IDOT, Mix Producers and Instrument Manuafcturer collaborate

on the best RAS Metering Solution.

Illinois DOT (IDOT) and Illinois Contractors Healy, Gallagher, Curran Contractors, Plote observing Iowa Henningsen's gravity fed RAS Impact Scale Operation and making recommendations what needs to be done to meet IDOT's scale accuracy expectations.

Pictured left to right. Joseph Rechner, Steve Hafel, Ryan Burgdorfer, Htoo Aung, John Lavallee, Duane Updike,Pete Lochner, Jesse Simmons, Tim Smith

RAS: Green for the Enviroment and Green for the Contractor.

The history of the RAS Weighing Problem has been around for twenty years. It has not surfaced to a problem worth looking at until the technology and environmentalist and rising oil costs made it economically attractive to the contractor.It has been fashionable and profitable to recycle as much of our waste back into cirulation instead of dead ending it into the limited space of land fills.

E nviromentalists consider this the Green Thing to do and at a $8.00 ton oil savings, the contractors are seeiing this as the Green Thing to do.

Just a few years ago, it was rare to find a mix producer introducing RAS. The trend has spiked because environmentalist now understand that it is now profitable to recycle the Shingles from reroofing jobs and have

been successful in influencing landfill owners, local and state agencies into paving the way for mix producers to capitalize on this this. This added supply of oil probably has an affect on the demand consequently driving the price of oil down.

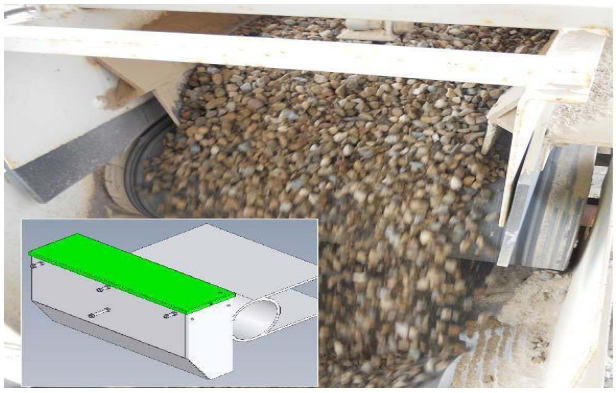
Today, many of the continuous mix plants are having a problem weighing the RAS accuratel. Most Contractors are trying to run Weigh RAS accurately using the existing Rap Feeder Sytem they have without making any improvements.. There are few reasons that the existing equipment is not adequate.

1) RAS carries a lot of oil in them. When accuracy is off, the oil content is affected by the error 3 to 4 times when compared to the oil content of RAP.
2) Sometimes producers us a 'Multi Bin in series with a RAP Scale' system with Rap in one bin and Shingles in another while weighing the combination of both over one Rap Scale. It's anyone's guess how much is coming out of either bin at any given time. The Rap Conveyor was built for heavier TPH flow rates (25 to 125 TPH) of RAP productions. Current RAS Rates requires weighing product from 5 to 25 TPH). That is a big difference. The Rap Scale System (conveyor included) was not built to accurately weigh material at such a low flow rate.
3) Under the 'Multi Bin in series with a RAP Scale' system, there is no way for the Blending Control to adjust for bin speed when one of the RAP Bins or RAS Bin clogs up, or density is changes. And density can change plus or minus 15%. Some belt scale manufacturers advise against using their scale to weigh light loaded products for such a critical application.

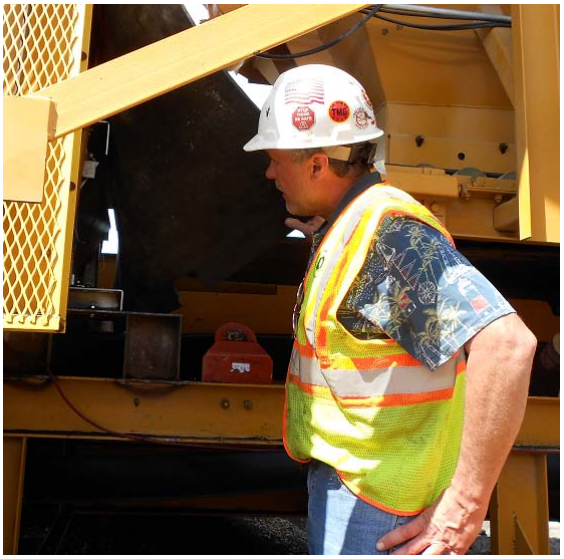
Contractor Henningsen acquired a 60,000 ton job requiring about 4% shingles for a job on in Iowa on the Illinois border. A. J. Dennis Campbell, Plants Superintendent for Henningsen Construction of Atlantic, IA, felt he needed a more accurate means of weighing RAS than what his belt scale was capable of doing. Campbell gave EZ-Flo an order to design, build and deliver in 4 weeks, a scale that weighs the material as it discharges from the RAS Feeder Belt to the Collector Belt. Ez-Flo accepted the challenge using the Impact Plate Technology.

