



COMPUTATION NOTEBOOK

Department PPT - Milliken
Subject Research
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43-648

75 Sheets, 4 x 4 Quad., 11 3/4" x 9 1/4"

2018-5



scan12x9

0 73333 43648 8

Rediform Inc. • Coppell, TX 75019

Made in Mexico

11/20 Dry-down - again

denim A	3.8785 g	B	3.8990 g
3/16 C	4.6236 g	D	4.6074

30 A #13	2.5649	C	3.0918
Royal B #14	2.5428	D	3.0877

Orange 5568 A	2.1108	C	2.7284
B	2.1000	D	2.7580

Nylon A	0.7047	B	0.6936
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828-755-4626

451 A	3.3541	C	3.8821
gray B	3.4047	D	3.8886

(damp)

301 navy #1	2.0634	#4 in bag:	2.6013
#2	2.0541	#5	2.5022 g
#3	2.0866	#6	2.5985

11-15 - first batch in (all except 301)

#7	2.2557	#10	2.1281
#8	2.3893	#11	2.1013
#9	2.3814	#12	2.1034

After dry:

		after laundry		AL ER.
		C	D	
Denim	B	3.7063	3.817	4.4583
	A	3.6914 ✓	3.778	4.4197

5568	A	2.0080 ✓	2.0397 2.02032	D	2.5468 ✓	2.5970
orange	B	2.0026 slow	1.9860 ✓	C	2.5350 ✓	2.5724

451	A	3.1690	3.2572	C	3.6563 ✓	3.7426
gray	B	3.2194 ✓	3.3112	D	3.6695 ✓	3.7466

Nylon	A	0.6905 ✓	0.6974	B	0.6801 ✓	0.6935
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30	A #13	2.4123	2.5068	C	2.9060 ✓	2.9722
	B #14	2.4028	2.4882	D	2.9137	2.9975

12:17 start drying 301's 13:00 start weigh

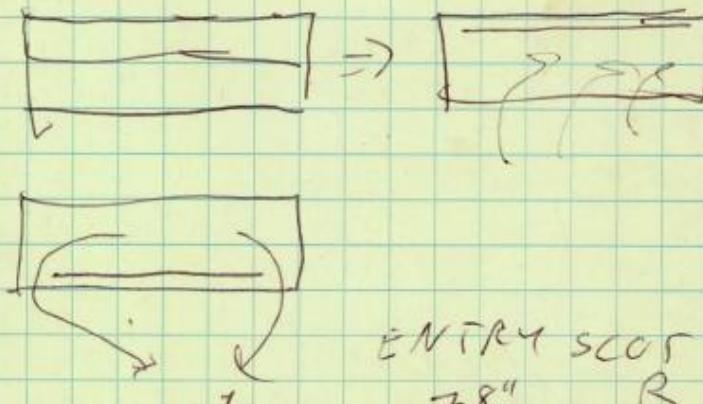
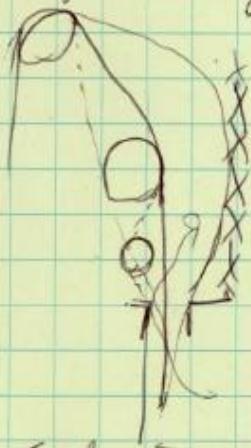
	0%	50%	30%	60%
301	1.9583	4 2.3286	7 2.1632	10 2.0352
	2 1.9586	5 2.2738	8 2.2170	11 2.0020
	3 1.9935	6 2.3423	9 2.2085	12 2.0090

Magnolia 11/16, ct'd

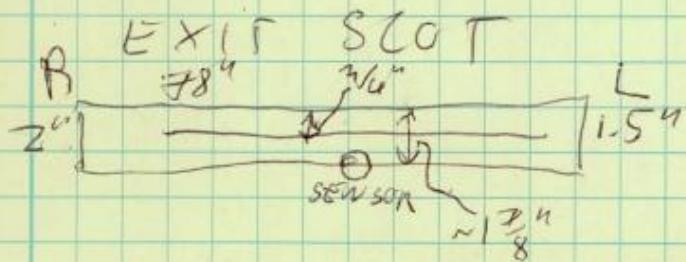
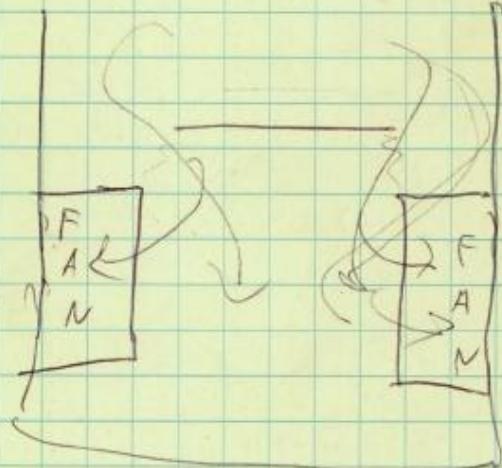
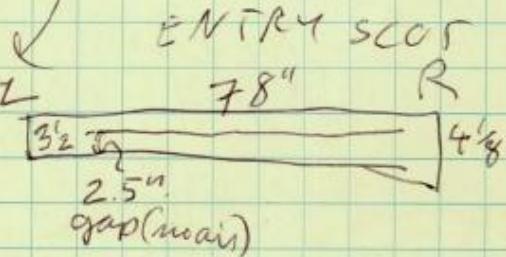
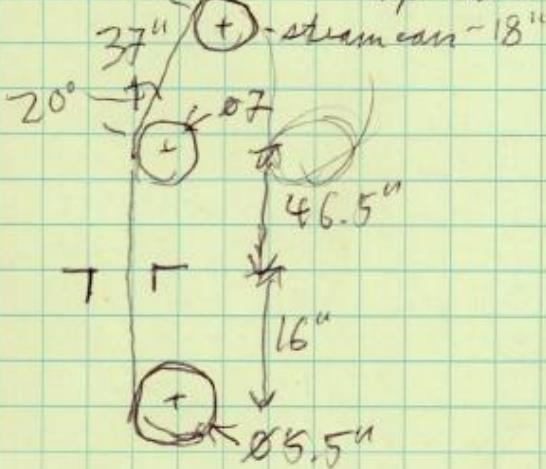
creasing issue in Eclipse

