TAPPI TISSUECON™ COPRODUCED BY Fastmarkets RISI

Buckman™ Chemistry, connected.

Hybrid Release Technology for Improved Yankee Coating Control

Grant Downham

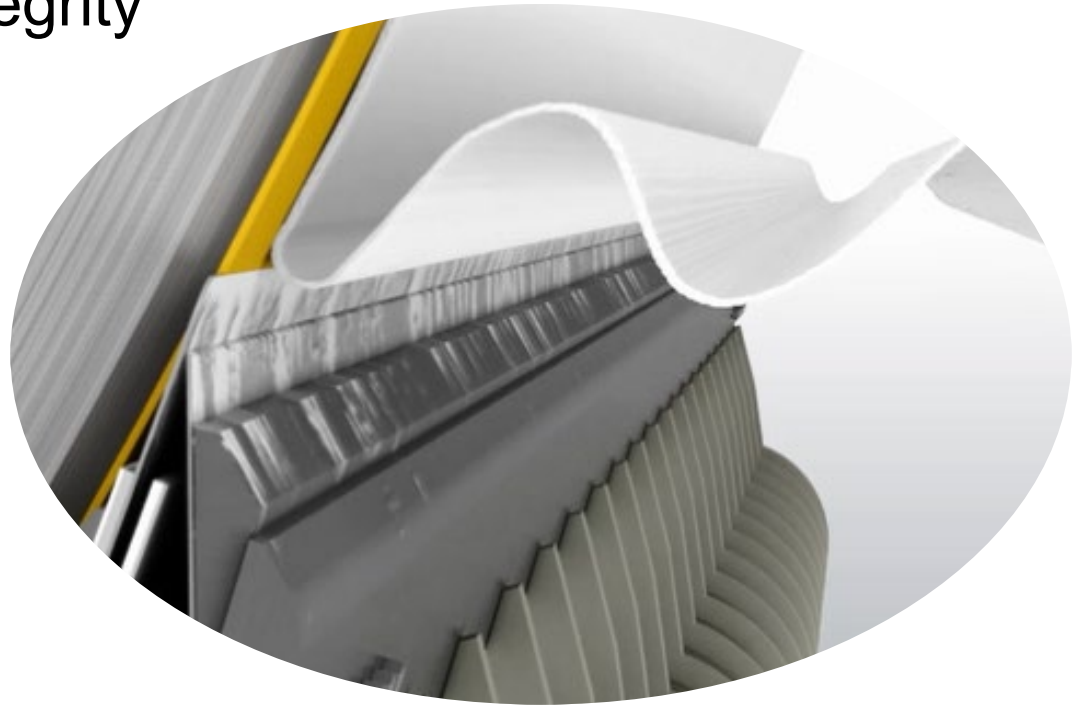
Senior Sales Executive Tissue

Daniel Glover

Innovation Director

Functions of a Coating Release

- Release the sheet at the blade
- Control adhesion
  - Modify the level of tack between the sheet and the Yankee coating without weakening the base coat integrity
- Lubricate the blade
- Soften the coating
- Control the coating set point
- Control the coating thickness
- Improve uniformity of the coating matrix

