

COMMITTEE ON MATERIALS AND PAVEMENTS

Meeting (Annual or Mid-Year)	Annual
Date	August 7, 2019
Scheduled Time	3:15 – 5:00 PM
Technical Subcommittee & Name	5a – Pavement Measurement and Performance Measures
Chair Name and (State)	John Donahue (MO)
Vice Chair Name and (State)	Scott George (AL)
Research Liaison Name and (State)	Curt Turgeon (MN)

I. Introduction and Housekeeping

II. Call to Order and Opening Remarks

III. Roll Call of Voting Members

Present	Member Name	State	Present	Member Name	State
<input type="checkbox"/>	John Donahue (Chair)	MO	<input type="checkbox"/>	Clark Morrison	NC
<input type="checkbox"/>	Scott George (Vice-Chair)	AL	<input type="checkbox"/>	Jeffrey Mann	NM
<input type="checkbox"/>	Jesus Sandoval-Gil	AZ	<input type="checkbox"/>	Russell Thielke	NY
<input type="checkbox"/>	Craig Widen	CO	<input type="checkbox"/>	Patrick Bierl	OH
<input type="checkbox"/>	Leo Fontaine	CT	<input type="checkbox"/>	Heather Hall	TN
<input type="checkbox"/>	Bouزيد Choubane	FL	<input type="checkbox"/>	Scott Nussbaum	UT
<input type="checkbox"/>	Peter Wu	GA	<input type="checkbox"/>	Robert Crandol	VA
<input type="checkbox"/>	LaDonna Rowden	IL	<input type="checkbox"/>	Kurt Williams	WA
<input type="checkbox"/>	Richard Barezinsky	KS	<input type="checkbox"/>	Paul Farley	WV
<input type="checkbox"/>	Sejal Barot	MD	<input type="checkbox"/>	Lane Becca	ON
<input type="checkbox"/>	John Staton	MI	<input type="checkbox"/>		
<input type="checkbox"/>	Curt Turgeon	MN	<input type="checkbox"/>		
<input type="checkbox"/>	James Williams	MS	<input type="checkbox"/>		
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Quorum Rules Met?

Annual Meeting: Simple majority of voting members (☐y/ ☐n) | Mid-Year Meeting: Voting members present (☐y/ ☐n)

A. Review of Membership (New members, exiting members, etc.)

IV. Approval of Technical Subcommittee Minutes

See Attachment A.

V. Old Business

A. COMP Ballot Items

COMP Ballot #	Standard	Results (neg/affirm)	Comments/Negatives	Action
20	R 32	0/37	<i>Illinois</i> commented that the revised description for 'calibration' in Note 19 of Section 13.1.1 should be identical to the one in Section 13.1, since both refer to the same thing.	The descriptions should be the same, so the following editorial change was made to Note 19 under Sec 13.1.1: Note 1 —This rotation procedure is

A. COMP Ballot Items

COMP Ballot #	Standard	Results (neg/affirm)	Comments/Negatives	Action
				different from the relative calibration procedure done for a an annual reference calibration. ----- Ballot passed for revised standard.
21	R 41	0/37		Standard was discontinued.

