To:
Attn:
Date:

Capabilities

We can run trials with different configurations on 1.15 m wide line (gross) with PP, as well as with PE and PET; other materials are possible but need to be qualified in advance.

Configuration	Fiber cross section [Bico]	Capillaries [#/m; total]	Orifice D, L [mm]	Bonding [Type]
R4s Single beam spunbond	Sheath-Core Side-by-Side	6,861; 7,022	0.6; 2.4	Calendered Hydroentangled Both
R4 Single beam spunbond	Sheath-Core Side-by-Side	5,510; 5,722	0.6; 2.4	Calendered Hydroentangled Both
R4 Single beam spunbond	Sheath-Core Side-by-Side	2,687; 2,730	0.6; 2.4	Calendered Hydroentangled Both
R4 Single beam spunbond	Tipped-Trilobal	6,861; 7,022	1.1; 1.9	Calendered Hydroentangled Both
R4 Single beam spunbond	37 Islands-in-the-Sea Sheath-Core	3,507; 3,592	0.4; 1.6	Calendered Hydroentangled Both

Configuration	Throughput range PP per m [kg/h/m]	Basis weight range [g/m²]	Line speed [m/min]	Denier [den]
R4/R4s Single beam spunbond	150 - 400	10 - 200	25 – 400	1 – 3.5

Configuration	Applications
HP Latex L570 Printer	Banners, Displays, Exhibition, Event graphics, Exterior signage, Indoor posters, Interior decoration, Murals, Posters, Textiles

Warranties

Due to the nature of research and equipment, NWI provides no guaranties or warranties as to the outcome of trials.

Resins

Before we can schedule a trial, we will need:

- Specifics of the resin, as clearly as possible (e.g. polypropylene, homo-polymer, MFR, PI - relative to standard grades, catalyst, co-monomers), and any details of prior experiments with such materials.
- All MSDS, SDS, and other relevant information should be submitted to NWI at least three weeks prior to the scheduled trial.
- The melt characteristics of all polymers and additives must be received at least three weeks before the trial. These characteristics include T_m, T_g, viscosity, melt flow index, melt rheology and processing conditions including drying temperatures and conditions, process temperatures and conditions, throughput rates, basis weight, and other characteristics of the webs.
- NWI's Analytical labs can determine these characteristics for its normal fees for such a service. If NWI is required to characterize the polymers, the materials must be received at least four weeks prior to the trial.

Shipping address for resins and additives

The Nonwovens Institute
attn. Mr. Bradley Scroggins
1010 Main Campus Drive
NC State University
Raleigh, NC 27606

Prior to the shipment of any resin, you must notify NWI. All relevant information about the materials shipped, and the associated trial plans must be sent to:

attn. Mr. Bradley Scroggins
Email: blscrogg@ncsu.edu and copy to nonwovens@ncsu.edu
Mobile: 217-791-2661

Shipments can be received Monday to Friday from 8:00 AM to 5:00 PM.

Please indicate on delivery papers your company's name and please make sure that the shipment is addressed to Mr. Brad Scroggins. We cannot guarantee that your material is marked properly and available for your trials. Unidentified resins can be stored only for two (2) weeks and then will be discarded at clients' expense.

Please allow sufficient time for the shipment, especially if custom clearance is required. Generally, resins must be supplied at least two weeks ahead of the trial by the customer. Resins cannot be stored in our warehouse.

The resins must be:

- Used at NWI pilot facilities
- Discarded on client's behalf at client's cost
- Returned to client at client's cost

NWI reserves the right to dispose of any material after a period of two weeks following the trials, in the absence of any other agreements.

Resin Service

Prior arrangements must be made if NWI is to supply the base polymers or fibers for trials at least four (4) weeks prior to the trial. This prior notice ensures that the materials are delivered and ready in time for your trial.

Additional Hours and Charges

NWI is open from 8:00 AM to 5:00 PM, and NWI staff normally work eight (8) hour days (plus one hour for lunch). Client will be charged time and one-half (1½) for hours worked on trials by NWI staff in excess of eight hours on a particular day.

