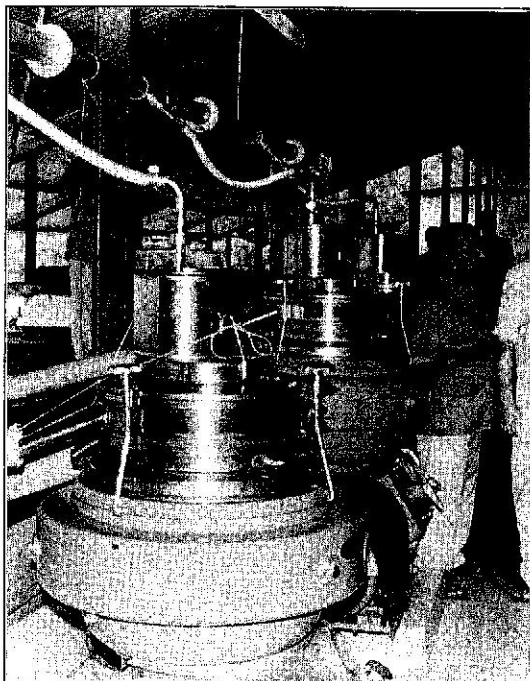


Harry F Bader

How to control quality, process in latex operations

Most of the problems of latex dipping operations can be avoided if there is sufficient quality and process control. When problems are avoided they do not require corrective action



Modern latex processing system

Several of my technical service projects, as well as several questions received by Rubber Asia indicate problems that would not occur if proper quality control and process control were in place.

Each latex operation should have sufficient quality control and process control to ensure that problems are avoided. When problems are avoided, they do not occur and do not require corrective action.

The following is a quality/process control overview for a latex dipping operation. If you have

questions regarding details, please address them to Rubber Asia.

Material control

- **Raw materials:** A specification should be established for all raw materials. The starting point would be the specification which the supplier says his material will meet.
- Once a specification is established, and after test batches have been made to ensure

quality latex products can be made with material that meets the specification, the supplier should be required to provide a certificate with each shipment of the material stating that the shipment meets the agreed specification.

- Simple tests should then be made to ensure that the material received is in fact what was ordered and what is stated on the specification and the certificate.
- ◆ Are bags of drums undamaged?
- ◆ Do the container labels match what you have ordered, as well as the specification?
- ◆ Is the colour, odour, and physical state what it should be?
- Materials should be used in the order they are received – First in, First out.
- These simple but necessary controls should give you confidence that your raw materials are satisfactory.
- All information should be recorded and permanent record files are to be maintained.

Latex or latex compound

- If you are buying compound, in addition to those general raw material controls, each drum or tank in shipment must be subjected to further testing.
- ◆ Mechanical Stability (MS)
- ◆ pH
- ◆ Total solids (TSC)
- ◆ Dry rubber content (DRC)
- ◆ Viscosity
- ◆ Chloroform precure
- If there are problems with colour, odour, or if coagulum is present, further testing may be needed.
- All results should match what is in the specification the latex supplier agreed to meet, and which is in the shipment certification.

The writer is Vice-President, Latex Services, Akron Rubber Development Laboratory, USA

- This uniformity which results from this degree of quality control will mean that process conditions can remain constant with little or no variations being necessary to get quality products.
- If you are purchasing raw latex and compounding in-house, greater controls and testing are needed.
- ◆ All testing done on purchased compound with the exception of chloroform precure should be made.
- ◆ Ammonia content should be checked when the shipment is received.
- ◆ Repeated testing should be done, probably weekly, to ensure no changes have occurred.
- ◆ Ammonia content should be maintained by additions at testing intervals.
- ◆ As with purchased compound, the test results for a shipment of latex should meet the agreed specifications.
- All information should be recorded and permanent record files are to be maintained.

Dispersion, solutions, and slurries

- All these mixtures must have a recipe and a process control document that remains with the batch until it is approved for use.
- This document (often called a batch ticket) should have materials listed in the order they are added to the mixture and they must have space for the signature of the person who added each material. There should also be space for the signature of the person who verifies that each material was correctly weighed or measured, and verifies that the material was in fact added.
- There should be further signatures and verification that dispersions were ground for the required time and that solu-

tions and slurries are mixed for the required time and under the proper conditions.

- When mixing and grinding are completed, samples should be taken to quality control for testing.
- ◆ Dispersions should be checked for total solids (TSC) and a water addition should be calculated to bring the % TSC to the specified level. Particle size should be verified with a Hegman gauge.
- ◆ Slurries can also be standardized in the same fashion as dispersions.
- ◆ Solutions should be checked for concentration, titration, specific gravity, % TSC are methods which can be used.
- All information should be recorded and permanent files are to be maintained.

Recipes for these mixtures should be calculated to produce a slightly higher per cent concentration than required, so that adjustments to the precise proper concentration can be made by the addition of a calculated amount of distilled (or DI) water, tap water or alcohol as the case might be. This would mean that addition of dispersion to the latex compound as well as additions to the coagulant and slurry tanks would always be the same. Conditions would therefore remain constant.

Latex compounding

- If you are purchasing a latex compound, the amount of compounding done in-house is usually limited to the addition of distilled or DI water to the latex to reduce % TSC to the level being used in your dip tanks. Beyond that, you may be adding a defoamer or dewebber and possibly some stabilizer. In some instances, you also may be adding a "cure package".

In all cases, additions should be added slowly with vigorous agitation. Agitation should not be gen-

erating bubbles and should continue for at least half an hour after the final addition.

- In-house compounding requires much more attention to quality control. If handled as covered above, the latex, the dispersions and solutions to be added to the latex compound will be in the proper condition.
- The recipe and the compounding work ticket should list all additions in the order in which they are to be added, with the amount clearly stated. There should be space on the work ticket for the signature of the person making each addition as well as space for the signature of the person in authority who verifies the addition.
- Each solution or dispersion should be mixed with an equal amount of distilled or DI water before it is added to the latex.
- All additions should be made slowly with vigorous agitation. Each addition should be allowed to agitate for 10-15 minutes before the next addition is made.
- After the final addition, the latex compound should be allowed to agitate vigorously for about half an hour. A sample should then be taken to determine the % TSC. The latex is then transferred to a maturing tank, where it is slowly agitated at a previously determined temperature for a previously determined time to bring it to the desired level of maturation. The precure level is checked periodically during maturation.
- When the % TSC has been determined, distilled or DI water is added to bring the TSC to the desired level, the viscosity is adjusted before the latex is transferred to the refill tank.
- All information should be recorded and permanent record files are to be maintained. ■

(To be continued)