Automated Faulting Method

Faulting is an important performance indicator of jointed concrete pavements. It is defined as the difference in elevation across a joint or a crack resulting from several factors including poor load transfer at joints, higher corner deflections, and inadequate base support. Faulting has a major impact on roadway lifecycle cost and vehicle operation costs. Restoring faulted pavements improves driver safety and ride quality, decreases water intrusion, and extends pavement life. Identifying the location and extent of faulting is critical when developing an accurate and effective pavement rehabilitation plan.

The Florida Department of Transportation (FDOT) has typically measured joint faults using a faultmeter. This process is slow and labor intensive, requires costly lane closures, causes traffic delays, and presents a safety hazard to the device operator and the traveling public. Moreover, measuring faults manually during a network-level survey is typically limited to a small sample of slabs, because it is not feasible or cost effective to test larger and more representative samples with a faultmeter. On the other hand, collecting faulting data with an automated high speed profiler (HSP) provides an efficient and cost effective alternative. Further, the new Highway Performance Monitoring System (HPMS) data model requires state departments of transportation to collect faulting data in accordance with the revised AASHTO R36-04 "Standard Practice for Evaluating Faulting of Concrete Pavements." Therefore, use of the HSP to collect faulting data also allows FDOT to be compliant with federal requirements.

An HSP consists of instruments mounted to a motor vehicle van used to survey pavement condition. HSPs capture more data than a traditional inspection survey crew and eliminate worker exposure to traffic. From a single pass, HSPs collect longitudinal profile data in both wheelpaths, which are used to derive pavement surface characteristics such as rut depth, smoothness, texture, and faulting.

FDOT recently developed an algorithm to detect joints and transverse cracks automatically and to estimate faulting using HSP generated data. The algorithm identifies spikes in the profile for the location of joints and transverse cracks (Figure 1). It emulates the revised AASHTO R-36-04 standard practice by using a step function for estimating faulting at transverse joints and crack locations (Figure 2). The program was designed for use with Microsoft Excel using the Visual Basic for Applications (VBA) programming language.

The algorithm allows for the accurate measurement of faulting data and helps FDOT allocate funds for highway improvements, thereby improving driver safety and extending pavement life.

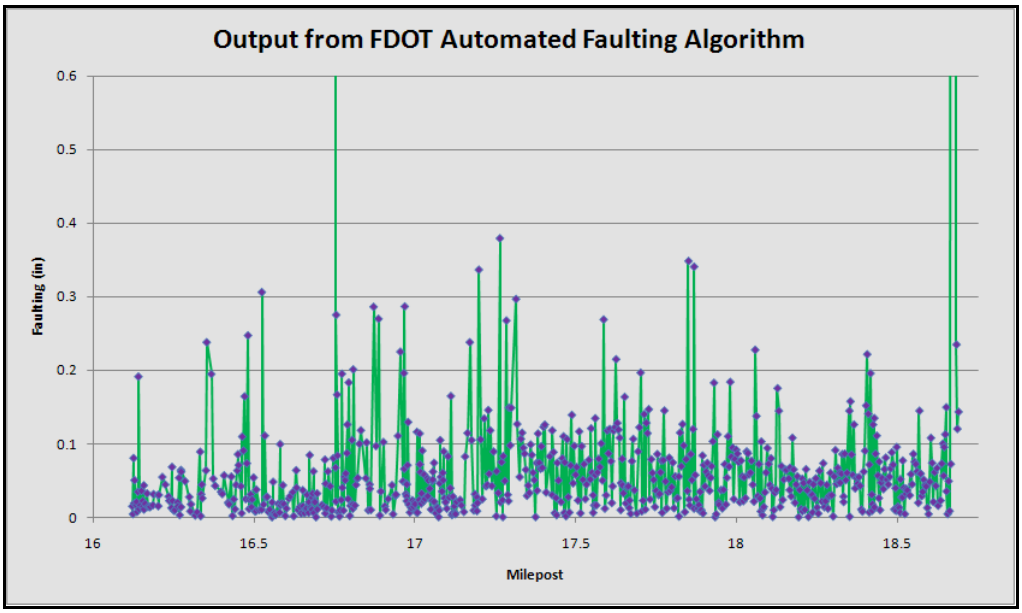

FIGURE 1 Automated joint and crack identification

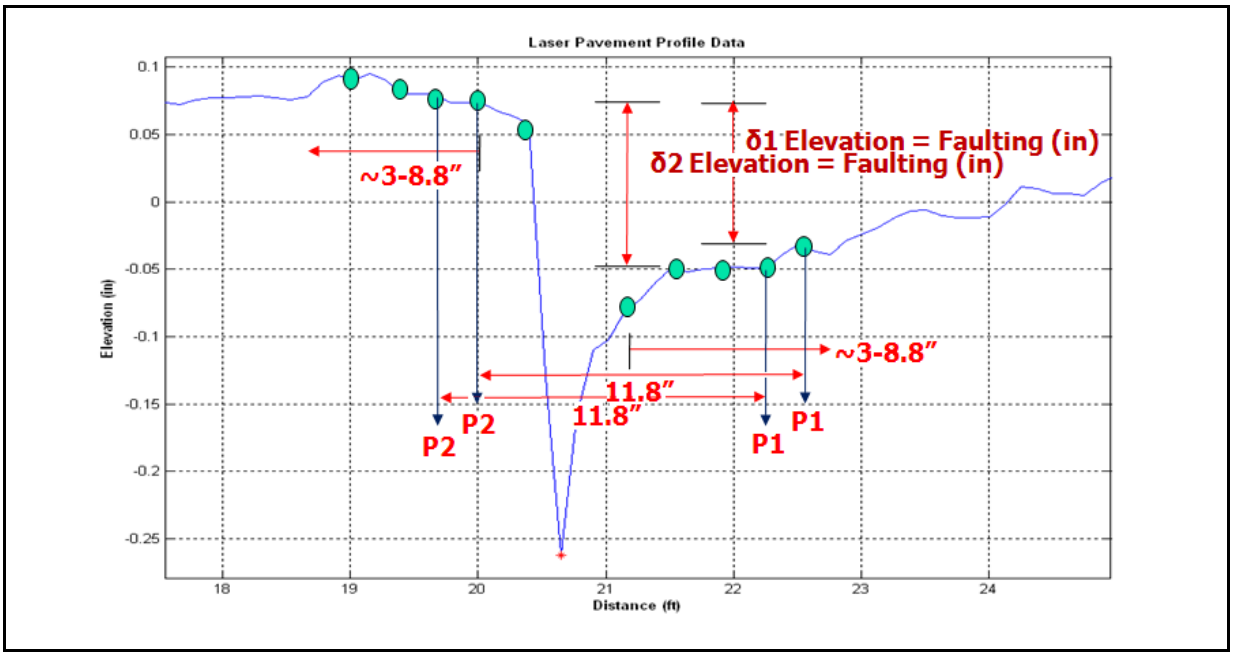

FIGURE 2 Automated faulting according to AASHTO R-36-04