The job was difficult. Generally, the area is confining. The distance between the RAS Feeder Head Pulley and RAP tail pulley and both of their support structures are 20 " and the distance between the bottom of the Feeder Belt and the center of Collector Belt was 12", not to mention the troughing rollers using up that 12" space. Then consider the Material entering Fins overhanging the head pulley by a foot.

Taking the confinement issue one step further, many existing rap bins have bin support structure and Bin Feeder Conveyor Drive Pulley-Sprocket arrangement on one side of the bin and the Loader Ramp barricading the other access to the confined space. In some cases, the task looks impossible unless one was to assemble the scale inside the confined space.



Taking this all into consideration, it was decided to minimize the size as much as possible, design it to be assembles inside our outside of the confined area, easily change from wide feeder belts to narrower one and mounted on skids with slots to slide the scale out of the flow when using the bin for RAP but keep it in the flow for FRAP (Fine RAP). FRAP has 8% oil and is worth close control and does not usually have big chunks.



Campbell points out the installation of the EZ-Flo Scale. As of this week, the plant has produced 40,000 tons of mix with little incident. Old Castle Plant Superintendent Brian Heger sizing up the new scale operation.

A couple of observations being made are worth making note.

1) Regarding measuring TPH flow volumetrically as is being done in most all RAS feeders; the Ez-Flo Rate Indicator was observed for several minutes at a constant bin feeder speed. At times, the flow rate changed as much as plus or minus 15%. The material was relatively dry at 12%. This rate of change is most unacceptable in most anyone's 'Book of Standards'. Most RAS Bins existing, do not weigh their discharge and therefore can not control their bin speed based on what is discharging from it. .


Henningsen Plant Manager Duane Updike shown here observing the Bin Flow Rate changing from plus or minus 15% while the feeder speed is running at a constant speed. The same 15% deviation was observed at flow rates as low as 6.75 TPH to 25 TPH. These sequential pictures illustrate the rate changes with the gate setting at 4" and the 21% feeder speed. The third picture illustrates, by the changing shadows on the key, it was some time later that a major plus deviation was happening.

2) QC Manager John Lavallee of Curran Contracting, finds the current method of volumetrically calibrating the RAS Flow Rate is like rolling the dice until the right numbers show up.

The Impact Scale is reading in real time is normally being monitored by the plant computer. Plant computers are programmed to either compensate for the oil when the Rap Scale deviates from Set point or to increase or decrease both Feeder Bin Speeds. Either way, one scale is not enough.

Now, the mix producer has the option of weighing the RAS and controlling that bin or the oil being added to the mix. The same RAS Rate Signal being used to control for the RAS and can be subtracted from the RAP Belt Scale (now weighing both RAS and RAP) indicating what the actual RAP TPH Flow Rate is.

Now, the plant computer can use RAP deviation information to:
a) the RAP Feeder Speed or
b) adjust the oil being added to mix (we understand some controls manufacturers do it this way).

RAS (Recycled Asphalt Shingles) and RAP over the same Belt Scale; the biggest problem is that the control system has no idea what is coming out of either bin all the time. Bins do bridge, feed throats do get clogged, RAS Density can change. After the Feeder Scale was certified accurate, a test was conducted to monitor the consistency of bin output at a given speed. The Feeder Scale reports normal changes of flow of plus and minus 15% TPH. This indicates that the assumption the industry is depending upon for the accuracy required for an ingredient as important as RAS is not an adequately accurate method to control RAS.

Note: Contractors interested in adding a scale to their RAS or FRAP should give a heads up to their blending control manufacturers about the changing requirements they should be asking of their blending controls. Today's blending controls are not usually set up with the software/hardware to accept another scale input or two (some contractors are talking about FRAP with 8% oil) to monitor the flow with a continuous weigh RAS scale and consequently control the flow from that scale information.

Clarence Richard Co. manufactures continuous weigh scales (EZ-Flo) for difficult materials that are being added to the mix process. Mix Producers are adding Recycled Asphalt Shingles (RAS) to their mix and are probably having a problem accurately metering RAS into the process.