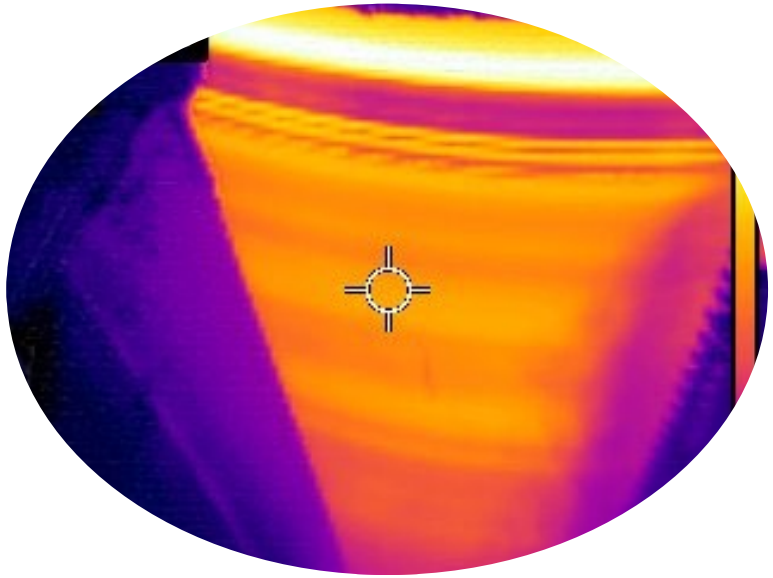


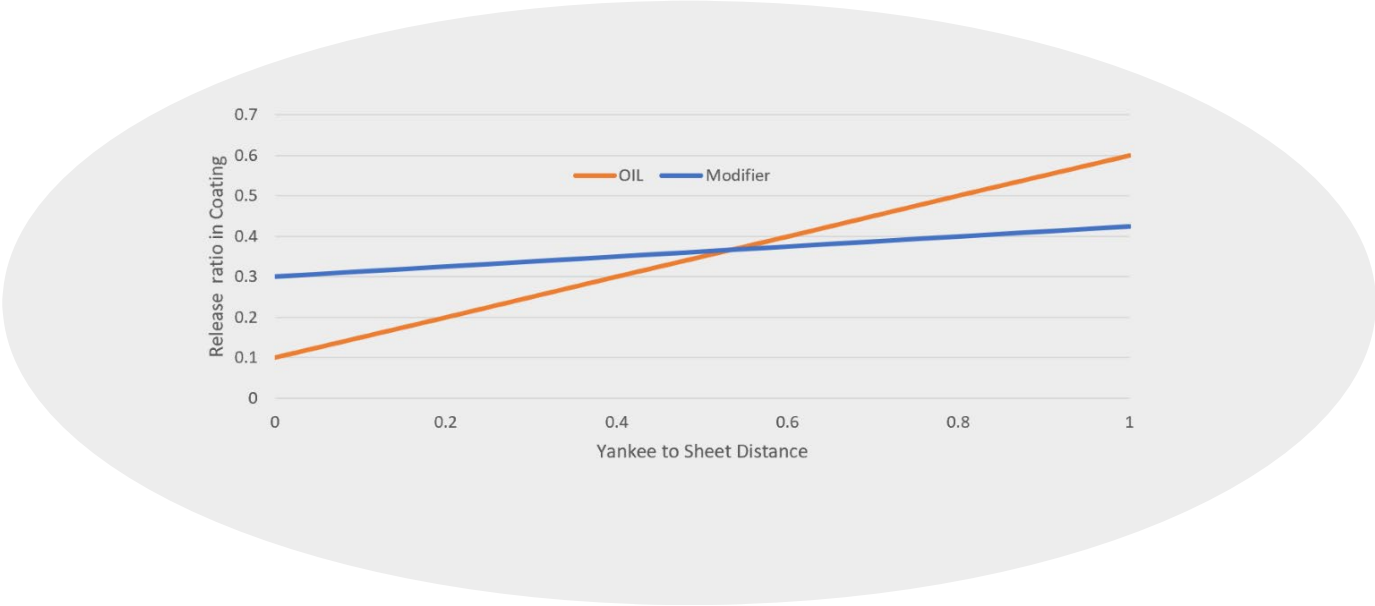
Traditional Release - OIL

- Oil release and water-based coatings do not mix effectively
- Oil has a tendency to migrate away from heat

Result is that uniformity suffers multi-directionally

  - Across the Yankee and through the coating matrix





Traditional Release - OIL

Oil releases have been used since the start of tissue creping with the following benefits:

- Excellent blade lubrication
- Best release properties at the blade
- Effective control of adhesion at the blade
- Control of the coating set point at the nip
- Effective stretch development
- Lubricity of the sheet for added “hand feel”

But their uniformity and softening of the coating are limiting factors.

Surfactant-based Modifier Release

A water-based surfactant modifier will mix within and modify the coating across the Yankee and through the depth of the coating matrix for improved uniformity, resulting in:

- Improved uniformity of the coating matrix
- Ability to soften the entire coating matrix more effectively
- Better control of tack adjustment at the blade
- Lower edge build up tendencies
- In general, production of softer tissue at low moisture creping

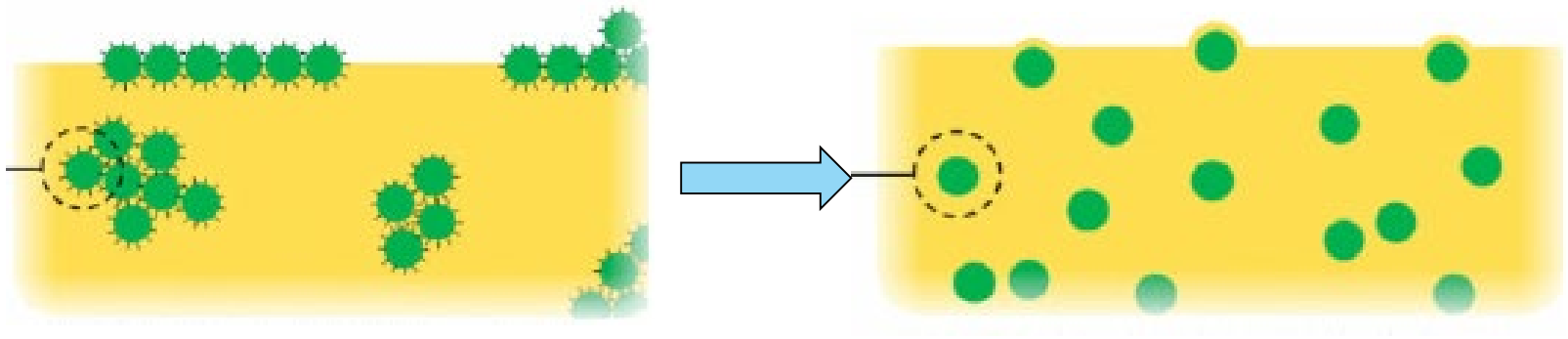
But lubrication of the blade and sheet stretch are limiting.

And The Winner Is ….? Both or Neither?