style	finish	color	width	w+	shade	creases
3080	956	72	66"	4.22	WOW	yes
3471	956	amy	63.5"	7.23	dyes	no ↴
3471	956	72	64"	7.2	wow	yes ↴
2594	956	72?	63"	5.23	wow	yes? ↴

wet on wet coating is foamed, 956, add blue & pink shade
70% pickup + 30% from foamer
try to dry before oven



Entry slot = tapered:



Buildup makes width nonuniform

Magnolia 11/16

11/16

Irrigation before pre-dryers, onion

Reading = 8:36 start

- ✓ 0.2% with nothing
 - ✓ 0.7 on bales
 - ✗ 2.1 316 + 50% denim
 - 1.2 316 Ctl
 - ✗ 1.7 5568 + 50%
 - 1.0 5568 wait 10 sec
 - 2.5 316 + 50% wait
 - 1.1 316 Ctl slow
 - 1.4 5568 + 50%
 - 1.1 301 Ctl
 - 1.0 301 + 10%
 - 1.5 301 + 30%
 - 2.0 301 + 50%
 - 1.1 30 Ctl
 - 1.7 30 + 50%
 - 0.3 972
 - 1.9 451
 - 1.9 451 + 50%
 - 7.8 301 spray
- 9:02 AM done

Recipe is 4444
"heavy weight"
3x1 cut turn

8:

9:55 onion startup - bales w/ drips

SCS is 7.1, 6.2, 44%, L, R, C produces 26.5%,
wet streak right at sensor temp, D = 0.7%

9:59 speed up 59:55 fabric throat no dark bales

Spray bar valve locks up, won't turn off sometimes

10:02 spray is on 3.1/66 1114 L44 R10 C62

predry reads 6.6%

10:05 spray is off, picked up the dry pad

moisture ~ 8.0, 14.7, 05.8 LMR

Running light pink 10:08 D = 25.8%, Sp 20

10:09, 0, ~~25.0~~ 24.8% running 110 Ym!

10:10 24.3% 10:11 LCR is 6.5 143.4 4.5

10:22 LRC is 6.1 4.5 106.2 D = 23.7%

10:31 LRC is 6.0 4.3 143.6 D = 23.2% Z6 @ 90%

Mahlo, cta

11/4

90°

45°

5568 AR	2.106g	A	→ 12.019gsm	16.66gsm	15.66
	2.096g	B	→ 12.039gsm	17.06	14.83
421451 AR	3.328g	A	→ 26.379gsm	26.78	26.98
	3.388g	B	→ 26.739gsm	27.00	27.35
30 + 50%	3.083g	C	→ 26.25	28.62	28.2
	3.086g	D	→ 26.76	28.78	29.51
451 + 50%	3.852g	C	→ 32.68	33.46	33.78
	3.862g	D	→ 32.52	33.25	33.12
5568 + 50%	2.696g	C	→ 27.50	24.79	25.32
	2.715g	D	→ 28.21	25.55	26.42
316 + 50%	4.604g	C	→ 40.17	36.71	39.18
	4.573g	D	→ 39.53	35.90	37.58

Now add steam

#1 - used to be 1.950 - 2.056g (5.4%)

target 2.1g - 2.15g

2.094g → 19.40gsm

2.158g → 25.98gsm

30+50%

# 4 wt (gsm)	# 7 gsm	# 10 gsm	# 13 gsm
wt ₀ 2.534	2.261g	2.122g	2.555g
wt ₁ 2.598	31.56	21.94	18.85
wt ₂ 2.647	36.91	30.20	23.90
30+50% C gsm	451 A	451 C	2.665g
wt ₀ 3.098g	27.92	3.860g	27.15
1 3.202g	35.81	31.11	3.961g
2 3.282g	42.98	35.91	39.91

0.703g = 53.1
~~0.775g~~ - 35.3
~~0.781g~~ + 6.5
~~0.720g~~ ↛ -36.3

5568 A gsm	5568 C gsm	316 A	316 C gsm
2.109g 12.55	2.704g 27.89	3.866g ?	4.620 40.79
wt ₁ 2.162g 18.35	2.795g 36.41	3.945g 36.64	4.758 50.70
wt ₂ 2.211g 23.12	2.857g 42.79	4.057g 45.45	4.852 58.50
#4 bonus			*
wt ₃ 2.701g 44.32			
2.779g 52.52			
2.869g 64.38			
7.34t 2.796g 67.2	jumpy		
3.010g 89.2			
11.71t 3.105g 95.9			
3.172g 97.3 MAX			