Operational Considerations

- A detailed trial plan must be developed in discussion with the responsible engineer from NWI at least two (2) weeks prior to trials. Without such a plan, the trial will be canceled.
- Minimum run time is one (1) day

Participation in Trials

If the client wishes to be present at the trial, NWI must be notified in advance and provided with the names and contact information of all individuals who will attend. **All participants must sign the visitor waiver agreement (Appendix E) and review a safety video before the trial start**; NWI must receive all signed visitor waiver agreements before the start of the trial, otherwise the client and its employees will not be allowed to be participate in the trial. If we have not received a signed copy the "**visitor waiver agreement**" in Appendix E before

the trial, we will ask you to sign the forms while you are here before the start of the trial. Please keep in mind that you are visiting a research and pilot facility. You must therefore, comply with all safety rules while on the premises.

NWI personnel will perform all trial work. Client's employees can be present during the trial, but are required to stay within approved safe zones or in the office away from the equipment. All safety guidelines must be followed by the Client's employees while in the pilot facility.

NWI staff will prepare the spinpacks required for the trial. Client's employees cannot be present during this stage of the trial. The details of the equipment and the spin packs are confidential and will not be disclosed under any circumstances.

Non-Analysis

Except as specified by Client and agreed to by NWI, NWI will not perform or permit others to perform any additional test, analysis, or other evaluation of the material for the purpose of determining the chemical character, components, or physical characteristics or the method of manufacture thereof. NWI will not share samples, or any portion thereof, with any third party, without the express permission of Client.

At Client's request, NWI can provide some basic measurements of denier, basis weight, air permeability and tensile strength as needed for the trials (Not to exceed 3 samples). Additional costs will apply for additional tests. NWI must be notified in advance for any special tests to be performed during the trial so that arrangements can be made with NWI analytical facilities.

Data

NWI will provide a basic report for the trial two weeks after the trial completion. This report will include run sheets for the trial and any tests performed.

Payment Terms:

- Charges will be in accordance with the Service Agreement (Order Form), Bylaws and if applicable, the Membership Agreement.
- NWI will not exceed the payment amount agreed to in the Order Form without written authorization from the Client.
- Fourteen (14) days before the scheduled trial, the Client's Purchase Order covering the trial must be on file at NWI.
- Invoices will be sent typically one week after trials.
- Final payment is required within 30 days of receipt of invoice from NWI.

General Considerations

- Violations of the procedures outlined herein may result in NWI's cancellation of the trial.
- Photographing, recording, or drawing sketches of any machinery or equipment and related processes at NWI Facilities is strictly prohibited.
- NWI reserves the right to conduct tours of all Lab Facilities unless a Client's proprietary information could be detected or discovered by those touring the Facilities. NWI must be notified of Client proprietary information in writing prior to the trial and NWI shall comply with the confidentiality obligations as set out in the fabrication services agreement.
- Any samples remaining after trial will be sent via Fedex Freight Collect unless otherwise arranged. Left over materials contribute to an unsafe work environment

Costs

Costs depend on line configuration and are as shown below:

Line configuration/Options	$ NWI Member	$/day* Others
Spunbond (Calendered)	10,000/day*	14,000/day*
Spunbond (Hydroentangled)	14,000/day*	16,000/day*
Spunbond (Calendered & Hydroentangled)	14,000/day*	16,000/day*
Set up/clean up Fee	750/Per trial	750/Per trial
Bonding Only		
Hydroentangling (Through-air included)	6,000/day*	8,000/day*
Calendering	6,000/day*	8,000/day*
Set up/clean up Fee	750/Per trial	750/Per trial
Options/Add-ons		
Analytical Testing of samples^	$50/sample	$50/sample
Analytical Testing of samples^ (Pre-Arranged)	$1,500/day	$1,500/day
Resin crystallization or drying	3,000/trial	4,000/trial
Pack change**	3,000/change	4,000/change
Calender roll change**	5,000/change	6,000/change
Through air	0	2,000/day*
Kiss Roll	0	2,000/day*
HP Latex Printing (30min Minimum)	200/hr	280/hr

***** Day working time is: Monday to Friday 9:00 AM to 4:00 PM; warm-up and shut-down not included. Additional time will be charged at time and a half.
**Changes will reduce the trial time from the 9a-4p allotment.
^Analytical testing to include basis weight (n=4), fiber size (n=10) and tensile testing (n=5). Three sample test are part of the Trial to evaluate the desired properties of first samples.