	OIL	Modifier
QUANTITY (ADD-ON)	Low	Mid - High
COST	Low	High
STRETCH	High	Low - Med
BLADE LIFE	High	Med
SHEET RELEASE	High	Med-Low
COATING UNIFORMITY	Low - Med	High
COATING SOFTNESS	Low - Layered	High
COATING DEPTH	Med - Layered	High
EDGE CONTROL	Low	Med
SHEET SOFTNESS	Med-High	Med-High

The New Winner - Hybrid Release Technology

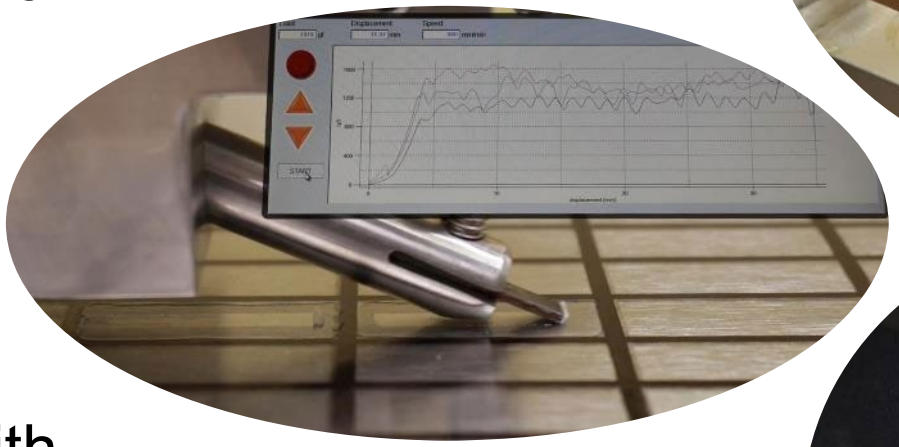
To achieve the benefits of both, our R&D has used unique amphiphilic fatty acids blended with an oil to create “hybrid release” products that improve oil dispersion throughout the coating matrix.

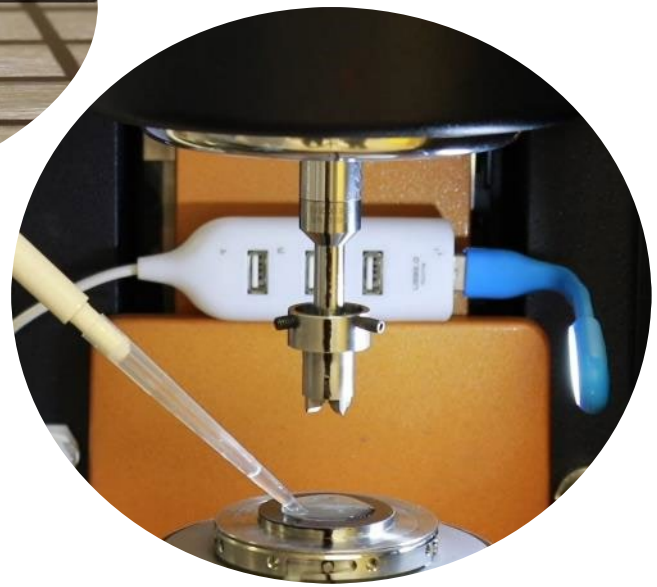


The resulting combination provides the lubricity benefits of an oil, while modifying the coating matrix like a surfactant-based product with the desired coating uniformity.

Lab Scale Tests

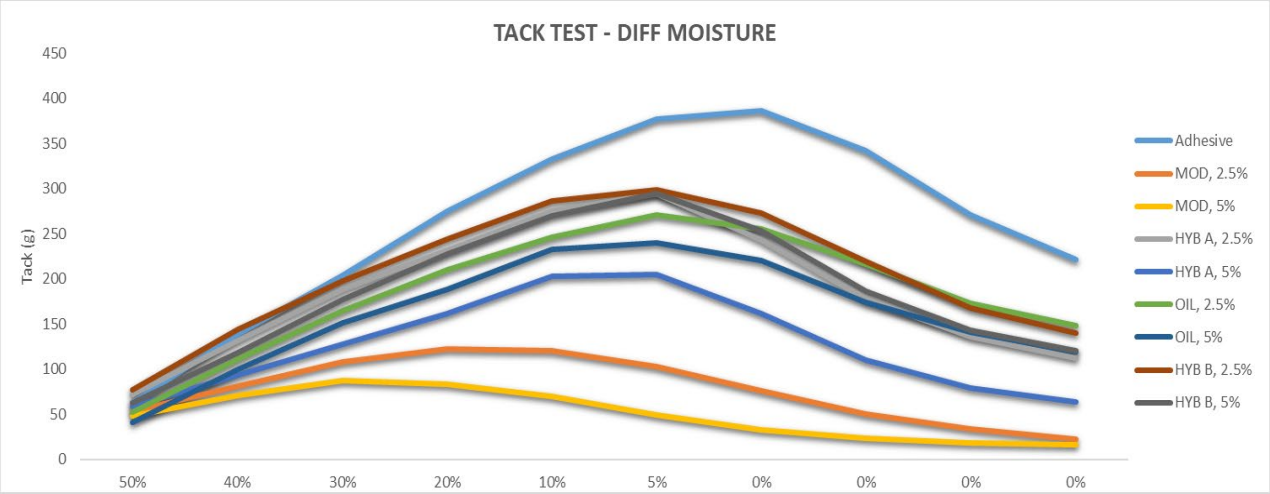
- Using one base adhesive, the effects of release addition were evaluated on:
  - Tack Curve at varying moisture
  - Final or Total Adhesion
  - Creping Force
  - Coating Deformation with Rheometer to evaluate hardness impact
- Modifier was compared to oil and two hybrid formulations with different oil-to-fatty acid ratios (A – lower oil, B – higher oil)
- Release was added at two concentrations