Mahlo, etc

11/4

Dry #4 a bluid time @ 11:30 → 11:37

2.440 g dry (2.436 min, 2.440@ move) → 17.25

2.452 g → 17.7 reading

18.239 gsm → 2.480, confirm 19.36

2.500 g → 20.95 slant

2.510 g → 21.81 √ 11:50 - dry #7

12:30 2.532 g → 23.73

12:42 work on #7 2.182 bone dry

10.48 gsm reading init 2.208 out - ~10.6 gsm knee

11.42 gsm → 2.219 g

12.15 gsm → 2.227 g

14.01 gsm ← 2.236 g

14.39 gsm ← 2.243 g

#45 ~~2.849~~^{3.559} sitting knee 25.74 gsm. Dry 13:03↳ 2.418 g bone dry 17.8 #10: init 2.124 g, 12.86 gsm
#11: init 2.100 g, 13.25 gsm
#12 init 2.102 g, 13.30 gsm18.1 2.464 g after calibration weight → 19.74
rats, 13:21 pm do it again #7 is 2.263, 15.52 gsm

#5 2.404 g bone dry 17.30 gsm

knee @ 5 min, 2.431 g ← 17.65 → 2.508 → 24.65

2.445 g → 18.6

2.460 g ← 19.60

2.480 g → 22.35

90°

#10 dry @ 13:40 prep 30 #13 2.552 wt. 18.41 21.27

↳ 2.038 g bone dry, 14.62 (final BOUN #14 2.534 18.02 21.28)

knee @ 3 min. < 2.000 g ← 5.40 gsm, M_w dry #1 @ 13:52

SCALE > 2.060 g → 6.2 gsm

2.080 g ← 7.2

2.098 g → 10.17 gsm

#1 bone dry 1.950 g → -0.30 gsm

4 min later < 1.976 g ← 2.0 gsm

> 1.976 → 2.65 gsm

1.993 ← ~4.2 gsm

2.012 → 8.00 gsm

90°

316 denim CTL - 3.868 g → 31.14 gsm A 28.74

3.892 g → 31.08 gsm B 27.94

972 Nylon CTL 0.699 g → -52.8 A 45° → -57.12

current 0.57 0.695 g ← -53.3

B 45° → -52.2

Mahlo

301 ctl - 2.056 g, 205.6 gsm 1.22 current #1
 want, 6.52, 6.41, 6.54 = 6.65 g/m²
 rotate 90° → 11.07, 11.01, 10.74 gsm
 rotate back: 5.154 open, 4.3 1sec sample
 can't update faster than 1 sec
 has post-process damping
 typical 4-6 in/min 40 mm footprint
 80Hz raw data

5.16, 5.22 → move → 4.53, 4.72 → 4.44, 4.39
 upside down → 3.51, 4.45, 3.04, 3.738
45° → 9.56

turn off some filters - 205.5

is at 9.56, 120°C

#2 is 2.060 #3 is 210.0 gsm.
 do 4, 10:03 → -19g → 1.971 g → -20 10:05
 0.94 mA

bone dry wt was set at 245.8, changed to 197
 and gsm goes -19 → 2 or 1.2
 +2 min → 3.2 gsm

regain: in 2 min 1.8 → 3.2 gsm photo 10:12
 #2 207.7 gsm in oven @ 10:17

195.3 start @ 3.5 ~ 10:22 initially
 room @ 40% moisture photo 10:24

#3 still 210.7 in @ 10:28

(#4: 2.601 g #5 2.567 #6: 2.604 g
 → 1.391 g @ 10:32 start @ 0.34 g

#3 photo @ 10:37

#4: 26.9, 26.7 current 1.97 AS RECEIVED
 add 260 - 197 = 206 = 54 gsm add-on... add 50 → 22.8

so 50 gsm offset changes by 4 gsm in calibration

↓ back to 197 bone wt → 25.87 g read

rotate 90° → 27.1 g

#5 AR: 26.92, 90° → 28.45

#6 AR: 26.72, 90° → 28.57

10:52 dry #4 (50% in 4-6) #7 is 2.345 g (30% KCC)
 610:59 out 2.472 g #8 is 2.379 g #9 2.378

18.3, 18.2, 18.0 11:02 2.498 g 11:00 dry #5

put back in 19.27... trend @ 11:07 drying time from 8:07 to 11:07

11:09 → back to drying 11:14 weigh 2.456 g, read 18.01 #4 DD
 drop to 17.9... 11:18 pic 11:19 @ 18.6 2.490 g

now 19.7 gsm → 2.499 g way, 2.520 g & 21.70

2.541 g → 23.52

Gerrish

- Would be nice if wedge fit in from L
 ~15mm space
 or better to be bigger, harder to drop

! On current fabric, front bar rarely catches

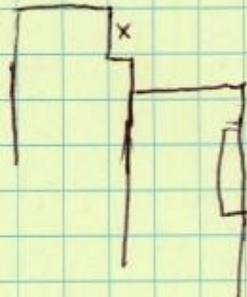
...
 We're able to actually run with this!

Fabric is $1\frac{1}{2}$ " wider

Guards fit nicely

Fabric @ 87", normally 86-86.5" (confirmed)
 with just one temple!

Make plates $5/8$ ", cut relief



Observations: Steam cans have periodic
 & cold spots - paint or repairs?
 Already have L-R gradient
 then big draft at edges cools, caused cold/wet
 streak at the takeup
 Second timing - no activity in 2nd half @ 55 rpm
 rollers 1 - 120 - 120 25 - 83 top
 3 - 112 - 120 ~36 77 3rd Q
 5 - 105 - 116 50 - 77 exit
 7 - 102 - 112
 9 - 96 - 108
 11 - 93 - 105
 13 - 92 - 102
 15 - 88 - 99
 17 - 86 - 96

Longleaf timing trial

10/11

8:20 AM - start looking at 451 on 54-2
walk down range

8:36 done. There is side to side ST into
and out of NH₃ chamber with patchy streaks
in the middle. Big cool streak at end
of range. Temp of incoming fabric is 136 F! Second
pass?

