Surface Finish Newsletter (Oct. 19, 2018 - By Atit Shah)

Importance of Mixer Vessel Surface Finish in MasterBatch & PVC Mixing Application

Measuring & specifying surface finish has, until recently, been left to a varying amount of speculation. The number of different standards being used by different machine manufacturer has created a great deal of confusion & misunderstanding throughout the industry. Increasingly stringent specifications are now being demanded for the surface finish on all items of process equipment in plastic processing industries and **neoplast®** is now quantifying the surface roughness of their mixing components.

It has long been recognized that the surface finish on Stainless Steel inside a mixing bowl has an important effect on compound deposition, corrosion resistance etc. especially when Colour MasterBatch & PVC compounding application is concerned.

neoplast® Methodology – *A Step Ahead….*

neoplast® *Mixer Vessels undergoes through Fully Automatic Polishing Machine as a standard scope – AT NO EXTRA COST*



Hand Operated Steel Polishing Machine with Unequal Directional Dull Polish is often performed by major local machine manufacturers but is often specified for external architectural applications which exhibit wide range of surface roughness depending upon the type of Wheel or Belt, Polishing Grit & expertise of polisher. Manual polishing of the mixing container leaves numerous surface scratches, dents, pinholes & Often exhibit deep grooves where Colour Pigments & chloride ions can accumulate & destroy the passive film, thereby initiating batch to batch colour contamination as well as corrosion attack. *For e.g.* A Black MasterBatch is compounded in 1st mixing cycle, then there is a pigment colour change & 2nd batch is compounded in White MasterBatch, the final mix of 2nd MasterBatch would be Greyish in Colour due to previous MasterBatch Pigment deposition on Mixer Shell Surface which still remains after clean the entire container as the deposition in inside the surface into the pin holes & not on the surface film.

In contrast, **neoplast®** strictly performs the Steel polishing operation via Automatic Polishing Machines to achieve Uniform Directional Clean-Cut Fine Surface Finish inside all the mixing containers. It is important to acquiring Ra Value (in Microns) ≤ 0.5µ which will generally exhibit Clean-Cut Surface with minimal chances of accumulation of Pigments & Chloride ION inside surface. In high speed mixing process of Dry-Blend of Plastics, the internal Stainless-Steel surface finish of mixing bowl is as important as coastal/marine application. Just a simple eye-washing Mirror Satin Finish polish would be insufficient to guarantee against corrosion protection affecting the overall life of the mixing bowl as well as batch to batch variation during compounding process as far as MasterBatch & PVC mixing application is concerned.

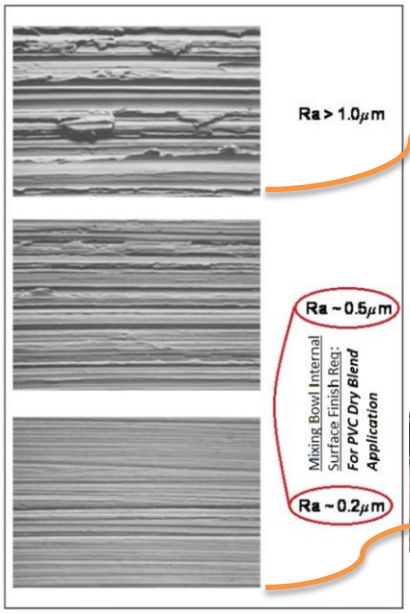
During the mixing process, the frictional forces takes places in tangential & radial directions causes the compound to drift against mixing bowl internal wall surface developing a fluidizing effect eventually heating the compound at a req. temperature (Generally upto 110 to 120°C). During this process, if the Internal Surface of the Mixing Bowl is not under req. Ra Value, the compound particles (Usually 100µ to 300µ) will start deposited inside the mixing bowl & will destroy the Passive Film, thereby initiating Corrosion attack. Besides Contamination & Corrosion issue, the deposited particles in the mixing bowl wall will repeatedly get heated in further mixing cycles making them degrade & eventually you will notice a dark black spots on the wall which in longer run will affect the overall batch that will be used in further downstream process (Extruder / Injection Moulding etc.) giving a small black spots on the final article or pipes extrusion.

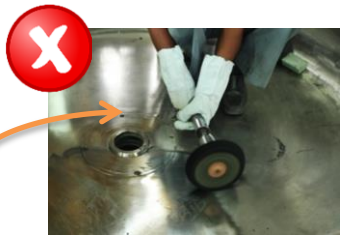
neoplast® *Vessel Surface Roughness Measurement*

The specification of grit reference cannot be equated to a consistent surface finish when it comes to Polishing of a Mixer Vessel. Variables affecting the resultant finish are grit size, tool load, condition of tool, feed rate, traverse rate condition of metal to be polished and lubricant used, if any.

For precise & consistent results, surface finish in Dry Blend Compounding applications should be specified in a range or maximum level of roughness average (Ra). This is normally expressed in micrometres (Microns). **neoplast®** use Stylus Method with USB interface principle in accordance with IS 3073 / ISO 4287, 4288. The Surface Roughness Measurement Test is conducted with duly calibrated German Make Measurement Device to achieve optimum results even at toughest reachable points inside the mixing container where chances of contamination are higher.

Fig 1: Variation in polishing finishes

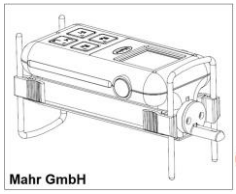


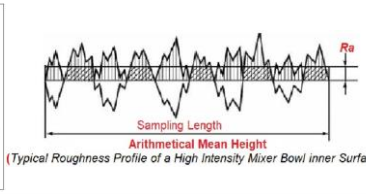


Hand Operated Polishing



Automatic Polishing





(Typical Roughness Profile of a High Intensity Mixer Bowl inner Surface)



Ask the EXPERT

Remember, if your application needs frequent cleaning of mixer vessel *OR* surface finish is one of your key concerns, **neoplast®** is the right place to discuss. Experience in polishing mixer vessels & components since 40 Years, we can guide you better.

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