B. Technical Subcommittee Ballots

TS Ballot #	Standard	Results (neg/affirm)	Comments/Negatives	Action

C. Reconfirmation Ballots

Reconf. Ballot #	Standard	Results (neg/affirm)	Comments/Negatives	Action
1	R 33	0/17	<p>Ontario commented that the 'Y-estimate' expression used in Sec 8.2.3 and 9.2.3 is not a typical statistic term. The nature of this term should be more accurately defined in the standard. The expression may reworded as "The standard error of the estimate for the load shall be" or simply "The standard error of the estimate shall be".</p> <p>Colorado commented that In Note 2 for 8.1.3, it appears that only dial indicators can be used. Should we allow digital indicators?</p>	<p>What is termed as the 'Y-estimate' is actually the estimate for the load, which is more accurate and understandable language so the following editorial change was made to Sec 8.2.3 and Sec 9.2.3 –</p> <p>"The standard error of the Y-estimate estimate for the load shall be no more than".</p> <p>Generally, users of the standard should not be confused to think the term 'dial' precludes reading a digital display, but to eliminate any misinterpretation the term will be deleted. <u>The following editorial change</u> will be made to Sec 8.1.3 –</p> <p>"The testing machine's dials indicated load should return to zero".</p> <p>-----</p> <p>Since both changes made were editorial in nature, the ballot passed for reconfirmation without further need for a COMP ballot.</p>
2	T 282	0/17		Ballot passed for reconfirmation.

D. Task Force Reports

Task Force #	Title	Members	Status/Update
	Dynamic Friction Tester Standard Development	Sejal Barot	

VI. New Business

A. New TS Ballots

1. 'Continuous Measurement of Sideway-Force Friction Number for Highway Pavements'

B. Revisions/Work on Standards for Coming Year

2. TP98-18 '*Standard Method of Test for Determining the Influence of Road Surfaces on Vehicle Noise Using the Statistical Isolated Pass-By (SIP) Method*'
3. TP99-18 '*Standard Method of Test for Determining the Influence of Road Surfaces on Traffic Noise Using the Continuous-Flow Traffic Time-Integrated (CTIM) Method*'
4. T360-16 '*Measurement of Tire/Pavement Noise using the On-Board Intensity (OBSI) Method*'
5. T256-01 (2016) '*Standard Method of Test for Pavement Deflection Measurements*'
6. R32 and R33 revisions – [Greg Uherek](#)

C. Review of Stewardship List

D. Proposed New Standards

1. Transverse profile standards - [Andy Mergenmeier](#)
2. Pavement surface 3D data format standards - [Andy Mergenmeier](#)
3. New method C for R 36 faulting standard (Attachment B) – [Georgene Geary](#)

E. AASHTO 'Guide for Pavement Friction' revisions - [Andy Mergenmeier](#)

F. NCHRP Issues – [Amir Hanna](#)

G. Research Proposals

H. Correspondence, Calls, Meetings

VII. Open Discussion

VIII. Adjourn

TS Meeting Summary

Meeting Summary		
Items Approved by the TS for Ballot <i>(Include reconfirmations.)</i>		
Standard Designation	Summary of Changes Proposed	Ballot Type
		<input type="checkbox"/> TS <input type="checkbox"/> COMP <input type="checkbox"/> CONCURRENT
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New Task Forces Formed		
Task Force Name	Summary of Task	TF Member Names and (States)
Research Proposals <i>(Include number/title/states interested.)</i>		
Other Action Items		



COMMITTEE ON MATERIALS & PAVEMENTS

2018 Annual Meeting – Cincinnati, OH
Wednesday August 8, 2018
8:00 - 10:00 AM EST

TECHNICAL SUBCOMMITTEE 5a Pavement Measurement

- I. Call to Order and Opening Remarks John Donahue – Chair (taking over from Greg [Stellmach](#)), Scott George – Vice Chair
- II. Roll Call States present: CO, FL, GA, IL, KS, MD, MI, MN, MS, NY, OH, VA, WV
- III. Approve August 2017 Technical Section annual meeting minutes Motion – MN, second - IL
- IV. Old Business

A. 2017 COMP Ballot Items

Ballot Name:	COMP 2017 Ballot
Ballot Number	
Ballot Start Date:	9/2017
Ballot Due Date:	10/2017
Item Number	24
Description	Concurrent ballot item to adopt as full standard PP 67 Quantifying Cracks in Asphalt Pavement Surfaces from Collected Images Utilizing Automated Methods.
Affirmative 44/51. Negative 0/51. Did Not Vote 7/51.	
No comments	
Item Number	25
Description	Concurrent ballot item to adopt as full standard and add "concrete pavement surface" to the Keywords section of PP 68 Collecting Images of Pavement Surfaces for Distress Detection.