Lint bridging on cans - some thermal streaks
from the wash water

Initial bags: #1 - 8.167 g
#2 - 8.198 g
#3 - 8.275 g
#4 - 8.233 g
#5 - 8.189 g

9:00 one more shot of 54-2

9:10 and again. 99° - 105 max in 150 max out

9:19 pass of 54-1 KCC pad/heat
spray is loaded

9:27 one more shot 54-2 still 99° and middle streak

9:29 range is moving

~85 going into NH₃, 35 out, 125 AP

RH is 15.8% and speed 18 YPM

9:42 hit moisture target

9:45 at speed 54-1 chiller wasn't working

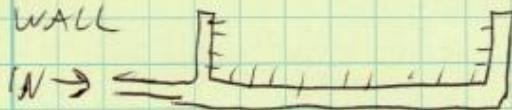
#2 10:12 start #2

Moisture on leader reading 6.6%

10:18 paused

10:25 we're on 10:44 sample collected

11:07 took NH₃ chamber pics - just on pipe



Pickups: #1 39.569 g - 8.167 g #3 38.554 g - 8.275
#2 37.886 - 8.198 g

35 YPM → 26 sec run time end up (40 yds)

30 YPM → 30 sec

11:30 running leader

11:34 done taking pics of 54-2 (running 301 for 45 min)

#3 11:42 guider/spreader fixed

~12:17 one more pic of 54-2 after 152nd pass pic

1:00 381 1st pass on 54-2 - pics of P1 ~~at 152nd pass~~ @ takeup

Isochem Day 4, ctd

10/6/20

- 11:48 sewing in 20T2 Moisture better? PIC 20T2
 → much better! Last 4" only
- 11:52 stop to cut out hole and re-sew
- 11:54 restart, light burners leader @ 200°F
- 11:55 pour KCC
- 12:01 turn NH₃ - moreover 5.8 - 7.0 - 7.2 W RH water spray in last wash box explains line (striations!) - PIC 12:03 condensation @ 1-2" high over
- 1:27 - run in "15-20 minutes"
 spray gun calibration check 222.15 g/min
- #19 MOISTURE: Bag 4.68 7.18 → 6.91 2.50 → 2.23 12.1%
- 1:42 NH₃ chamber is dry switch to many leaders
- 2:05 leader in, sewing 2:19 range pulling 19R 19R
- 2:20 pour KCC RH: 13 - 13 - 3
- 2:26 NH₃ done 2:32 range stop - almost out?
 ran out of leader just a little early
- 2:39 eat 2x20 yard pieces
- 3:00 sewing in sample

21/23

Heat 2 predry, cans, glue @ 175°F

3:14 - start double run - I'll be busy

Moisture = dry - 5 to 7 and C3

Spray - ~20 18+ to 25 3:30 DONE

20T2 moisture = Bag 4.57 7.06 → 6.97 0.9g

20T1 moisture : Bag 4.66 6.96 → 6.85 0.11

19R MOISTURE: Bag 4.66 7.12 → 6.96 0.16g

21 : 4.55 7.01 → 6.90 0.11g

23 : Bag 4.63 10.87 → 10.19 0.68g

Isoculum Day 4

10/6/20

		15 sec	19 sec @ 11, 19, 19	
	wet	normal	dry	spray
44%	17✓	19V (19%)	21✓	23cf
28% TI	X	20TI✓	X	X
28% T2		20T2✓		

dry down: at 50°C

17 10:23 about ready

dry 1 set of pre-dries (2)

10:26 light pre-drier. Take photos

10:28 pour KCL 44%

pre dry temp steady @ 138 - 132

10:32 @ NH₃ late fire RM @ MAX

93° out → 104 → 112 (max)

10:36 done, going thru wash

10:41 sample collected

- cold at holes - fabric is moist
- less contact pressure on steam cans
- very very white when treated
- funny warp striations on takeup
(moist & less moist) - fabric sizing issue???

19 Heat 2 pre-dry + blue 10:46 turn flue on

10:56 running speed up half way thru pre-dry

11:00 hot flue

seam is hot too wet, very white

should leave run 4 pre-dries ↑

21-24-25W start was 8.5 rpm

11:10 sample collected NH₃ temp 138 w/

lots of condensation, especially on room side

20T1 Heat 4 pre-driers, flue up from 165 to 175

"The hotter we run, the more even it heats"

11:22 flue @ 170

11:30 pour KCL leader pyrolyz 275 fab 154

fab 140 max out of blue 95 - 127

fab 106 - 112 NH₃ no tracks W14-15-11R RH

11:57 went at takeup 11:41 fab is white

take first 10 yards 11:43 still moist in drapes

- need a way to dry it out fast?

