

Tissue Experts review

Changing your drying energy balance? A few points to consider

By a panel of BTG Tissue experts (Ian Padley, Fernando Dantas and Jeff Peters)

Soaring energy costs in the papermaking sector, especially for natural gas, may make some tissue makers look at their Yankee dryer/gas hood drying split, as a means to reduce energy costs. It is well known that drying the sheet with the bias to the Yankee can be more efficient. In this short article, BTG offers some points for tissue makers to consider to ensure a continued safe and efficient operation of the Yankee dryer.

INTRODUCTION

A combination of a post-pandemic energy demand boom, compounded by recent political events, has led to a significant increase in natural gas pricing in the last months. For example, US spot pricing for natural gas doubling in the last 12 months. Many tissue makers have previously run a slight bias towards hood drying, 60:40 being typical, as this can give an optimum result for sheet handfeel, bulk and coating control. On many machines there may be marginal gains in net energy usage if the drying bias is moved in the direction of more Yankee drying, provided the Yankee is operating well, especially in terms of steam and condensate removal. With today's energy prices, these marginal gains may seem a lot more attractive. However, increased heat flux through the Yankee shell may influence the way Yankee coating behaves, with the potential for harder coating which may induce runnability issues, quality defects or even increased blade vibration and the consequent risk of Yankee damage. So what should the tissue maker be thinking about for safe operation of the Yankee with increased steam drying?

1. STEAM AND CONDENSATE OPERATION

The dryer will need to handle an increased condensing load if the drying bias to the Yankee is increased. The tissue maker needs to be confident that their steam and condensate system is working well, especially for condensate removal. Good steam side and water side chemical treatment programs are critical, as is the condition of the soda straws. Attention should be paid to the differential pressure or blowthrough velocity according to which control strategy is in operation, and the implications of any changes in these for the critical blowthrough: motive steam ratio. If needed, further advice can be sought from specialists, such as the BTG/Voith PROsteam audit.

2. BLADE VIBRATION

Many tissue makers have equipped their Yankee with a blade vibration monitoring system, or VMS. Ideally a good VMS will show real-time trending over a range of frequencies for both creping and cleaning blade, if used. The ability to check the full spectrum of vibration, an FFT spectrum display for example, is helpful to check that no new frequencies have emerged and the ability to historize this spectrum is even better. Finally, a good system will co-trend important process tags, such as coating and dryer settings, so that we can do easy data correlation. BTG's VigilancePRO has all these features.

If the tissue maker is adjusting the dryer balance, then the live trend of the important vibration frequencies is their friend. The macro trend across many blade change cycles should be stable, not increasing blade to blade. The instantaneous 'damage level' view of vibration does not necessarily give the correct insight of changes for the user, as the changes can be initially quite small and only compounding over a number of weeks. There have been instances where Yankee damage has occurred even with a VMS installed, and the damage was apparent in

trend view, but sadly only in hindsight as no one was checking the trend on a regular basis. An always-displayed live trend is best, but failing that, daily checks are recommended.

Aside from asset protection, the VMS has a valuable role in helping the tissue maker re-optimizing the coating package. The VMS should respond to quite small coating changes, and as the goal is to achieve good adhesion but without hardness, looking at vibration in the mid-teens kHz range is an excellent way to monitor coating changes.

3. BLADE LIFETIME MANAGEMENT

Blade lifetime management is a quick tool for an initial control of higher vibration. It does increase costs slightly both in consumable material and change time frequency, but it's an effective short term control to avoid damage whilst longer term solutions are bought on line. Changing the blade based on a safe vibration limit can be a good strategy compared to arbitrary time based limits or waiting for sheet defects. If a cleaning blade is used, then increasing its change frequency can be a less disruptive way to re-establish a flat vibration control baseline.

4. YANKEE COATING CONTROL

Changes in the drying balance imply a change of the coating plasticity properties. As the drying is more driven by the Yankee steam, tissue makers shall expect a modification of the coating hardness gradient of their coating throughout the coating layer. Typically, the coating will become harder in the inner coating layer which is in contact with the Yankee surface while only a very thin outer layer closer to the sheet will remain softer. Yankee coatings generally need some moisture content within the coating matrix to maintain good plasticizing performance. The degree of the changes expected to be seen on the new coating characteristics as a result of the new drying conditions, mainly depends on the heat demand properties of the adhesive, plasticizing capabilities, release or modifiers, and the ability to change the total evaporating load through the spray bar. All these combined with new settings of the total add and the adhesive/release ratio, will be required to adapt the coating characteristics to the new drying conditions and maintain its best performance.

5. BLADE OPERATION MANAGEMENT

It is critical to ensure the doctor holder(s) (creping, cleaning and cut-off) are in good working order and blade profiles and loading are to manufacturer's specifications to ensure good doctoring conditions of the Yankee coating. Pre-conditioning the Yankee surface with dedicated blade, such as BTG PROclean to eliminate any residual of hard coating by smoothing the surface during machine operation or after a machine shutdown, should be followed by the correct conditioning procedure with MAP and coating. This prevents a trigger point to initiate the typical stick and slip movement of the creping and cleaning blade which is at the origin of any chatter event on a Yankee.