

**2010 SCoPM Performance Excellence Award Application Cover Sheet**

<b>Team Name</b>	<b>Pennsylvania Asphalt Improvement Network (PASIN) Team – S.R. 28 Allegheny Valley Expressway Project</b>
<b>Date Team Operating from</b>	<b>3/26/2009 to 10/28/2009</b>
<b>Organization Name</b>	<b>Pennsylvania Department of Transportation</b>
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**Team Purpose:** The Pennsylvania Asphalt Improvement Network (PASIN) Team implemented an innovative approach to improving the quality of the PennDOT S.R. 28 Allegheny Valley Expressway Project, an approach that has been rarely attempted in the highway construction industry. The PASIN Team combined a Quality Management System (QMS), which is a parallel approach to that of ISO 9001:2000, along with a warranty requirement in the project to ensure that attention to quality is greatly enhanced.

The multi-disciplinary PASIN Team was comprised of stakeholders representing the public and private sector. Specifically, the PASIN Team for SR 28 Project was comprised of representatives from the Pennsylvania Department of Transportation’s (PennDOT) Central Office Bureaus and Districts, Federal Highway Administration, Pennsylvania Asphalt Pavement Association (PAPA), American Association of State Highway and Transportation Officials, American Council of Engineering Companies, and Pennsylvania Aggregates and Concrete Association. The PASIN Team listened to the customers (Pennsylvania’s Deputy Secretary for Highway Administration, the Pennsylvania Asphalt Pavement Association and the Contractor, Derry Construction, Inc. (Derry)) and developed the PASIN and warranty specifications to improve the quality and consistency of the end product, asphalt pavements, and of its various process components.

**Impact of Team’s Improvement(s):**

The innovative PASIN approach enabled the SR 28 Project to be constructed with increased productivity, while improving ride quality and durability. The PASIN approach impacted the objectives of three entities: FHWA, PennDOT, and the Asphalt Industry. FHWA’s objectives are *National Leadership, Advance Innovation and Program Delivery*, and *Program Management*. These objectives were satisfied with the unique approach of merging the QMS with a warranty requirement, which was an innovative approach to advance program delivery and management. PASIN fully embraced PennDOT’s objectives of *effectively managing Pennsylvania’s transportation system with quality and consistency* using the ISO-like Quality Management System approach, with customer focus at the center and by collaboratively identifying and deploying the key processes effectively to deliver a quality construction project. The PASIN approach also satisfied the Industry’s objectives to *ensure best quality pavements*, and *assist with QC/QA processes*, in which PennDOT and the prime contractor collaborated to improve quality, while having the contractor manage the QC/QA processes.

## **Category 1 - Customer Focus**

### **1.1. List the key customers of the team**

- 1.1.a. Deputy Secretary for Highway Administration, PennDOT (Deputy Secretary) and Pennsylvania Asphalt Pavement Association (PAPA) – combined because of similar concerns.
- 1.1.b. President and staff, Derry Construction, Inc., project prime contractor.

### **1.2. Explain **why** you determined that these were key customers**

- 1.2.a. As the leader of the management of the Commonwealth's highway assets, the Deputy Secretary strongly supported implementing ISO processes in PennDOT's maintenance and construction areas and desired to improve asphalt pavement quality. PAPA also had the desire to develop methods to improve pavement quality and consistency while improving productivity.
- 1.2.b. As a profit based company, Derry is focused on providing quality asphalt pavements while operating efficiently. The president of Derry Construction communicated in the project kick-off meeting that he required that the company implement a quality focused, streamlined approach to remain competitive, which the PASIN QMS provided. He also required limited potential for future maintenance efforts under the warranty provisions of the contract.

### **1.3. Explain **how** the team listened to and collected information from the key customers**

- 1.3.a. The PASIN team reviewed the results of a gap assessment that evaluated the level of quality management within the industry and opportunities for improvement that would be available through an ISO 9001:2000 style QMS. They met with the Deputy Secretary and PAPA to discuss their concerns and goals regarding the gaps identified.
- 1.3.b. Derry Construction's representatives had a basic understanding of the PASIN effort from attending previously held PASIN orientation sessions. In 2007, Derry had constructed a warranty project adjacent to this project, but without implementing the PASIN QMS requirements. On the SR 28 Project kick-off meeting discussions gleaned the management processes within the company and the assistance necessary to implement the required QMS.