Affirmative 44/51. Negative 0/51. Did Not Vote 7/51.	
Wisconsin Department of Transportation (Barry C Paye) (barry.paye@dot.wi.gov)	Section 6.5.1 - may want to include language about validation site including both asphalt and concrete pavements or individual validation sites for each surface type. Response: No change - there are many different considerations for validation sites, the existing language covers the items in an all encompassing method.
Item Number	26
	Concurrent ballot item to adopt as full standard and add "concrete pavement surface" to the Keywords section of PP 69 Determining Pavement Deformation Parameters and Cross-Slope from Collected Transverse Profiles.
Affirmative 44/51. Negative 0/51. Did Not Vote 7/51.	
No comments	
Item Number	27
Description	Concurrent ballot item to adopt as full standard PP 70 Collecting the Transverse Pavement Profile.
Affirmative 44/51. Negative 0/51. Did Not Vote 7/51.	
Virginia Department of Transportation (Charles A. Babish) (andy.babish@vdot.virginia.gov)	The provisional practice is very generic. The practice should provide specific details on the data collection and equipment capabilities. DOTs need a standardized practice for transverse profile data collection otherwise the DOTs are relying on vendor specific algorithms making it difficult to compare data obtained from profilers. Does the Technical Section intend to improve this standard and include specific details on data collection and equipment capabilities in the future? Response: No change - There are NCHRP and TPF-5(299) projects ongoing with the objective to improve the standard.
Item Number	28
Description	Concurrent ballot item to make a few revisions and remain provisional standard TP 98 Determining the Influence of Road Surfaces on Vehicle Noise using the Statistical Isolated Pass-by (SIP) Method. See pp. 12-36 of the minutes.
Affirmative 44/51. Negative 0/51. Did Not Vote 7/51.	
No comments	

Item Number	29
Description	Concurrent ballot item to make a few revisions and remain provisional standard TP 99 Determining the Influence of Road Surfaces on Traffic Noise Using the Continuous-Flow Traffic Time-Integrated Method (CTIM). See pp. 37-59 of the minutes.
Affirmative 44/51. Negative 0/51. Did Not Vote 7/51.	
No comments	
Item Number	30
Description	Concurrent ballot item to revise M 261 Standard Tire for Pavement Frictional-Property Tests with minor changes to match ASTM E501-08(2015). See pp. 60 of the minutes.
Affirmative 44/51. Negative 0/51. Did Not Vote 7/51.	
No comments	
Item Number	31
Description	Concurrent ballot item to revise M 286 Smooth-Tread Standard Tire for Special-Purpose Pavement Frictional-Property Tests with minor changes to match ASTM E524-08(2015). See pp. 60 of the minutes.
Affirmative 44/51. Negative 0/51. Did Not Vote 7/51.	
No comments	
Item Number	32
Description	Concurrent ballot item to revise T 242 Frictional Properties of Paved Surfaces Using a Full-Scale Tire with minor changes to match ASTM E274/E274M. See pp. 60-62 of the minutes.
Affirmative 44/51. Negative 0/51. Did Not Vote 7/51.	
No comments	