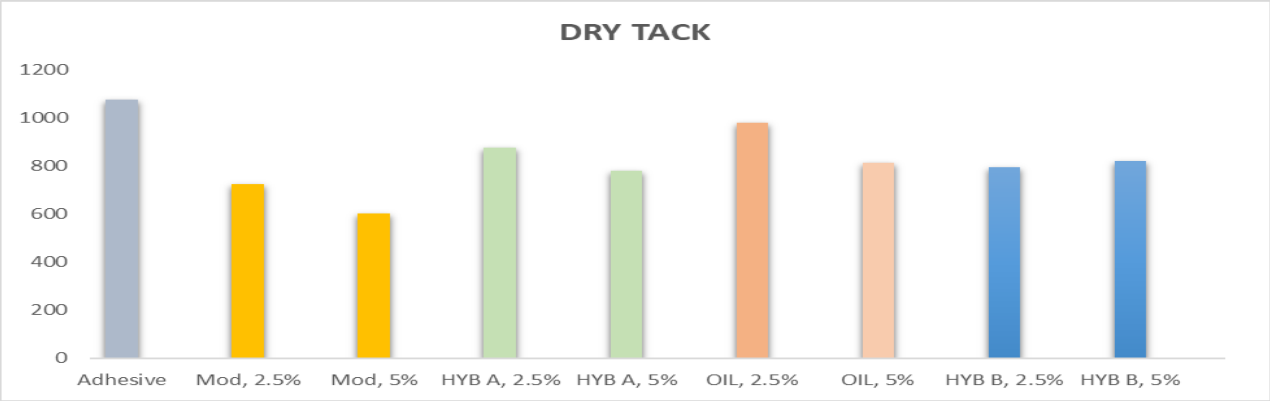




Lab – Tack Tests

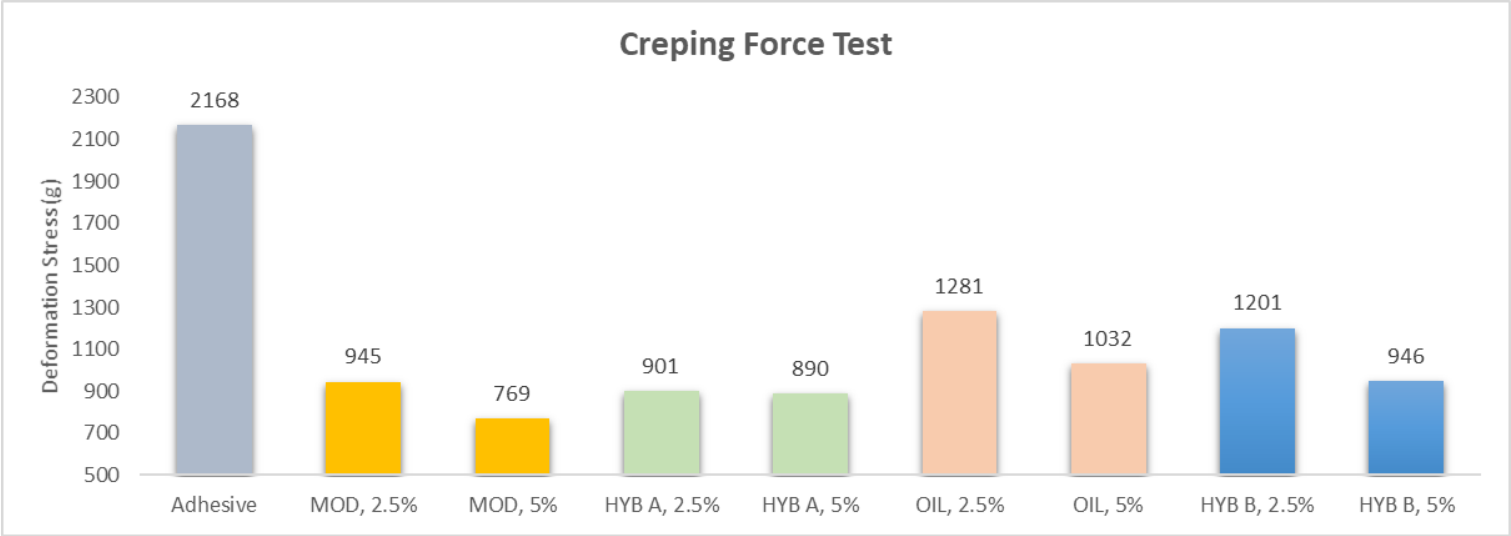
- Tack Curve
  - Modifier reduced tack to the greatest degree at all moistures
  - Hybrid A – mid-range effect
  - Oil – least impact on tack
  - Hybrid B – similar to oil
- Dry Tack or Total Adhesion
  - Same trends as tack curve with Hybrid A having an effect in between the oil and modifier