### **1.4. Explain **how** the team turned information collected from the customers into requirements**

- 1.4.a. Through discussions with the Deputy Secretary and PAPA, it was agreed that the standard acceptance specifications utilized in prior pilots of the QMS kept the contractor from striving to improve with tighter quality control than the specification limits. This project included both the requirement to apply the QMS principles along with a 60-month warranty, driving ownership of quality and productivity improvement by the contractor.
- 1.4.b. Upon understanding Derry's management structure and existing quality control processes, the PASIN team was able to guide in the development of their QMS Implementation Plan. PASIN also provided templates for tracking mechanisms and training on auditing and management processes to aid Derry in successfully adapting the QMS within their organization.

1.5. Explain **how** the team determined both customer satisfaction and dissatisfaction

1.5.a. The PASIN Core Team Leader communicated with the Deputy Secretary and PAPA the progress of the QMS implementation with the warranty specification and the improvement efforts undergone by Derry. A pilot close-out presentation to the Deputy Secretary and PAPA communicated the final results which showed no dissatisfaction with the process.

1.5.b. The PASIN Team conducted an After Action Review session. Derry's comments in this session confirmed the company's complete satisfaction with process improvements to their management systems and productivity as a result of the application of the QMS. The metrics indicated improved quality of the constructed pavement, satisfying their economic concerns.

**Category 2 - Process Management**

2.1. List the process(es) applicable to the team purpose and performance expectations

2.1.a. A contract had to be developed that included a 60-month warranty and implementation of a PASIN QMS. The contractor would need assistance in QMS development and implementation, an external audit would be needed and results would need to be reported to the Deputy Secretary and PAPA.

2.1.b. A key process for Derry was obtaining education and assistance in the development of the PASIN QMS in the company. Derry's president indicated that the education provided by the PASIN Team facilitated an understanding of PASIN QMS within the company. Next, the president required that the company would be able to develop and implement the QMS. They established processes for Management Review, Customer Satisfaction, Internal Audits, Corrective and Preventive Actions, Control of Non-conformances, Control of Documents, Control of Records, and Metrics Systems.

2.2. Describe the steps taken to achieve the purpose of the team

2.2.a. The PASIN Team revised the specifications for the PASIN QMS and the 60-month warranty to ensure compatibility with each other. On the earlier pilots, as a result of conducting a Failure Mode Effects Analysis (FMEA) that indicated opportunities for failure in the quality control, material production and placement process, Best Practices were required to be followed by the contractor. Under a warranty scenario, the contract could not dictate Best Practices but, instead, required Derry to address the specific failure modes, with the Best Practice list available as a reference. The PASIN Team also revised the following components of the QMS: Management Review, Internal and External Audits, Corrective and Preventive Actions, Control of Non-conformances, Control of Documents, Control of Records, and Metrics System. They educated the contractor on the QMS processes, offered advice during Derry's QMS development and implementation, participated in status meetings and conducted an external audit at the project's completion. The effort was finalized with a presentation of results to the Deputy Secretary and PAPA.

2.2.b. The PASIN Team developed templates for a Management Review Meeting Agenda and Minutes. Templates for an Internal Audit Plan and Forms, Corrective Action Report Form and Log, and Control of Non-conformances were provided by PASIN.

2.3. Explain how the steps taken to achieve the purpose of the team affected efficiency, effectiveness, quality, and/or customer satisfaction attributes

2.3.a. The external audit results presented to the Deputy Secretary and PAPA, to their satisfaction, confirmed that without standard acceptance specification criteria, the contractor used the QMS processes to focus fully on quality and productivity improvement. ISO type QMS development independently can take a year or more to complete. With the assistance of PASIN, Derry was able to have a functioning system in a month.

