Best Practices for Processing Fiber Glass Yarns

Over the past 50+ years, AGY has gained valuable experience in running fiber glass yarns in many different processes and products. Based on this experience, some common "best practice" processing techniques have proven to be beneficial in most applications.

In an effort to maximize the performance for our customers, AGY has compiled the following listing of best practices:

- Product conditioning and storage
- Temperature and humidity control
- Contact point design and composition
- Strand alignments
- Strand tension
- Housekeeping

Product Conditioning and Storage

Material should be stored in a suitable environment, protected from the elements and in accordance with the appropriate safety considerations for the area.

Prior to use, pallets should be placed in the production area with the plastic wrap removed for a minimum of 24 hours to allow them to acclimate to the processing environment. For product traceability reasons, the product label from the plastic wrap should be retained with the pallet.

Special attention should be given to pallets being moved from cold environments into warm, humid areas because as the material warms, its moisture content will increase significantly. This added moisture can negatively impact the product's performance; however, once the material has acclimated, this will no longer be an issue.

Temperature and Humidity Control

Fiber glass products process best if temperature and humidity are controlled. The control of humidity will enhance the ability to control static electricity, fuzz, and fly. The dynamics of the running glass will create static electricity, which can negatively impact strand control and become a nuisance for operators. Control of temperature and relative humidity becomes more critical as fiber processing speeds are increased. AGY suggests the following:

- Temperature = 70°F ± 5° (21.1°C ± 2.7°)
- Relative Humidity = 60%RH ± 5%

In some instances, addition of static elimination equipment may be required.

Contact Point Design and Composition

Every contact the material makes with equipment will affect its performance. Contact points should be hard enough to resist being cut or worn by the glass, yet smooth enough so that they do not themselves break or abrade the glass. AGY suggests the following:

Composition

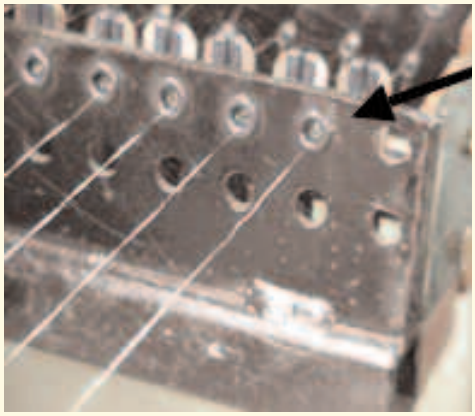
- Metals: choose hardened steel, high-density chrome, or in some cases, brass; soft metals should be avoided.
- Ceramics: conductive ceramics have proven extremely durable; they also reduce fuzz and broken filaments. TiO_2 material meeting AlSiMag 193, which is the electrically conductive version of AlSiMag 192, is an excellent option for these purposes.

Design

- Minimize the number of contacts.
- Minimize bend angles in the contacts. The more severe the angle, the more fuzz will be created.
- Create contacts with maximum allowable bending radius; those below 5/16" (7.9mm) will show an increase in fuzz depending upon the level of tension.
- Ground contact point mounts and equipment to reduce static electricity.
- Position initial contact points near the center of the bobbin/spool/tube; an off-center pull will break fibers.

Maintenance

- Keep contact points clean of fuzz and binder.
- Regularly inspect contact points for abnormal wear, cuts, or nicks; repair or replace as needed.



Ceramic guide eye insert into grounded steel holder

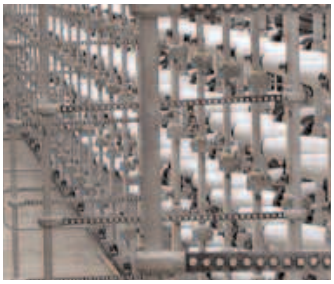
Strand Alignment

The design of the strand path is important for successful fiber processing. The strand should be aligned in the middle of the guide eye with minimal bends. Most guide eyes are designed to facilitate the strand moving within the inside circumference. Care should be taken to avoid undersizing the guide inside diameters, to do so will generate fuzz and potentially break out the end.

If bends are required, small angles with large surface areas are preferred.

Strands should not be allowed to touch each other during processing. Glass is very abrasive and glass-on-glass contact causes severe broken filaments.

When running an "over-the-nose" type operation as shown in the picture, if the speeds are such that ballooning of the strand occurs, then it is recommended that the distance from the nose of the bobbin to the first eyelet should be optimized to minimize tension caused by this ballooning action.



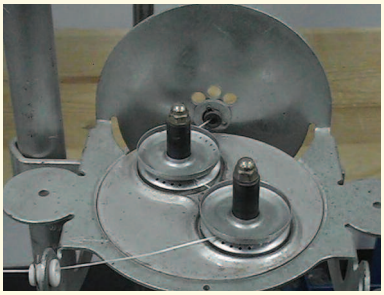
Strand Tension

Strand tension is an important factor in processing fiber glass yarns. In general, it is advisable to run at the lowest tension that your process will allow. Lower tensions cause less wear on contact points which, in turn, will reduce strand breaks.

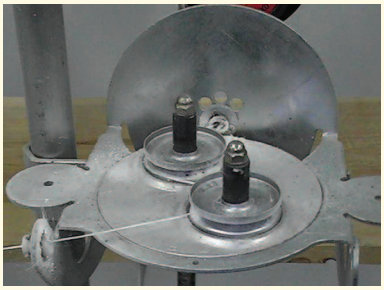
The tension imparted on the running strand can be created by various means, and many different types of strand tensioning devices are commercially available. Two of the most commonly used devices are the post and disk tensioner, and the whorl tensioner:

Post and Disk Tensioners

Regular examination of post and disk tensioners, both magnetic and non-magnetic, is essential. Posts which are free of cuts and wear facilitate glass movement and reduce abrasion and breaks. In magnetic tensioners, clean disks promote a stable magnetic force which in turn helps maintain a consistent yarn tension.



Example of clean tensioning

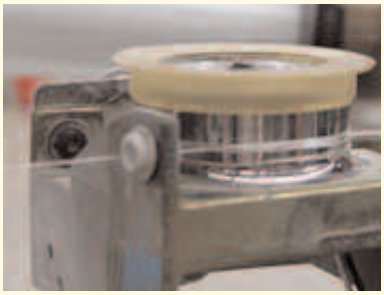


Example of dirty tensioning

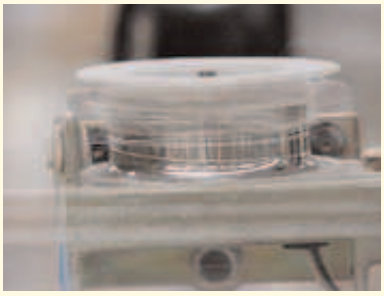
Whorl Tensioners

Whorl tensioners should be monitored regularly and any buildup of fly or fuzz should be removed. Ensure that whorls are kept level and well-aligned to allow for the free movement of the yarn through the exit eyelet. Minimize the number of wraps to reduce slippage.

The principles discussed above can be applied to other commonly used tensions.



Example of a "clean" whorl



Example of a "dirty" whorl that needs cleaning

Housekeeping

Keeping the area clean will help in minimizing fuzz and contamination. Normal cleaning schedules based on run time have been found to be very effective. Make sure to pay special attention to each contact point to quickly identify wear and cuts, and to ensure that any buildup of fuzz or binder is removed promptly.

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