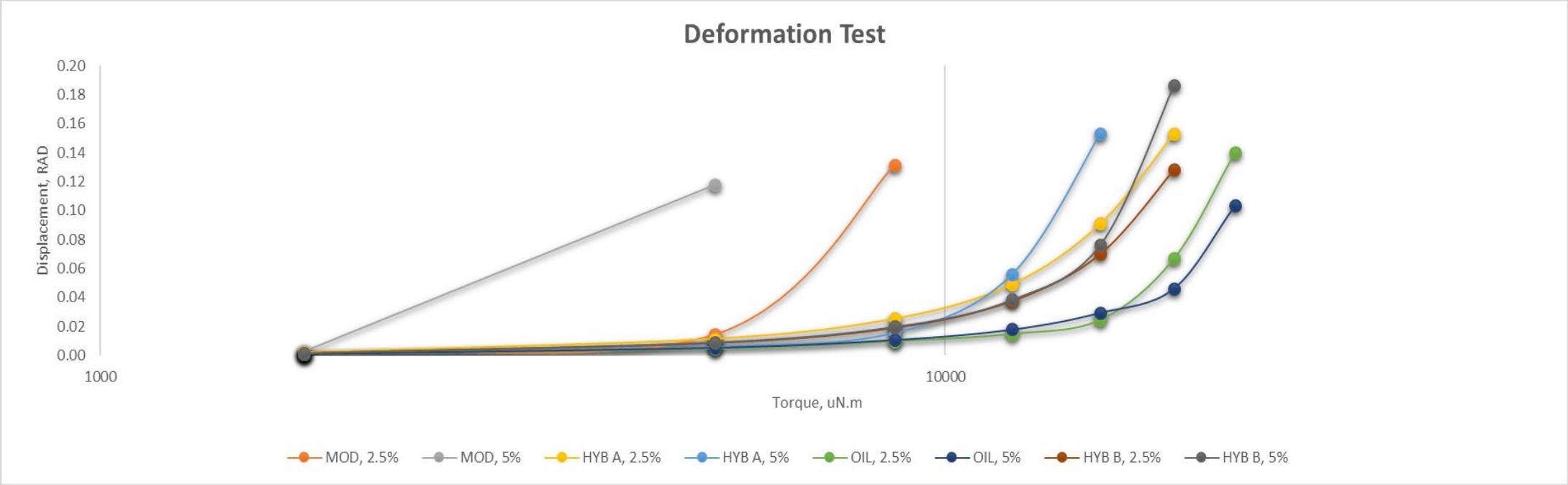
Lab – Crepe Force Test

- Creping force test shows adherence to the metal as well as the doctor ability of the coating film.
- The Hybrid A chemistry shows similar impact as a modifier indicating its ability to modify the film for better doctoring vs an oil.
- Hybrid B with higher oil content is similar to the oil but with slightly better doctor ability.



Lab – Rheometer Test (Coating Hardness)

- Modifier - largest softening effect
- Hybrid A and Hybrid B having next effect, limited difference between the two
- Oil release has least impact of softening the coating film

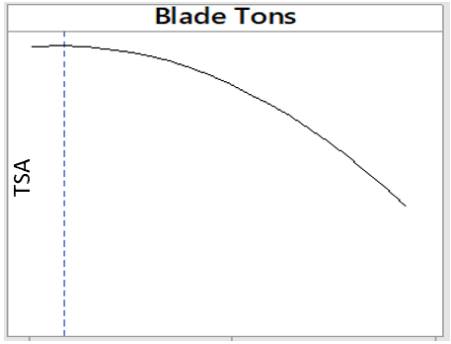


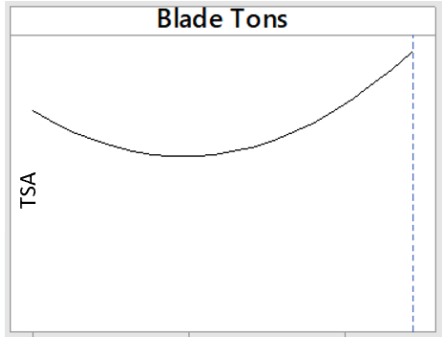
Case History 1 – Premium Toilet AWH

1100 MPM
5%

GAP - maintain softness longer through blade life (modifier to hybrid)

- Coating kept soft for intimate attachment and adhesion while improving blade lubrication and minimizing wear
- Improved TSA softness through blade life as per multiple regression analysis
- Blade wear reduced
- Blade age became less of an impact to sheet softness