The following costs will be added to the final balance where applicable:

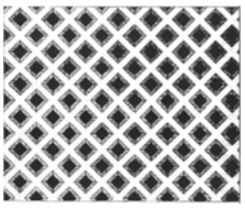
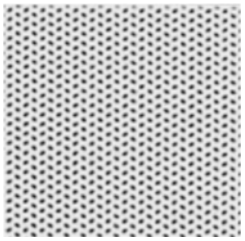
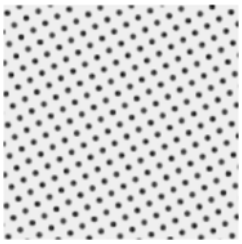
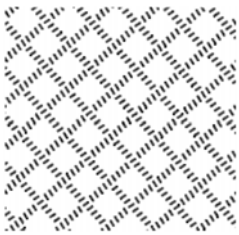
Item	Costs
Raw Materials Cost (including purge polymer)	Cost + 20% for admin and handling
Expendables (Boxes, tubes, etc.	Cost + 20% for admin and handling
Project Management (if requested)	Individual cost/hour + benefits
Overtime (if requested)	1.5 times the applicable hourly rate
Shipping, packing, customs clearance if provided by NWI	Actual - Shipment will be “prepaid” and added to the invoice unless otherwise specified by Client
Storage if prior arrangement is made	Actual
Disposal management for resins other than PP	$500
Waste water disposal for kiss-roll trials	$500
Equipment damage or costs due to incorrect technical information or materials supplied	Actual

Cancellation fees are as shown below:

- 4 weeks and longer: no charge
- 2 to 4 weeks: 30% of trial costs
- 1 to 2 weeks: 50% of trial costs
- One week or less: 75% of trial costs

Appendix A – Please check the availability of pattern rolls

Embossing Patterns

Engraving ID: 11.11.98 - NW382/0 Bonding shape: Square Bonding area: 19.87% Figures/cm²: 32.7 Square size: 0.78 mm x 0.78 mm Pattern: 1.75 mm x 1.75 mm	
Engraving ID: U2888 Bonding shape: Ellipse Bonding area: 18.10% Figures/cm²: 49.9 Ellipse size: 0.88mm x 0.52mm	
Engraving ID: similar U2090 Bonding shape: Diamond Bonding area: 14.6% Engraving depth: 0.68mm Figures/cm²: 34.6 Diamond size: 0.75mm x 0.75mm	
Engraving ID: U5714A Bonding shape: Round Bonding area: 12.10% Figures/cm²: 24.0 Circle diameter: 0.8mm	
Engraving ID: None - smooth Bonding shape: N/A Bonding area: N/A Figures/cm²: N/A	
Spare Steel Roll to be engraved with client's bond pattern.	**Special patterns can be engraved at 33% cost of a roll + engraving costs. The roll will be kept for 6 months with that pattern, and the roll can be engraved with a different pattern thereafter.**
Engraving ID: U5938 Bonding shape: Quilt Bonding area: 12.10% Figures/cm²: 24 To be ordered later	

Appendix B – Please check the availability of jet strips

Jet strips for staple fiber webs and also for second pass

Number of Rows	Capillary Diameters (Microns)	Spacing, H; V (mm)	Quantity	Strip ID
2	140; 140	0.9; 0.6	2	2N9
2	115; 115	0.75; 0.6	12	2J14
3	115; 115; 115	1.4; 1.2	2	3J7.5

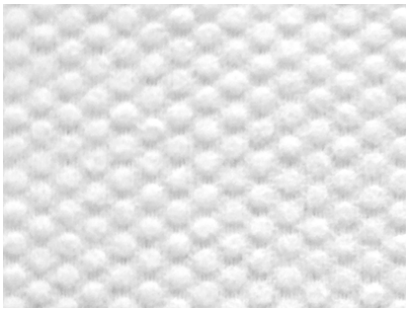
No. of Rows	Jet Strip Capillary Diameter (Microns)	Spacing, H; V (mm)	Quantity	Size-Spacing-Rows
1	130	0.6	12	0.13-0.6-1
1	130	0.8	12	0.13-0.8-1
1	130	1.2	12	0.13-1.2-1
1	150	0.6	6	0.15-0.6-1
1	150	0.8	6	0.15-0.8-1
1	150	1.2	6	0.15-1.2-1
2	90/130	1.2; 0.6	4	0.9-1.2-1/2 0.13-0.6-2/2
2	130/130	1.8; 0.6	6	0.13-1.8-1/2 0.13-0.6-2/2
2	150/150	2.4; 0.6	6	0.15-2.4-1/2 0.15-0.6-2/2
1	130	1.0	6	0.13-1.0-1
1	130	2.0	6	0.13-2.0-1
1	130	3.0	6	0.13-5.0-1
1	100	0.5	6	0.13-0.5-1