Item Number	33
Description	Concurrent ballot item to revise T 279 Accelerated Polishing of Aggregates Using the British Wheel with minor changes to match ASTM D3319. See pp. 63 of the minutes.
Affirmative 44/51. Negative 0/51. Did Not Vote 7/51.	
Maryland Department of Transportation (Sejal Barot) (sbarot@sha.state.md.us)	"Yes", with minor correction. AASHTO 5.3.2: Slider width 31.875 mm instead of 31.75 mm, per ASTM D 3319 Sec 5.3.2. Response: Change AASHTO slider width in 5.3.2 to 31.75 mm.
Item Number	34
Description	Concurrent ballot to delete R 48 Determining Rut Depth in Pavements. See pp. 4-5 of the minutes.
Affirmative 43/51. Negative 1/51. Did Not Vote 7/51.	
Affirmative votes	
No Comments	
Negative votes	
Tennessee Department of Transportation (Brian K. Egan) (brian.egan@tn.gov)	The new standard (PP70) are for fully automated systems, and have not been fully implemented or excepted. R48 allows for a standard practice to measure ruts "manually" with a template from site to site. Response: TN withdrew negative per Egan 11/3/2017 e-mail.
Item Number	35
Description	Concurrent ballot to delete R 55 Quantifying Cracks in Asphalt Pavement Surface. See pp. 4-5 of the minutes.
Affirmative 43/51. Negative 1/51. Did Not Vote 7/51.	
Affirmative votes	
No comments	
Negative votes	
Tennessee Department of Transportation (Brian K. Egan)	The new standard (PP68) are for fully automated systems, and have

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Egan) (brian.egan@tn.gov)	not been fully implemented or excepted. R55 allows for a standard practice to measure cracks/distresses "manually". Response: TN withdrew negative per Egan 11/3/2017 e-mail.

B. Technical Section letter ballot

Ballot Name:	TS5a Reconfirmation Ballot 2017
Ballot Start Date:	9/2017
Ballot Due Date:	10/2017
Item No.	1
Description	Reconfirm M328
Affirmative 19/20, Negative 0/20, Did Not Vote 1/20	
Arizona Department of Transportation (Paul Burch) (pburch@azdot.gov)	<p>Subsection 1.3 states, "It is intended to be sufficiently detailed that the data collected from multiple profilers will be identical." It is unlikely that data from different profilers would ever be completely identical. This sentence could benefit from additional clarification.</p> <p>Response: Profiler ETG consulted. For the 2019 production - Change the last 2 sentences in subsection 1.3 to: "The objective is to clearly define the function of an inertial profiler and specify standard outputs. The document provides technical specifications intended to ensure accurate and repeatable collection of roughness indices and the underlying profile from multiple devices."</p> <p>Subsection 4.1 states, "The equipment shall function independently from the vehicle suspension dynamics and vehicle speed throughout the operating range of 20 to 70 mph for high-speed profilers and less than 25 mph for low-speed profilers." Would it be beneficial to provide a lower limit (approximately 15 mph) for low-speed profilers? Response: Profiler ETG consulted. No change. The actual lower limits of speed for valid operation is not very consistent among</p>

	manufacturers, individual units for a given manufacturer, and road types. Note that the speed range for high-speed profilers could be thought of as an operational requirement, given that they have to make measurements on active roadways. For low-speed profilers, which operate on closed roadways, no such operational requirement exists, and the valid speed range will trade equipment cost and measurement efficiency off against validity.
Item No.	2
Description	Reconfirm R37
Affirmative 19/20, Negative 0/20, Did Not Vote 1/20	
Item No.	3
Description	Reconfirm R40
Affirmative 19/20, Negative 0/20, Did Not Vote 1/20	
Item No.	4
Description	Reconfirm R54
Affirmative 19/20, Negative 0/20, Did Not Vote 1/20	
Item No.	5
Description	Reconfirm R56
Affirmative 19/20, Negative 0/20, Did Not Vote 1/20	
Illinois Department of Transportation (LaDonna Rowden) (ladonna.rowden@illinois.gov)	A revision was made in Section 8.3.1.9 on Page 6 of the standard to change "in./mile" to "in./mi" for the units, but other locations were left alone. This standard needs to be reviewed and be consistent on using either "in./mile" or "in./mi" for the units. Response: editor to review
Kansas Department of Transportation (Richard A Barezinsky)	Renummer the footnotes. Response: editor to review

Item No.	6
Description	Reconfirm R57
Affirmative 19/20, Negative 0/20, Did Not Vote 1/20	
Item No.	7
Description	Reconfirm T317
Affirmative 19/20, Negative 0/20, Did Not Vote 1/20	