2.3.b. Derry Construction communicated that, with the emphasis on improvement that resulted from applying the QMS principles, the company increased average daily production by over 20%, with minimal down time, and achieved a higher ride quality bonus. They also indicated that the quality of the pavement they constructed improved over that of previous projects.

2.4. Explain how the team gathered data, analyzed it, and the tools used to make decisions

2.4.a. Explain how you gathered the data and how you analyzed it.

2.4.a.1 The PASIN Team attended Derry's progress meetings, conducted an external audit and orchestrated an After Action Review. The efforts were compared against the PASIN and ISO QMS standards to confirm compliance.

2.4.a.2. Derry monitored the required metrics data to monitor quality and improvement. They discussed their internal audit findings in management review meetings and set forth process improvement adjustments as a result.

2.4.b. Identify the tools you used

2.4.b.1 PASIN performed a cause and effect analysis to develop the failure modes and developed process flow diagrams and templates for QMS development and implementation. Internal and external audit checklists were used to confirm compliance with specification requirements, and charts depicting quality and productivity improvements were developed.

2.4.b.2. The PASIN process flow charts and the failure modes list were addressed in Derry's QMS implementation plan, as well as internal audit checklists and straight line diagrams.

**Category 3 – Results (this section is worth 450 of 1000 point total) Provide one page of graphical results**

**3.1. Provide current levels and trends for customer satisfaction and dissatisfaction**

3.1.a. The Deputy Secretary and PAPA were satisfied with the metrics data, external audit results, and the After Action Review comments. They were dissatisfied with the amount of time needed by the PASIN Team to support the contractor. The successful implementation of the QMS by deploying a team approach involving all levels, from executive management to the operator, with responsibility for quality at each process step was clearly assigned.

3.1.b. Derry indicated that their average daily production increased from 2,400 to 3,000 tons per day over their efforts on an adjacent warranty project in 2007. Derry also indicated that their material quality consistency improved.

**3.2. Provide current levels and trends in key measures or indicators for the process(es) listed in Category 2 above**

3.2.a. The audit and metric results that were reported to the Deputy Secretary and PAPA indicated that Derry, with the assistance of the PASIN Team, was able to improve its quality management and productivity under this scenario.

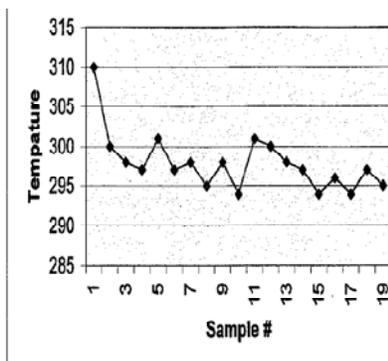
3.2.b. Derry indicated that the paving crew's average daily down time reduced from one hour/day in 2007 (trucking inefficiencies) to continuous paving realized on this project in 2009.

**3.3. Provide current levels and trends in key measures or indicators of effectiveness, efficiency, and/or quality**

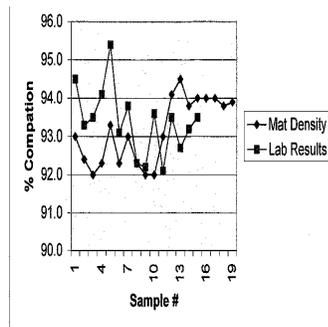
3.3.a. Graphs 1, 2 and 3 indicate that tighter process control facilitated achieving more consistent temperature, density, and asphalt content results while achieving a 600 ton increase in their average daily production.

3.3.b. The 600 tons average daily production increase indicates much improved efficiency and effectiveness. Derry indicated that it received a ride bonus of 82% on the adjacent warranty project in 2007, with a three lift application of asphalt. On this project, Derry received a 98% ride bonus in Phase I and 100% ride bonus in Phase II, with only a two lift operation. Graphs 1 through 3 depict examples of quality consistency improvements in mat temperature density control and asphalt content, to cite a few of the required project metrics.

Graph 1-Mat Temperature



Graph 2-Mat Density



Graph 3 – Asphalt Content

