar sections (5%)



Why do we still get tramlining ?



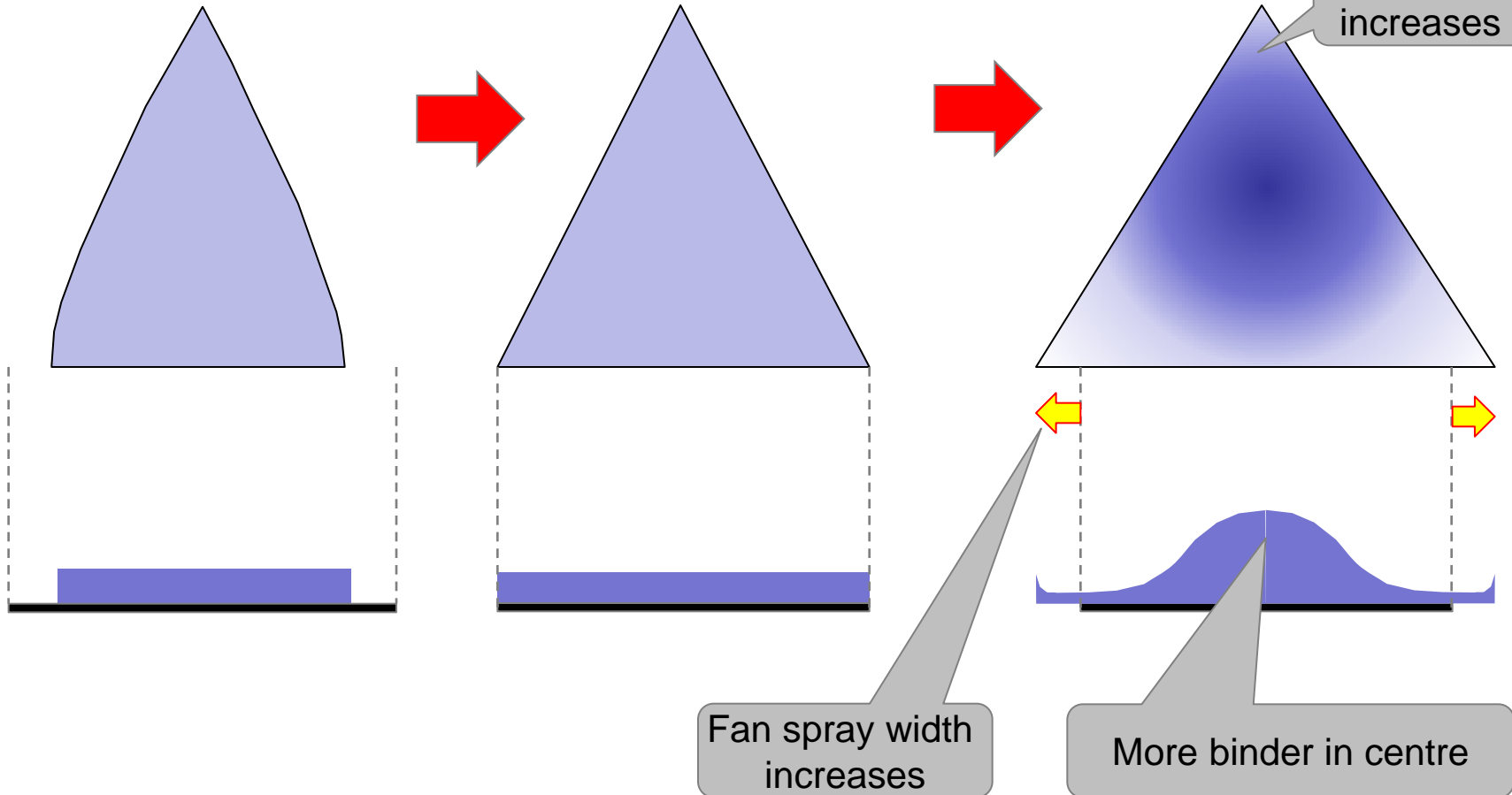
Effect of too high pressure



Pressure effects

Too low pressure

Too high pressure



Poor fan also visible on edge



How can we test and certify uniform fan transverse distribution ?

- **Several alternatives considered**
- **Variables**
 - Viscosity (Binder and temperature)
 - Nozzle design
 - Pump speed and pressure
- **Also full calibration plant** →