Appendix C – Injectors and Pressure Ranges

Injectors	Pressure Range Bar*	Location	Purpose
1	20 - 30	Spunbond Belt	Pre-wet; pre-entangling
2	0 - 250	Drum 1	Entangling
3	0 - 250	Drum 1	Entangling
4	0 - 250	Drum 2	Entangling
5	0 - 250	Drum 2	Entangling
6	0 - 250	Drum 3	Entangling
7	0 - 250	Drum 3	Texturing or Structuring

- Pressures are for standard jet strips with 120-130 micron capillaries. Larger capillaries will use more water and will lead to lower maximum pressures

Appendix D – Please check the availability of drum patterns

Drum ID	Purpose
Standard Random	Micro-porous random
Andritz 910P	

All visitors must follow instructions below:

	Stay in the area (**ground floor**) of pilot facility where your trial is in progress, and public areas. Make sure to wear your name tag and safety vest provided by NWI.
	Smoking is prohibited within the building and restricted to marked areas outside the building.
	Taking photos, films (usage of mobile phones with cameras), etc. is strictly prohibited.
	Use earplugs (you can obtain disposable earplugs from NWI). Use helmets during erection works. Helmets are available on request.
	Be careful at site of the lab lines. These are working areas: cranes may be used over your head, forklifts are moving material such as resin and machine parts
	Lab and workshop can only be visited / used together with NWI staff ONLY. No ties/scarfs can be worn while on NWI premises. Appropriate clothing and footwear are needed.
	**ALL INFORMATION YOU GET FROM OUR SITE, AS WELL AS ALL VISIBLE INFORMATION ARE PROPRIETARY AND CONFIDENTIAL INFORMATION – ANY USAGE OF SUCH INFORMATION IS STRICTLY PROHIBITED.**

Company	
Name	
Date	
Signature	

Appendix E – Visitor Participation Agreement

Visitor has requested permission to be present on the North Carolina State University ("NC State") campus and to visit the NWI SpunMelt Pilot Facilities ("Facility"). As part of the visit, Visitor will oversee a trial at the Facility (the "activity" herein).

Visitor acknowledges that their presence and participation in the activity at the Facility is for their own personal benefit. Visitor acknowledges that they have voluntarily elected to participate the activity at the Facility, and desires to do so at their own risk. Visitor further agrees to assume responsibility for all damages, losses, and personal injury to others that is partially or completely due to their fault

While at NC State, Visitor understands that they are subject to and will follow all NC State policies, rules and regulations, including those concerning (a) conduct, (b) use of the Facility, (c) environmental safety and health, and (d) intellectual property. There is a safety plan for the Facility, as well as safety instructions, which Visitor agrees to review prior to participating in the activity.

Visitor acknowledges that there are potential risks of injury and even death from participating in the activity at the Facility. Furthermore, Visitor will be responsible for the proper care of all equipment and property used by or entrusted to them. In consideration for being allowed by NC State to use its Facility and participate in the activity, Visitor agrees to assume responsibility for all risks to themselves and their property, and agrees to indemnify and hold harmless NC State, its trustees, officers, employees, and agents from any and all negligence, claims, damages, and liability arising from or related to the Visitor's activities at the university. Visitor further agrees to accept and assume for themselves, their assigns, executors, and heirs any and all such risks and losses that may occur.

This agreement is given freely in exchange for the valuable learning experience. Visitor acknowledges that they have read and agree to the terms of this Agreement, and understands that this agreement is given in consideration for their participation in the activity.

Visitor Name: _____
[Printed name]

Visitor Signature: _____Date: _____

Visitor Name: _____
[Printed name]

Visitor Signature: _____Date: _____

Visitor Name: _____
[Printed name]

Visitor Signature: _____Date: _____