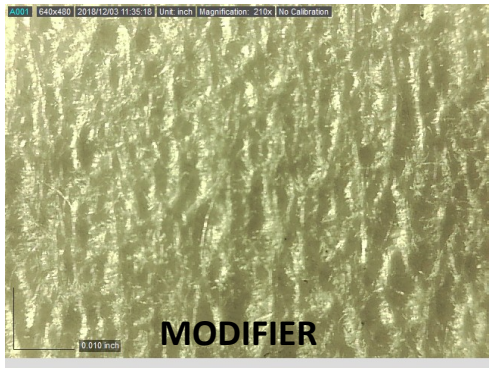


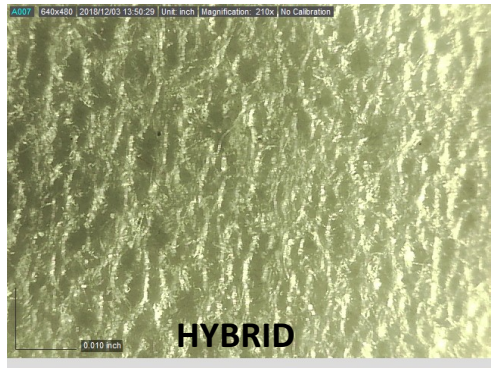


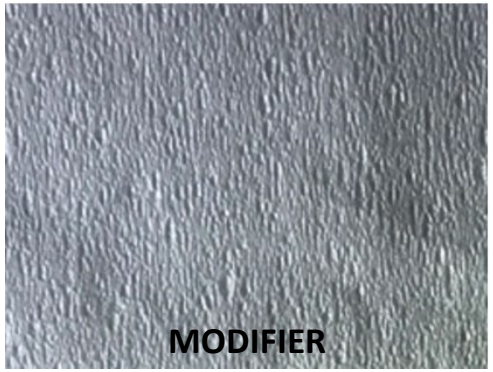
Case History 2 – Premium Toilet

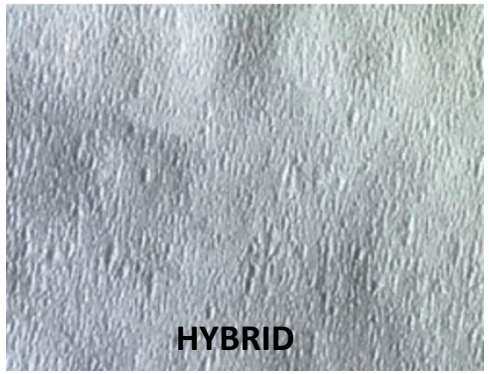
1675 MPM
3.5 – 4.5%

- GAP to improve softness achieved with hybrid release vs modifier
- Introduction of hybrid release on 100% virgin and virgin/RF blend grades showed significant impact on crepe structure