17 Moist RT: bag 4.57 7.98 g → 6.84 g

3.41 → 2.27 50.2%

Isochem Evaluation

Reheat all samples CTI, etc

6 T1 + bag:	6.9607	6.8759 @ 1:35
8 T1	7.8499	wet + bag
9	8.5845	
10	6.3008	
11	6.1183	
12 T1	7.2647	
12 T2	6.3828	

load from 1:00 to 1:06 PM ✓ out ~ 1:35

6 T1	10 sec	2.4061	1' 2.4154	2' 2.4210
3'	2.4243	4' 2.4268	5' 2.4287	
7.5'	2.4318	11' recorded	2:10	

8 T1 in bag 7.7435 out @ 1:53
out 10" 3.4675 1' 3.4773 2' 3.4859

9 out 8.4762 in bag out 2:15 bag 4.492
0": 3.5833 1' 3.5925 recorded in XL's

11 out 2:26 6.0470 1.9970 @ 10 sec
1' 1.6032 2' 1.6089

10 T1 6.2393 in bag out 2:35 1.7357 @ 10"
1' 1.7407

12 T1 7.1858 in bag out 2:43
4" 2.8270 1' 2.8380

12 T2 6.1643 out of bag 2:54 1.9807 @ 10"

3:05 PM - all samples in oven

3:3 2T1 3:35000 6.6349 - 20 sec 2.520
~ 1 min. 2.2568

3:35 2T2 6.8088 g out 3:40 2.4140

3:45 11.5 7.0375 out 3:46 2.6712
3:50 13 7.1724 out 3:5 2.6772 15"

Isochrem Experiments, ctd

9/24

- 11R Redo 11 with more heat
 13:39 start sample 162 → 150 → 142 → 132 @ ~~10 sec~~
 confirmed on
 1:43rd flue 13~~0~~-109 RH : W13-13-10R.
 caught pix out of NH₃ < 1:47
 temp profib very uneven
 2:19 - spray gun at 119 g/min (call it 120)
 debate oven speed - not enough heat to dry?
 Hot flue chamber run at 155°F max (pix)
 2:36 collecting sample.
 got pix under flue, out of chamber before &
 after seam - first is 14, second 16
 may not be dry enough. Vlom B:
 Vredry + cans + flue, spray under NH₃ chamber
 - spray in flat after oven, still room to check RH
 2:46 sewing in
 2:50 and we're in
 2:51 stop - on cans - mashed w/ pen line
 stuck on cooling cans
 3:12 re-threaded
 3:20 sewing 3:30 range is on again
 3:39 done w/ NH₃
 - had some drips at end, one right on 15
 moisture read 12% - 12.6%
 fabric whiter on spray side? Cleanup
 FLIR E5
- 14/16
- 13
- 15

Dry-down test

9/28

- #1 - sample is 6.882 - 4.411 = 2.471
 sample in C-lab: 6.8979 - 4.4306 ≈ 2.4807
 Isochrom: 6.79 - 4.41 = 2.38 dry
 11:00 sample in 11:10 weighs 2.3936 (< 30 sec)
 60 sec → 2.4017 120 sec - 2.4069 3' = 2.404
 doors shut! Now open 5': 2.4206 10' = 2.4378
 15': 2.4645 20': 2.4732 25': 2.4752
 32': 2.4783 102': 2.4735

#3: In bag 6.9938 g sample 2.5680 bag 4.4270
 dry @ 11:26 → 11:36^{out} 6.8924 in bag

2'	6.8946	5'	6.8955	3.4717 nobag (< 5 sec)			
1'	2.4821	2'	2.4903	3'	2.4981	4'	2.5051
5'	2.5104	8'	2.5211	10'	2.5267	70'	2.5617

Isochron Experiments, ct'd

9/24

- 10:00 - add KCC 9
 $\text{NH}_3 @ 148$ - gun may 115
 10:04 sample exits caos
 10:05 sample @ NH_3
 sample @ 106 mas, end 108 \rightarrow 120 w/ leaden
 10:13 sample out, cut off
 sample streaky - ~ 1-2" wide near room side 10 T1
 and many others
 go to 28% mix
 10:29 getting ready to pour...
 10:31 KCC poured in get temps out of medley
 129-134 - see pic. still splotchy
 10:37 NH_3 leaden @ 108 mas
 temp is 92-95
 10:38 lot of pics of splotchiness. done NH_3 ,
 get slade photo
 10:50 sewing in II 11
 10:54 pour KCC 28% 44% 11
 1R temp 112, 94... changing out of medley
 58-59 NH_3 tiny sample $\text{NH}_3 @ 152$
 Max temp 102
 RII 20-21% 106 max @ end
 stopped to get sample before peroxides
 <1 minute, front sits in wash boxes
 11:03 sample almost out. very white
 too wet - add 2 pre-driers 12 T1
 11:17 sample started :18 pour KCC
 sample out of pre-dry: 149-140 R
 132-130 down to 101° @ end
 ~910 out of flue 11-13% R A
 91-92° out of NH_3 178° @ end - see pic
 12T1 is darker than II, but matches control 12 T2
 11:36 range turning, poured 11:38
 1R dropped 150 \rightarrow 135° pic
 best flue 11:41 132/112 w, 128/98 w
 108/95 end sel.
 ~98 out of NH_3 - pic mas 116, 119, 122
 11:49 collect sample.
 Dry-downs: 9 8.89 \rightarrow 8.45 4.48 bag 10T1 6.91 \rightarrow 6.73 bag 4.50
 11 6.07 \rightarrow 6.03 bag 4.46 12T1 7.20 \rightarrow 7.15 - 4.34
 12 T2 6.34 \rightarrow 6.36 - 4.35

Isochron Experiments, etc

9/23

- 5 11:35 running cond. 5 into fiber fabric surely won't dry entering fiber @ 200°F
 150-167 coming out
 38:00 into NH₃ fabr 96° in 123-125 out RH 8%
 125-122 @ 37:40 128-131 @ 40:00 127-133 @ 40:30
 128-133 @ 41 129-136 end (41:40) bottle in room
 Spray: 135g in / min ... 140g estimate scissor hole
 Moisture #5: 6.94 → 6.91 bag 4.45
 2.492.8g g → 2.46g 1.2% moisture
 next, run 7, then try 818 hybrid sample
 spray gun: 55g / min
 35g/min = 5% moisture
 7 13:05 start #7 soon
 Leader is 280° out of spr dry 13:12:41 lit KCC
 170° hot sample produced
 17:45 9.1% moisture 9.1W 9.3R
 118-122 120-124 19:15
 105° at bottom of cool yard
 124-126 20:15
 13:22 - sample in wash cans
 13:37 - leadering in #6/8
 :39:33 seam lit pad
 fabric out ~ 155 13:40:07 mid-seam
 fab out of NH₃ 120-123 #6 - 123
 moisture 7.4 - 7.4 - 7.6
 124 max coming out
 123 @ 48:10 48:40 end-on can

