21142

Heathrow Asphalt Plant hot RAP modification

FM Conway 1 3 4 5

FINALIST

ON VIDEO

DESCRIPTION

The hot RAP system at Heathrow Asphalt Plant has historically suffered from blockages in the heated chute that transfers the material from the weigh hopper to the asphalt mixer.

In the past, oil-based release agents have been used to assist the movement of the RAP through the chute. Two years ago, it was recognised that there is a considerable risk in introducing oil-based products into an environment with elevated temperatures and pressures that occur during the production of asphalt. In the past, there have been a number of high consequence explosions at asphalt plants.

The chute was built with a slant to the OEM design of 50 degrees and, due to design constraint of the plant, there was no way to increase the angle of the chute to ease the flow of the RAP. During 2020, numerous modifications were tried to prevent the blockages, liner plates in the chute that had specialist coatings or fabricated chutes using a different material, all of which had no notable success.

Continually having to unblock the chute created a number of risks, such as the hot material and fumes from the mixer box, the manual handling of rods and scrapers.

The Heathrow team set up Big Risk group to consider the options and decided to make a significant change to the OEM design of the plant to eliminate the problem.

The chosen engineered solution to this problem was to remove the angled heated chute and replace it with a vertical chute that fed onto a high-speed conveyor that in turn fed the RAP into the mixer. Neither the OEM nor any of the other engineering companies that FM Conway used regularly on the asphalt plants supported this, leaving FM Conway to manage this innovation.

There were five main components to the project.

1, The conveyor. Using a Wirtgen conveyor made the integration to the control system easier with all components being familiar.

2, The conveyor belt. The belt needs to be able to withstand a considerable variation in heat during production, several different chemicals and oils that are found during the production of hot RAP and the abrasive nature of RAP. The belt selected was the closest to meeting all the criteria.

3, Electrical installation. A N Naylor were chosen because they are familiar with the plant, the process, and the control system.

4, Mechanical installation. GJP were given the mechanical installation part of this project as they have two engineers who have worked on prototype projects and understand the need for design changes during the installation and commissioning.

5, Software and control system modifications. Software changes and the control system modifications were carried out by Wirtgen to allow the total integration of the hot RAP conveyor into the process without any negative effects on production capabilities.

Over a three-week period, the old equipment was removed, and new system installed, with material trials and modifications undertaken during the commissioning process. The problems that needed to be addressed were.

- The inlet chute to the mixer from the conveyor could not cope with the quantity of material being delivered. This was overcome by removing the chute and fabricating a new chute with increased volume capacity, installing the chute, and testing.
- The conveyor belt scraper could not cope with the adhesiveness of the RAP which during production was accumulating on the belt. A new and more effective belt scraper was installed.
- On the first five or six batches the RAP was slow to discharge from the weigh hopper. The control system can "dose" the RAP from the weigh hopper onto the conveyor belt. It was found that at the beginning of a production run the "dose" timings needed to be increased until the RAP was at optimum temperature allowing the timings to be reduced and expected tph production levels met.

Throughout the project and into commissioned use, risk assessments and safe systems of work were in place with teams trained in the safe operation of the conveyor. Several Big Risk audits were conducted to ensure standards were maintained and any weak signals or high potential incidents were captured.

BENEFITS

- Reduced confined space working
- Reduced working at height
- Reduced exposure to fumes
- Reduced manual handling
- Reduced exposure to hot material
- Reduced exposure to RCS
- Reduced risk of being struck by a falling object
- Reduced the need for human intervention
- Improved production efficiency and throughput (TPH)
- Reduced energy consumption
  Elimination of oil-based release agent

- Cost and environmental benefits
- Demonstration of the effective application of 'The Big Ten in 10' hierarchy of controls
- Enhanced culture of employees openly questioning 'how else can we improve health and safety'.

TRANSFERABILITY AND DEVELOPMENT

- This project reflects how the cultural influence of 'The Big Ten in 10' guided FM Conway to look for solutions that would eliminate the problem and combining this with the continuous drive for improvement.
- It highlighted to FM Conway how few contracting companies were able to proactively support this project.
- This project was shared across the company so others could learn and to allow others to reflect on their current process and if they are able to apply elements of this project to their site.
- The project improvement can be applied to all similar processes involving the same or similar materials but should be subject to conventional planning and risk reviews to ensure compatibility with any existing process and infrastructure.
- Development of the current system will be focussed on longevity of the belt, improvement in the scraper on the belt return to eliminate spillage and improving wear time. Additional resource will be put to improving the process control of the belt and materials.

New vertical chute and high speed conveyor