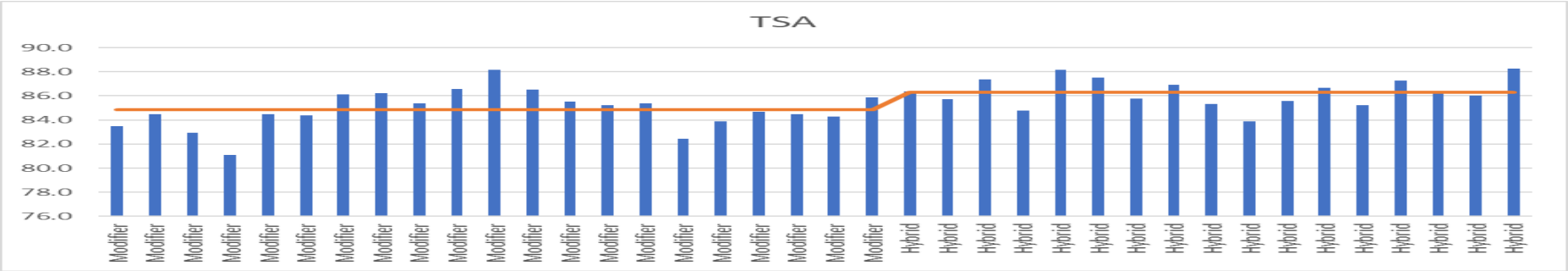








- TSA average 1.5 pts higher with Hybrid release vs modifier on virgin grade

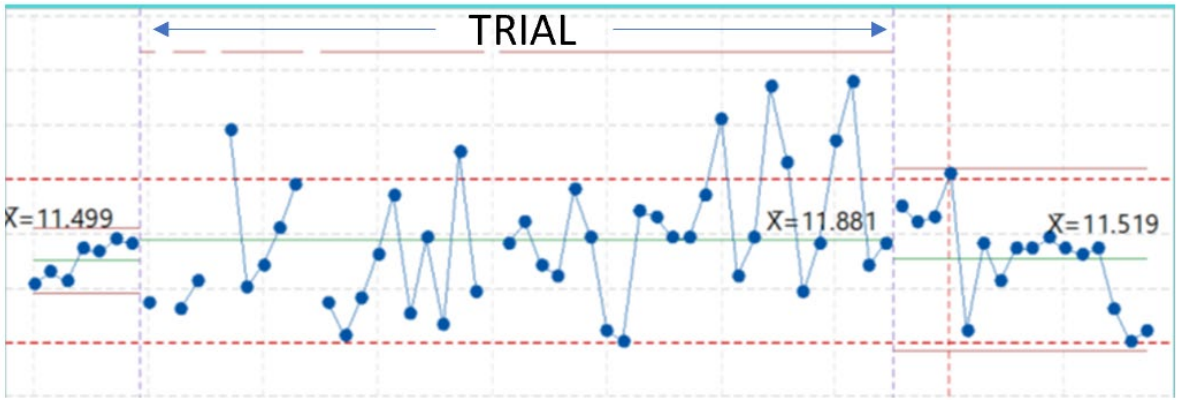


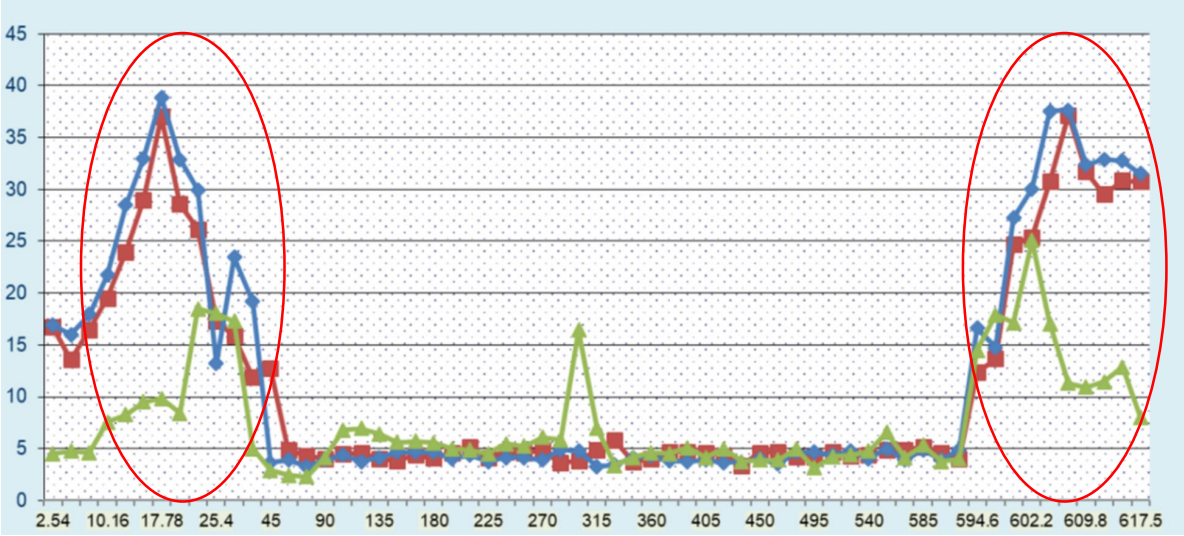
Case History 3 -100% RF Bath Tissue

1850 MPM
6%

Target: Reduce cost by utilizing hybrid release to replace mineral oil release

- Release add-on reduced from 12mg to 8mg/m^2
- Stretch increased by 2.6%
- Edge control improved vs the oil as shown through blade wear pattern
- Blade life maintained at 48 hours