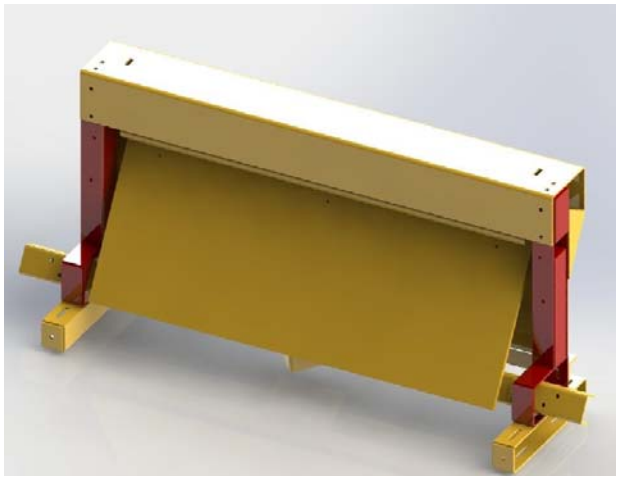
The Flow Scale impact plate is mounted 6” away from the end of the Belt Feeder Head Pulley.

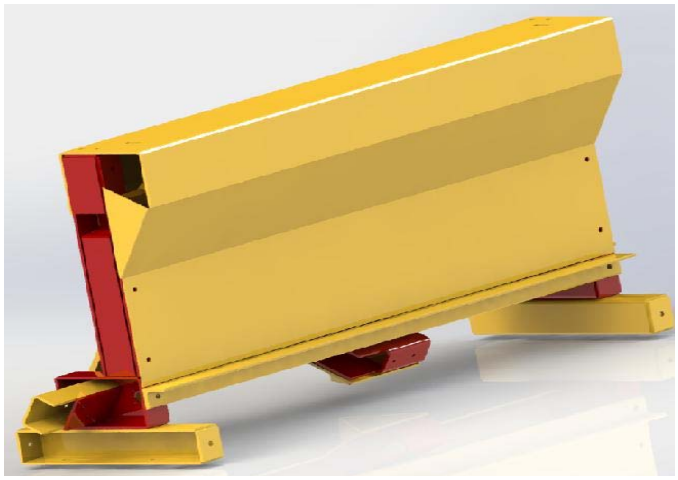
Picture Left illustrates the material flowing out the bin and under the NO-Flow Switch and falling over the head pulley to the Impact Plate below. The Feeder Gate Level is normally set at 4” to keep material chunks out of the mix. The Flow Scale easily recognizes bridging problems even in instance the NO- Flow Switch does not recognize that a chunk is impeding flow on one extreme side of the feed throat or the other. Sometimes feed throats build up with material; the flow scale recognizes that and reports the actual flow to the control system. Picture Right illustrates the RAS falling from the Belt Feeder to the Impact Plate below and then to the Collector Belt below the Impact Plate.

'How it Works'.. *EZ-Flo Continuous Weigh – Belt Feeder Scale*

The flow scale works much like a belt scale except it does not need a tachometer since it knows the speed of the material passing through it is constant (gravity). Do not confuse the Flow Scale with meters. Meters read volumetrically. Meters do not have load cells and meters do not weigh gravimetrically. Meters read air much like cold feed bin, vane feeder or a positive displacement asphalt meter. They can make a closed loop control system an open lop since it does not actually know the flow and therefore can only assume it.

Just like all he typical EZ-Flo Scales as well as RAP and Virgin Belt Scales; the Feeder Scale is sensitive to air flows such as wind. The Feeder Scales are shipped as an easy to assemble type 'Erector Set' for ease of shipping and ease of installation. The space, the Feeder Scale is placed in, is often very small and impossible to place something of such great volume into. Therefore, the owner has the option to assemble most of or part of the flow scale inside or outside of the confined area. The area is so confining, that the frame and scale inner workings are shipped without the enclosure to keep the wind out. As part of the system, the owner agrees to protect the Impact Plate from air flows by draping some material around the flow scale area. Draping a material around the scale can usually seal up the Scale area adequately. Old conveyor belting works very well as enclosure material.





The Flow Scale reads the Rate of Material Flow as it impacts the front face of the Impact Plate. The two different readings displayed on the Integrator indicates information common to your automobile instrument panel. The Rate reading (TPH is much like the Speedometer MPH) indicates how fast material is passing through the flow scale and produces an output signal very useful for blending materials. The Totalizer reading (Tons or other engineering units is much like the Odometer) is used for calibrating the scale, cross checking accuracy, inventory control and produces a signal capable of batching product.

How it Works... The plate is suspended from a hinge. Material flows off the end of the Feeder Belt impacting the Plate. The Plate is forced away from the flow against the Load Cell Rod. The force is measured by a Load Cell and converted into a Rate Signal. The Flow Scale discharges the material as soon as it receives the material.

Patent 7007557 and Patent Pending

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