V. New Business

- A. Standards Requiring Reconfirmation Stewards were contacted by John and they were fine with just reconfirming these standards, with the exception of comments below by the FHWA.
- i. R32-11(2015) ‘Standard Practice for Calibrating the Load Cell and Deflection Sensors for a Falling Weight Deflectometer’ FHWA commented that “annual calibration” should be “reference calibration”; Motion to approve as a Subcommittee ballot – MN, second – FL; this isn’t an editorial change. NOTE: After the 5a meeting a last minute change was submitted by Greg Uherek of AASHTO re:source to modify the FWD operator recertification frequency from two years to one year. He also submitted some editorial changes for the document references. Since the recertification duration revision was not reviewed and approved earlier by TS 5a, the R32 standard shall be on a concurrent ballot.
 - ii. R33-11(2015) ‘Standard Practice for Calibrating the Reference Load Cell Used for Reference Calibrations for a Falling Weight Deflectometer’ Reconfirmed.
 - iii. R41-05(2015) ‘Standard Practice for Measuring Pavement Profile Using a Dipstick®’ FHWA had comments on this standard and John Donahue asked for language that can be included as a subsection (closed-loop check for the Dipstick); John offered to do the editing to include the additional wording and then it will go to Concurrent ballot; motion to move changes to Concurrent ballot – MN, second – NY NOTE: Upon further recommendation from the FHWA and after confirmation in the 5a meeting that no current State members even used the Dipstick® for profiling pavements, the R41 standard shall be submitted for sunseting on a concurrent ballot.
 - iv. T282-01(2015) ‘Standard Method of Test for Calibrating a Wheel Force or Torque Transducer Using a Calibration Platform (User Level)’ There is an ASTM equivalent (E556); the AASHTO standard hasn’t been revised since 2001 and it should be compared to E556 for harmonization purposes; John

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Donahue would like to reconfirm T 282 this year and ask for review and comments next year.

B. Guidance Documents

i. *Guide for Pavement Friction*

1. FHWA contract to provide recommendations to revise document expected in 2019 The guide was first published in 2012 and no further revisions have been made; Andy Mergenmeier spoke about the plan for possible revisions
2. Task force formation? Motion to create a task force – MN, second – WV; the following will participate on the task force: FL, WV, AL, IL, FHWA; FL will chair the task force

ii. *Pavement Management Guide*

C. Recruitment

- i. New State members Email John Donahue (John.Donahue@modot.mo.gov) and Casey Soneira (csoneira@aaashto.org) if you are interested in joining
- ii. Friends of Committee
- iii. Standard and guidance document stewards Email John Donahue if you would like to volunteer to be a steward; the list of standards can be found at <https://materials.transporation.org>

D. Active Research –

- i. NCHRP approved funding for a TS 5a RNS – “Project 20-07/Task 411 Review and Update of AASHTO Standard Practice R 87” Amir provided an update.
- ii. NCHRP has several ongoing projects that are expected to impact TS 5a on macrotexture and cracking measurement.
- iii. TPF-5(299) contract to update R36, Andy Mergenmeier, FHWA. If interested in participating in the project, contact your State research administrator to submit your commitment letters at <http://www.pooledfund.org/Details/Study/543> (Next meeting is at RPUG in September.) Andy gave an update on the Pool Fund study; will be starting another study in about a year. Next meeting is in September 2018 in South Dakota.
- iv. Proposed RNS’s (Please submit any proposals to Curt Turgeon, TS 5a Research Coordinator.) Jia (Jack) Xiaoyang from TN DOT spoke about a proposed RNS. See attached notes.