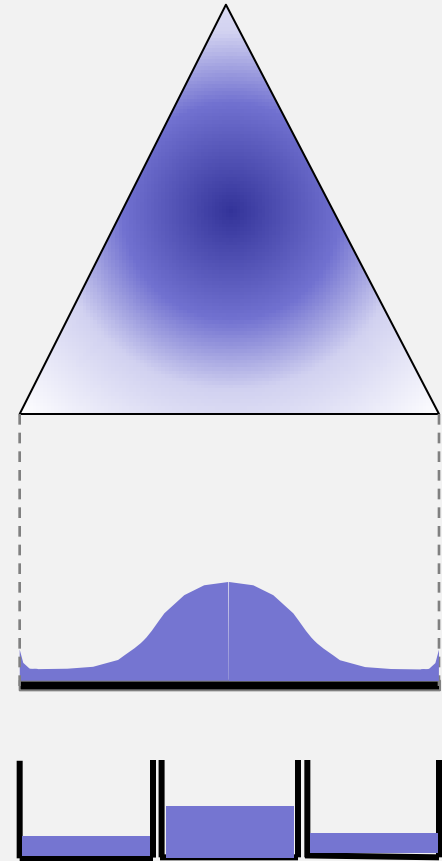


- **Need simple process that could also be used on site**

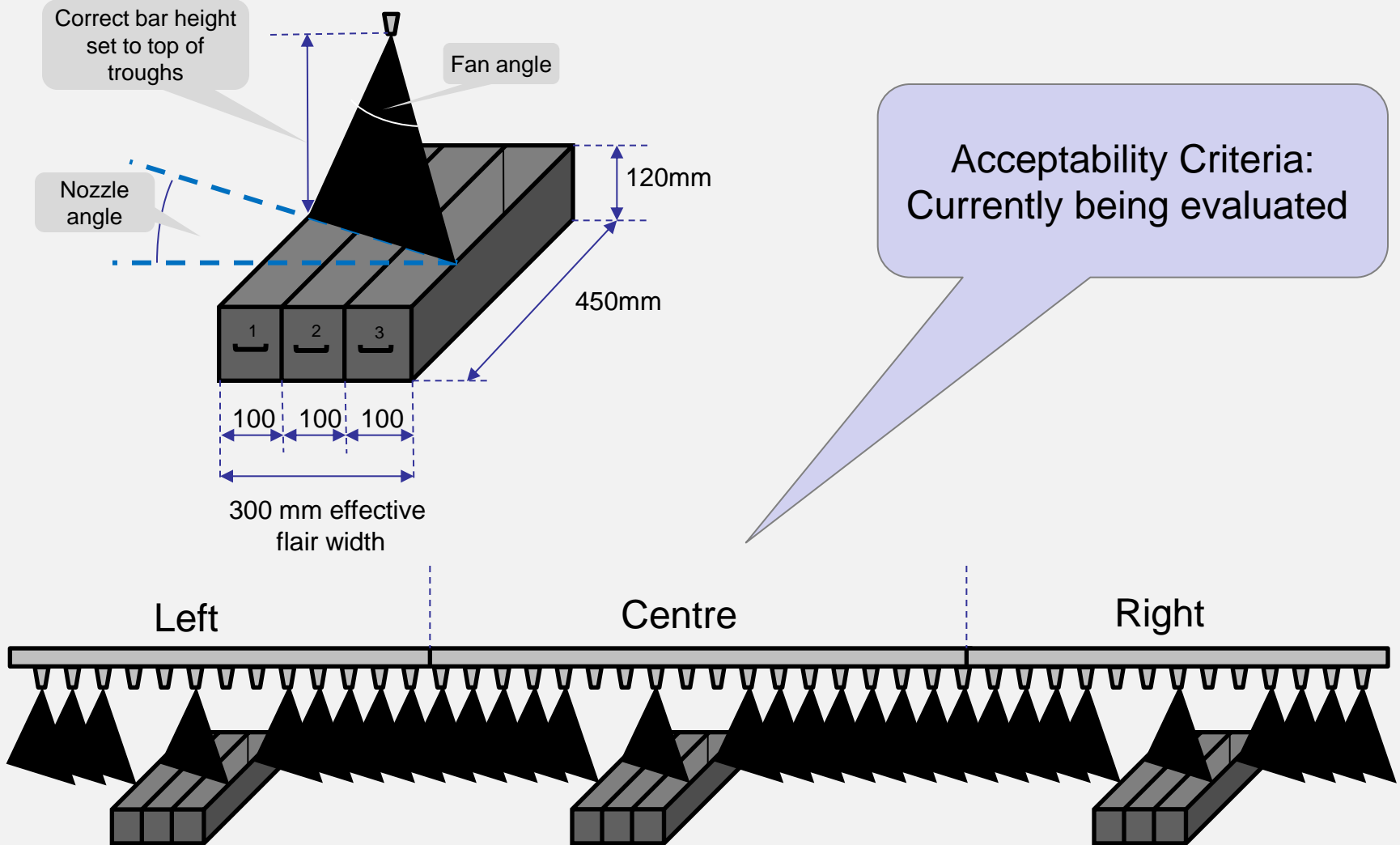
- **Spray fan distribution test**

- Sprayer calibration
- Site QA

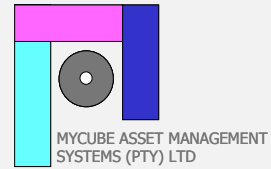
Principle: Test variation across fan width



New: Spray fan distribution test



Application



- **BT25 compliments BT21-BT24**
- **Responsibility of supplier/distributor owner**
 - Determine appropriate pressure and spray bar height to obtain a uniform distribution over the fan width for 3 binders e.g.:
 - 65% Cationic Emulsion at 60°C
 - 70/100 Pen bitumen at 170°C
 - S-E1 at 180°C
 - Testing during certification process
- **Certification**
 - Accredited independent testing organization
 - Recording and issuing of certificate
- **Site checks**
 - Check fan transverse distribution only with one binder

STOP !!!