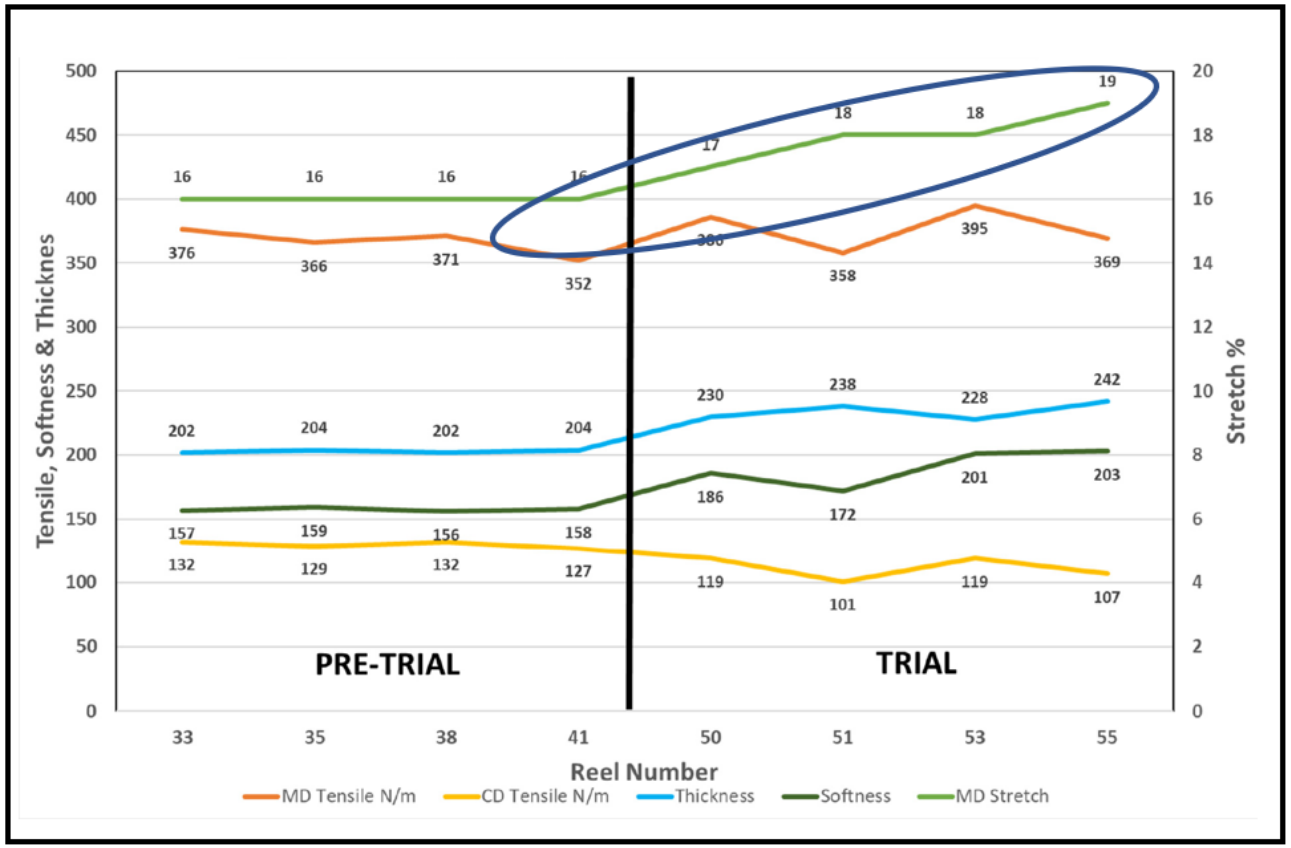


Case History 4 – Bagasse Toilet Tissue

3600 FPM
6%

Target: Reduce release add-on by utilizing hybrid release to replace mineral oil release

- Release flows reduced from 60ml to 20ml/min
- Stretch increased from 16 to 18%

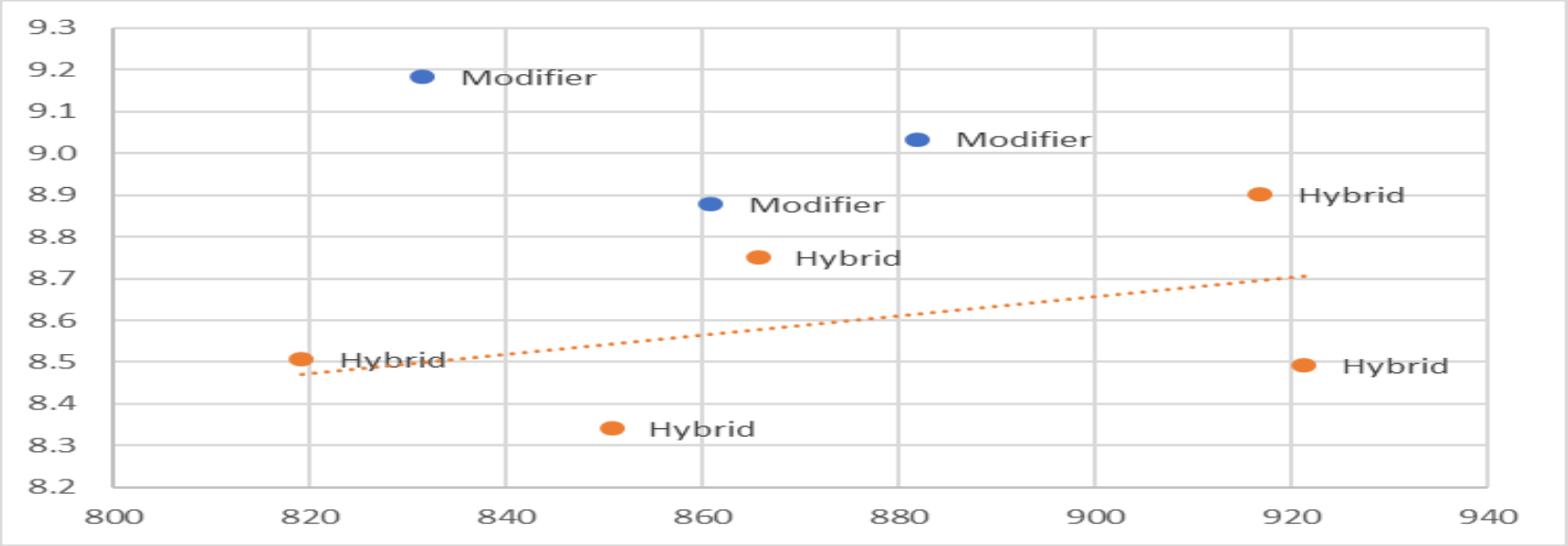


Case History 5 – Facial Trials

800 MPM
<2%

Facial trials to produce soft premium facial showed the benefit of the hybrid release for softness

- Modifying coating at high temperature and low moisture
- Adjusting adhesion at blade
- Lubricity of the sheet for “hand-feel”



- TS7 vs GMT showed better surface feel vs modifier on same adhesive

Hybrid Release Technology

Lab scale work, as well as a number of trials and applications have proved the benefit of combining the advantages from the lubricity of an oil and the softening and coating uniformity characteristics of a modifier to achieve -

- Improved softness
- Improved stretch
- Improved blade life
- Reduced add-ons

The future holds the opportunity to explore hybrid technology further with different ratios and blends of components to maximize the potential synergy.

Hybrid Release Technology

- Questions??

- Thanks to Jian Tan for providing lab data and analysis