E. Faulting measurement using 3D pavement data presentation, Georgene Geary, GGfGA Presentation given at meeting; Georgene will draft language for a Subcommittee ballot in Spring 2019

F. Task Force Report – Dynamic Friction Tester, Test Method/Specification Development, Sejal Barot, MD DOT (presentation given at meeting)



- G. Proposed standard for continuous friction measurement system based on side force friction testing, Andy Mergenmeier, FHWA ([presentation given at meeting](#))

VI. Other Items

- A. “Hot Topics” for Roundtable. [These will be discussed tomorrow.](#)
- B. Mid-year meeting. [There probably won’t be a need to have a mid-year meeting.](#)

- VII. **Adjourn** [Motion – WV, second – MD; meeting adjourned at 9:30 a.m.](#)

8. METHOD C—PROCESS OF AUTOMATED MEASUREMENTS 3D

8.1. The data processing and reporting should comply with the following best practices for identifying locations of joints/cracks and computing faults. Method C consists of a two-step process. Firstly, joint/crack locations are identified and then an algorithm is used to compute faulting for each joint/crack location.

Note 4 – This method is intended for 3D automated pavement data.

8.2. Identify joint/crack locations using an automated method as noted.

8.2.1. Locate joints by manually digitizing or by using an automated algorithm provided by the 3D data provider.

8.3. Use the sampling procedure described below to identify the boxes used to sample range values:

8.3.1. Identify a point A 7 inches (178 mm) away from the right edge of the joint as shown in figure 3a.

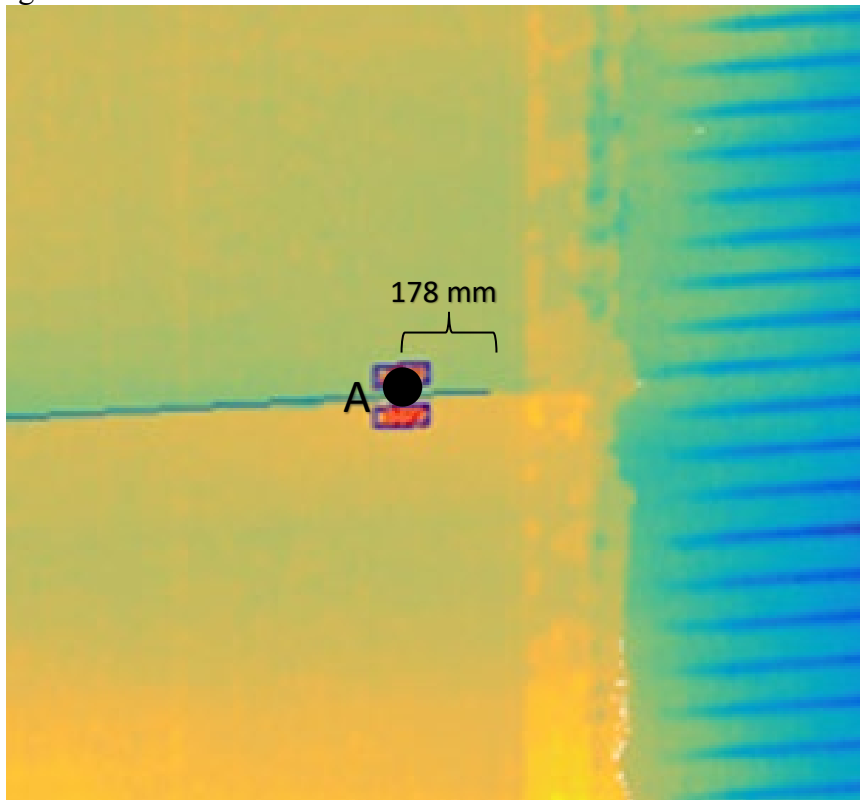


Figure 3a

8.3.2. Calculate the offset distance o as:

$$o \text{ (mm)} = 60 + \frac{w}{2} \tan \theta$$

Where w is the width of the box (100 mm) and θ is the angle made by the joint with the transverse direction. (This is for skewed joints, and so $\theta = 60^\circ$ for perpendicular joints.)