Moisture #7: 6.80 - 6.74 bag 4.32
 2.48 → 2.42 2.5% moisture

8:12 is 2:10 → subtract 6h 2 min
 FLIR 120 = 16.56 pm = 10:54 AM is 4T1
 115 = 16:19 = 10:17 cond 3

- 9/24 Moisture: #6 6.88 → 6.86g ^{4.48 bag} #8 7.77 → 7.71 + 29 bag
 9:22 still waiting on lettr - just arrived
 9:32 ready to check timing
 @ 8.5, takes 37 sec ... go to 10.5 → 30.29.7 sec
 Run 10.5 4PM today! No change to dry - expect 42%
 10:00 FTIR on leader
 132-140 on wet fab

Isoclim Experiments, ct'd

9/23

9:37 start 3 yard re-run 44% 1 rerun

chamber: can max 110°, 114° front, gauge 142°F

9:44 sample going up into NH₃ " 140° punch circle

44-00 into chamber out: temp 72° start 79° end

10:07 heat flux @ 162 SP165 3
leader exits flux @ 138°

room 134 → 125 wall temps coming out!

10:14 NH₃ 0 142 10:14:26 seam in 8.6% RH

114 - steady 112@1 min RH 12.8%

113 final 104 on wall side

114 - 103 17:40 117-104 18-**

room side is hotter even though it dries

fabric lead cool streak wherelets cut square

10:27 sample 3 collected

#1 moisture: dry 4.19 wet 7.22

dry 6.59 - C50 - 6.52 - 6.57

3.03 g → 2.38 g 27.3% moisture ??

Appearance is very different...

RH on lead - field was "11% - 13%" - lets

10:42 marked condition 4 sample (28% KCC) 4T1

leader temp 133 → 127 still hot on room side

10:45 sample started... chamber 153 (123 can)

46:26 seam out of cans 49:18 seam out of flux (front)

49:37 seam into NH₃

127 → 125 sample out of flux RH 0% 10.4%

117 - 114 109 → 96 cold side on van

15 - 8% RH 15 on wall

107 - 85°F fall out 10.53 (almost end)

10:59 collecting sample

now run 2nd pass

4T2

#3 moisture: 6.94 - 4.42 to 6.89 - 4.42 2.52 → 2.42

2.0% before NH₃ (0.07g)

11:11 sample (T2) in flux 130-125°F out

13:50 sample into NH₃ moisture 8.0% M 9.5°W 6.6R

116-120 out 116-119@15:30

109-116 16:15 105-119 end why is end worse?

hole Ø start Ø 11:23 collect T2 sample to a bumpy streak, no hole or cutout on this one!

∴ 4T2 has Ø on leading edge hole was cut off

11:30 about to start #75 heavy mix, bone dry

Isochem Experiment, ctd

9/22

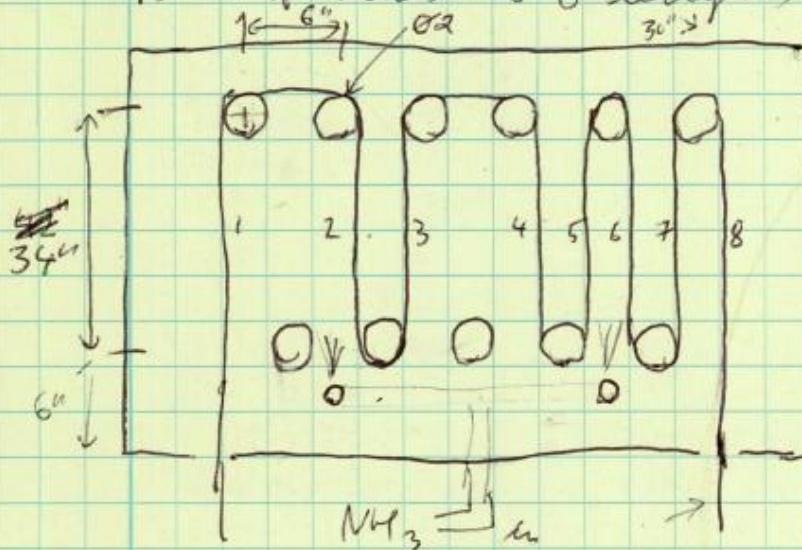
1

- 12:15:03 header seam \uparrow 44% KCC
 :16:35 header is KCC, stop & sample
 :17:30 restart :18 NH₃ @ 152 18:57 seam off cans
 :20 chamber @ 149 : 22:13 seam in NH₃ \rightarrow E stop
 : seam out F ~~+60 sec~~ +60 sec
 12:28 fabric too in chamber
 wet pickup on second pass was 30% moisture

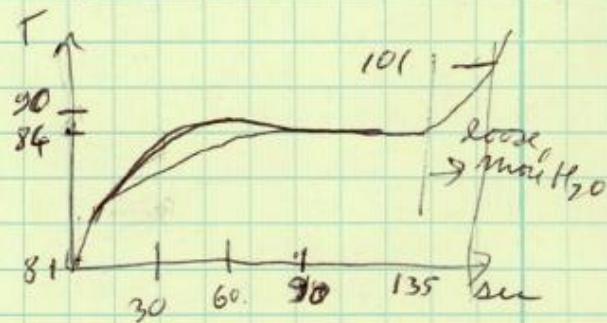
Jerry: need to wash sample before drying?

