CUSTOMER CONNECT

HINCOL

Better Roads, Better Life

Hindustan Colas Limited

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PAVING THE PATH FOR PROGRESS

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"CUSTOMER CONNECT"

The Quarterly Newsletter of Hindustan Colas Ltd, aims at strengthening exchange of information and experience sharing amongst its customers. The success of this communiqué is largely dependent on feedback and information inflow from our customers and we thank them for their continued support.

1.Bitumen Particle Size Distribution in Bitumen Emulsion

For evaluation of Bitumen Particle size distribution in bitumen emulsions, there is no Indian Standard and no standard test method. This is an important parameter that influences many of the emulsion properties that are critical to success in application and service.

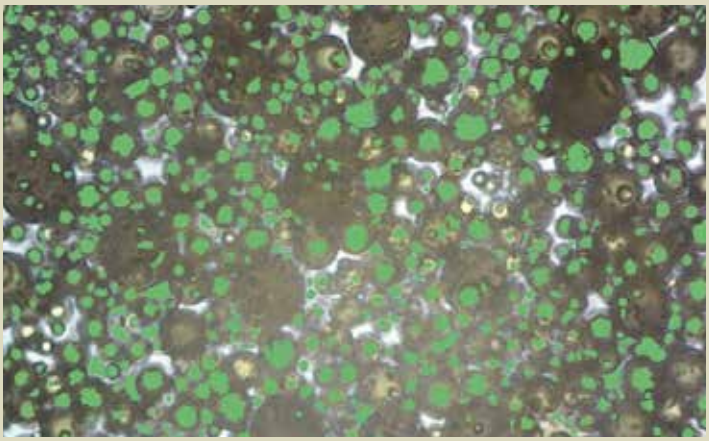

Figure 1 Microscopic View of Bitumen Emulsion

The strong influence of particle size distribution on the properties of bitumen emulsions is due to the fact that the surface area of a spherical particle is proportional to the square of its diameter and its mass is proportional to the cube of its diameter. Many performance properties of an emulsion are influenced by the amount of 'free' emulsifier in the aqueous phase, i.e. the amount of emulsifier that has not been absorbed onto the bitumen particles. The amount of emulsifier that is absorbed onto the bitumen particles depends on the total surface area of those particles. Even a small mass proportion of bitumen present as submicron particles can create a large surface area.

The distribution of emulsion droplet size is dependent on the interfacial tension between the bitumen and the aqueous phase (the lower the interfacial tension, the easier the bitumen disperses) and on the energy used in dispersing the bitumen. For a given mechanical energy input, harder bitumen will produce coarser emulsions and high penetration or cutback bitumen will produce finer emulsions. It is possible to influence the particle size and distribution by modifying the materials and process used to make an emulsion. The smaller the size of the bitumen particles, the finer will be dispersion, resulting in a slower breaking rate of the emulsion.

Manufacturing conditions substantially influence the particle size distribution of the emulsion. The following parameters are strictly controlled and maintained during emulsion production at Hincol to achieve satisfactory particle size:

i. Temperature
ii. Bitumen content
iii. Composition of the aqueous phase
iv. Operating conditions of the colloid mill
v. Increasing the flow rate through the mill
vi. Decreasing the viscosity of the bitumen:

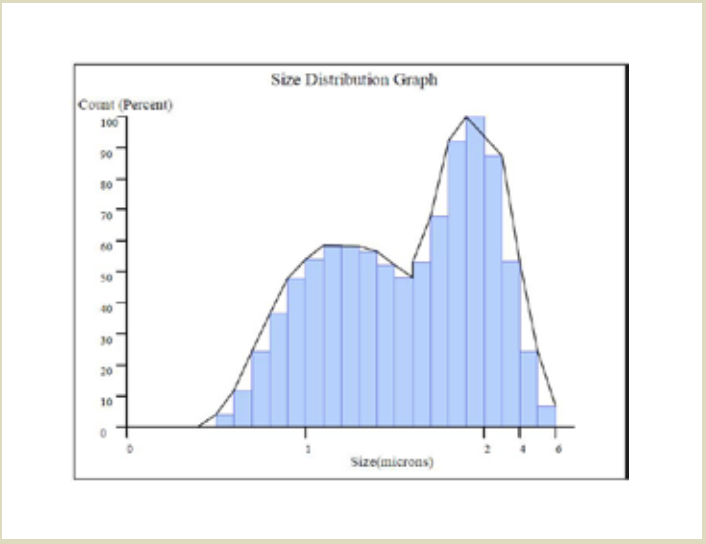

Figure 2 Hincol Emulsion PSD curve

It must be noted that average bitumen particle size for Hincol emulsion is < 2 microns.

2. CRMB for Dense Bituminous Macadam – Advantages

From physical and chemical interaction of crumb rubber with the conventional bitumen, Crumb Rubber Modified Bitumen (CRMB) is made. Hincol CRMB60 is a unique

product conforming IRC:SP 53-2002 and has advantages like: Lower susceptibility to daily & seasonal temperature variations, higher resistance to deformation at elevated pavement temperature, better age resistance properties, higher fatigue life of mixtures, better adhesion between aggregates & binder, prevention of cracking & reflective cracking, and overall improved performance in extreme climatic conditions & under heavy traffic conditions.