8.3.3. Locate the bottom center of box P at a point o distance away from A along the direction of travel and top center of box Q at a point o distance away from A along the opposite of the direction of travel. The width of the boxes is $w = 100 \text{ mm}$ and height is $h = 50 \text{ mm}$ (Figure 3b).

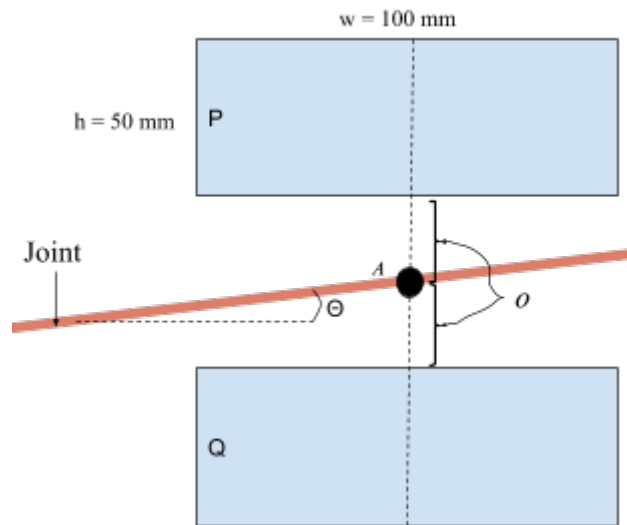


Figure 3b

8.4. Smoothen the pavement surface captured within boxes P and Q using the following steps:

8.4.1. Fit a plane to the points inside box P using ordinary least squares method. The location of the pixel provides the x and y coordinates while the height of the pavement surface at that point given by the range image provides the z coordinate. Let the equation of the fitted plane be $a_P x + b_P y + c_P z + d_P = 0$

8.4.2. Repeat step 8.4.1 for box Q. Let the equation of the fitted plane be $a_Q x + b_Q y + c_Q z + d_Q = 0$

8.5. Calculate the faulting across the joint using the following steps:

8.5.1. Identify 5 collinear points inside box P (P_1, P_2, P_3, P_4 and P_5) and box Q (Q_1, Q_2, Q_3, Q_4 and Q_5) with P_3/Q_3 at the center of their respective boxes and the other points placed horizontally at 17 mm intervals (figure 3c).

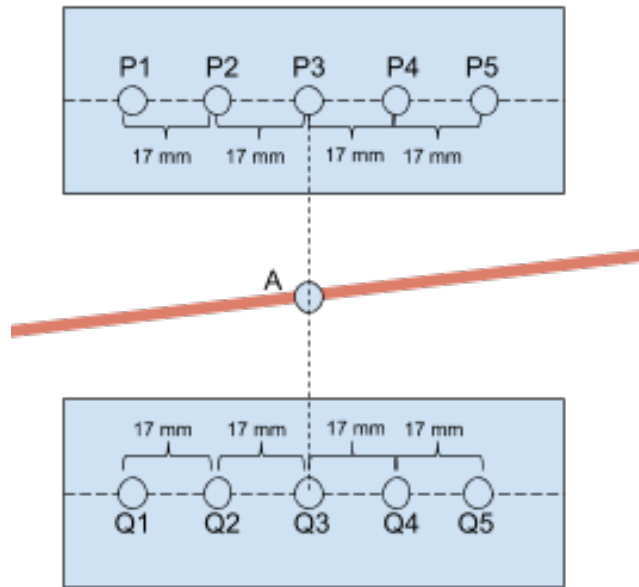


Figure 3c

8.5.2. Use the equations of the fitted planes for box P and Q to find the height of the plane at these points. For example, for point M at (x_M, y_M) in box P,

$$z_M = \frac{-a_P x_M - b_P y_M - d_P}{c_P}$$

8.5.3. Calculate the faulting F as the average difference between the heights of the fitted planes at each point:

$$F = \frac{\sum_{i=1}^5 z_{P_i} - z_{Q_i}}{5}$$