13:17 breaking from lunch

13:52 fabric has 8 lengths in chamber + traverse



wall heater 1/4 wire
 taped on, falling off
 $27 \text{ deg} \over 8.5 \text{ min} = 14.1 \text{ sec}$



14:21 seam in chamber says 140° but gun says 108 max
 14:26 turning

14:29:17 seam \uparrow into range 14:30:45 add KCC, @ pad

:33 chamber reads 135°, 104° max on gun

:35:42 into chamber 81° out 86°@30sec 90°@60sec
 84°@90sec ... steady... @ 101° near end > 2:15

14:40 stopped range momentarily

14:46:30 seam hits collection bag

another breakout

final sample @ 24% moisture ~30 min to dry sample
 final vs initial - no washing [44%, 60sec, "wet"]

9/23

9:10 ready to go Re-run 3 yards for Petri, then crank up temperature

2" pass from yesterday: W=wet 8.83 $\theta=4"$

dry 8.15 \rightarrow 8.15 \rightarrow 8.12 bag 5.76g

chamber @ 152 idling

9:58:150 3.07g \rightarrow 2.36g
 30%

Isochrem Visit, etc

Migration - needed to even out spots

- can see shade changes - spectrophotometer

Moisture control, pickups, drying will pay for themselves

20-25% moisture into flue,

Run ~10% peroxide, gets to 7-8

8 PSI on 2x "1/4" pistons

KCC nips - 5.5" bore x 2 @ 18 PSI, run 4-30 PSI
4 PSI = 100%

You'll see pre-dry (IR), dry cans (0 sec)

52 sec NH₃ & steamer stay 2.5 min (10 yds)

pH probe w/ recirculation outside, so you can clean

Isochrem Experiment

9/22

282 g/l, make up 4 l

10:15 - do pickup check 82.7% with 28% mix
NH₃ chamber is @ 72°F (no heat)

2T1

10:22:00 heat on 10:23:30 start 72 (no flow)

10:27 - 78°F (5 min) Heater setting is 70°C @ walls

10:30 - 86°F (8') 10:33 - 95°F (11')

10:36 - 106°F (14') 10:39 - 117°F 10:42 - 127°F

10:45 - 133°F 10:48 - 130°F 10:51 - 139°F

10:51 - peroxide is 45°C / 152°F from your NDT - water bath

2T1

10:56 fabric started, going up

57:12 leaders in KCC, mix added (28.2%)

57:48 leaders out of IR 58-34 leaders off cans

11:00:09? collect sample. seam into NH₃ Temp 130-178

11:02:28 80°F 11:03 - 92° 72 → 126 then xerox

11:04 stop 11:07:2d seam lifts final cans 11:08:10 out of cans
* fabric out of chamber

Now run 2nd pass Warren - NH₃ time is 49 sec

2T2

8.6 would be 60 sec 8.5 → 60.5 sec

11:30 range moving again 11:18 seam ↑

NH₃ is at 152°F 11:32:45 add KCC, seam is read

34 NH₃ @ 145°F → 140@that seam out, temp is 72 /

@1V

11:39:48 temp out is 85.0, 72° turns (cools quickly)

fabric is 88°F for stop near end

42.4% moisture after drying "wet" (10.5 min)

12:12 NH₃ setting at 169°F 12:14 moving

Isodrum Visit

9/16

Todd Wissenant, father Bill, son Will
~~Jerry~~

Grace - lab manager

Petri-formaldehyde needs remediation, burn failures
 Do we need 60 seconds?

10 m/min max

12 yards in box 52 seconds NH₃

Slood ammonia box, +1 PSI

Moisture pulls in NH₃

Heat needs to be even, migrates the chemical

People tend to be too wet - frosting effect

Moisture depends on style

Denim vs lightweight reads 16% or 7%

Flexa - can't measure low level

Product is a humectant

"trash can work"

Stay with the same fabric & mix

Run a day a week?

Pricing conflict in the past

Pets - 20 condition

Their drying is static - limited moisture control
 can lift high side

600 m is suspect

3-5 yards to warm it up

160°F needed for bisulfite to neutralize formaldehyde,

pH needs to be < 7 Metabisulfite

Add LSA7 to end

Could also do a separate pass

They can cut to width, 22" face width, 18" fabric

Ammonia chamber temp:

- depends on flow - can calculate

- more chemistry = hotter

- same style - different pickup? (prep)
 wild swings of 8-10°F

- seams mess up moisture control

- gas has endotherm, cools the chamber

THPC can be 2-3, KCC should be 4.5, have a buffer
 quick turnover is good

pH goes up to 8-9 from ammonia

like 1.5 minutes just after NH₃? Enough to get sample

Data collection is critical - Jerry

Gas burners - hard to run even mix/temp

longleaf weights

	SIZE 2 weight	SIZE 3 weight		
KCC	6x7 7.1497	6x7 6.9727	B4 FR 54-1	6x7 5.6346
WALL	6x7 7.1696	6x7 7.0167	B4 FR 54-2A3	6x7 5.6758
AISLE	6x7 7.1677	6x7 7.0063		
AA	6x7 6.9331	6x7 6.8616	54-2A3 FINAL	6x7 6.6661
PEROX	6x7 7.1418	6x7 7.1750		
END	6x7 6.5034	6x7 6.5245		

scale drifted to 0.0257 g

Ammonia chamber running 30°

Start 11/19 1PM - speed trending up with resets at 1g=80, stop @ 23:30

Ammonia @ 137 → 140

11/20 speed is 40 @ 8AM, drops @ 9 to 34, to 36 @ 16:00
temp spike @ 16:30 starts 16:15 to 150°