The binder course in flexible pavement, sometimes called the asphalt base course, is the layer below surface course. In India, this layer is usually Dense Bituminous Macadam (DBM). With the incorporation of Hincol CRMB60 in the DBM layer, the overall thickness of the bituminous layers can be decreased for a fixed design life which is a cost-effective option. Even if the DBM layer is laid with the conventional thickness, there will be an extended design life with Hincol CRMB60. This is because our unique product has enhanced rheological properties using chemical additives and modifiers to improve durability of pavements under extreme climatic conditions and increased traffic density. Generally, with

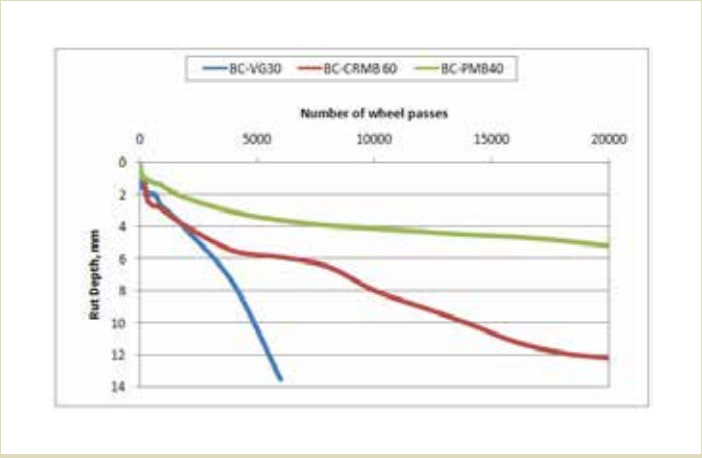

Figure 3 Hamburg Wheel Tracking Test @50C

increase in temperature, Complex modulus decreases but phase angle increases. Conventional bitumen will have no elasticity at high temperatures but CRMB60 can display considerable elasticity even at 70˚C.

For any new technology to gain credence with Highway Engineers, it must be cost-effective. Maintenance costs significantly reduce as the pavement resists cracking by using CRMB60 in the DBM layer. This benefit drastically reduces the life cycle cost of flexible pavement. It is already proven that CRMB provides technically sound solutions to a number of road construction problems. That most of them achieve this with only minimal changes to established working practices is equally sure. From a typical analytical pavement design case study, it is observed that, when VG30 is replaced with CRMB60 both for DBM and BC layers, the fatigue resistance is improved by 40% and rutting resistance is improved by 60%. It must be noted that there is no additional financial outgo as cost of CRMB 60 and VG30 are almost identical. The service offered by Hincol include:

i. Analytical pavement design for key accounts
ii. Hot Mix Design activity
iii. Technical information on asphalt mixes such as manufacturing, transport, laying, mechanical testing, and mechanical properties.
iv. Support on value added bitumen application trouble shooting, product specification, quality, test methods, equipments, procedures and bitumen technical information on safety, storage, and handling

3. Bitumen VG 40

Of the wide variety of crude oils commercially available, only a limited number are considered suitable for producing bitumen of the required quality in commercial quantities. In general, these are heavy crude oils with high sulphur content.

In modern, integrated refineries, it is common practice to blend multiple crude oils to produce consistent quality high grade bitumen that meets precise engineering specifications. Residues from the distillation of meticulously selected crude oils provide the base materials for bitumen production. Bitumen refining separates the lighter fractions from the residues. Several manufacturing methods are used to produce specification bitumens depending on the crude source and processing capabilities available. Often a combination of processes is selected.

Hincol Bitumen VG40 is manufactured adopting the route of blending higher and lower viscosity residues in the required proportions. Higher viscosity residue is produced in Hincol premises by rectification of lower

viscosity residue. Lower viscosity residue is oxidized through Hincol invented process against typically used blowing process at refineries. It must be noted that

1. Oxidation processes lead to similar product
2. In batch process, controls are much better leading to consistent quality products
3. Chemical modification process using certain inorganic acids leads to inconsistent product. The reaction kinetics will vary depending upon the bitumen chemistry which is quite complex. While some bitumen have large ratio of reactive components, others have very minimal reactive sites.

Figure 4 After Microsurfacing treatment

4.Field Experience - Microsurfacing

Hincol undertook Microsurfacing project at Tatanagar during the quarter. More than 100,000 sq meter area were laid using Type III Microsurfacing.

The project has been executed under strict quality control.

- For Microsurfacing, quality of aggregates is critical. Good quality aggregates were transported from a long distance specifically for this project.
- The quality of emulsion is extremely important. The emulsion is custom made for the project conditions (climate, traffic, aggregate etc).
- The traffic blocks were very minimal. Within 45 minutes, traffic is allowed on the laid surface
- Typically ~3 – 5 % chip losses are experienced immediately after opening the traffic on Microsurfacing. However Hincol system does not generate any chip loss.

Figure 5 Quality of aggregates is crucial

We look forward to enhanced contribution from our customers to further enrich this newsletter. We also welcome suggestions, recommendations and critics that will help us serve you better. You may send your feedback and contributions to us at:

customerconnect@hincol.com

or visit **www.hincol.com**

Alternatively, you may also post us information at:

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