Ammonia 140 → 145 and peak @ 150

11/21 speed 34 until 9, stop, 37 @ 11, falling to 33 @ 24

Ammonia steps: 141 until stop, then 146, 150 @ 20:00 *

11/22 speed 33 until 3, stop, start 4 @ 35, 37 @ 11 →

Ann. 146 falling to 143, 143, ramp up @ 11 to 152

Pretty close correlation. Faster = hotter

Longleaf 8/26, ctd

15:50 54-1 PT 173 AT 144
 F 102.4 99.9 98.7 96.7 101.4
 155.3° into pad <1" foam

15:52 54-2 PT 138 AT 135
 F 102.9 97.6 95.9 95.9 96.0
 141.0° out 127.1° in pad

BAG = 4.142 oz

Re-weigh

time	54-1	After out	54-1	54-1	DRY	DRY
KCC	9.56 kg	no bag	dry 9	(10.45)	10	9
KCC	28.10		14.835	28.44	16.20	16.411
R WALL	20.66	16.08	15.566	20.23	15.19	15.712
L AISLE	21.62		17.059	20.08	15.34	17.23
AA NH out	6.61		2.1439	4.50	4.5514	2.22
H2O out	8.49		2.7512	12.99	5.879	2.835
END	7.15		2.7501	10.43	6.0137	2.83

	54-2	"12"	2:09	"2"	3:32	"3"
KCC	12.43	DRY 12	14:09	DRY 12	15:32	DRY 3
KCC	29.35	17.036	29.28	17.046	29.17	16.924
R WALL	22.37	17.4320	21.19	16.266	20.65	15.814
L AISLE	20.73	17.3565	19.45	14.790	22.03	17.266
AA	18.92	13.9360	18.07	13.379	18.51	13.876
APPROX						
Per 100 out	18.11	8.9384	19.03	9.845	20.22	10.756
END	13.31	8.9113	19.95	15.109	19.52	15.239

Last sample in 12:05 samples out 13:25

	SIZE 9 wt	SIZE 10 wt	SIZE 12 wt	
KCC	6x7	7.1313	6x7	7.0228
WALL	6x7	7.1154	6x7	7.1266
AISLE	6x7	7.0870	6x7	7.0961
AA	0.2	0.5239	TINY	TINY
PER	0.275	1.0131	04 0	2.0697
END	0.275	0.9275	04 0	1.9478
			6x4.5	4.1513

Songleaf 8/26, ct'd.

54-2 modified setup

Ammonia temp 121 perovod 101

fabric | 103.3 97.8 96.1 94.6° 95.2° |
 leaves 124°, dips at 114° F @ 12:40

fabric samples @ 12:43 54-2 start 1st lot

29.37 g	KCC				
20.791 g	B4 NH ₃ left (aisle)	12:43 PM			
22.364 g	B4 NH ₃ right (wall)				
18.904 g	After NH ₃ (before H ₂ O ₂)				
18.164 g	H ₂ O ₂ (after)				
13.330 g	END				

13:44 PM Ammonia flow 3.5, Am T 133, Px T 135
 103.1 98.3 96.1 95.2 95.4

scam just passed 1:44 @ Ammonia chamber

137.5° coming out, 123.6 into pad, no foam

~ 1 PM? 1:10 PM?

in 102.4	97.7	94.3	93.8	94.6
out @ 135.7	into pad @ 122.6			

Second frame in spray, start @ 1:56:25

moisture @ 13%, flashing red 13.6%
 lime seed is 36 YPM Δ setpoint or one screen is
 wrong, actual is 13% not 11%

yardage counter is broken Mahlo sees speed not sp

14:09 takes more fabric samples

29.300 g	KCC			
19.421 g	B4 NH ₃ A ISLE	14:09 PM		
21.172 g	B4 NH ₃ W ALL			
18.021 g	After NH ₃			
19.044 g	After Px pad			
19.555 g	END			

14:33 451 running on 54-1 AT 134 Px 176 p 15.2

fabric | 102.2 99.5 97.8 95.0-96.5 100.3 |

154.4°F with prox pad, ~~no~~ foam! (px)

Batch on 54-2 ~ 14.40 ~ 1" AT 137

14:37 | 101.5 96.3° 94.5° 93.3° 94.5 |

137.8° out, 124.3° into Pad

15:32	29.202 KCC	18.500 After NH ₃	15:32 PM
	20.617 Wall	20.260 Mto H ₂ O ₂	
	22.013 Fish	20.272 END	

Longleaf fabric sample 8/26, ct₁ sample

aisle 98.4° 94.4° 94° 89.7° 95.0 wall
entering NH₃ chamber! repeat

10:35 97.6 94.7 92.4 89.5-91.5 94.5

136° going out... still foaming

→ and into porous pad

142.4°, 144° in middle, 136° selvedge
128° wall selvedge - hard to read, prob.
not accurate

10:44 NH₃ chamber @ "130"

fab in 94.3° middle, 146° out → pad

lets sampling fluids again

fabric samples @ 10:45 end of regular SP run

29.446 g KCC

20.036 g B4 NH₃ LEFT (aisle) 10:45 AM

20.264 g B4 NH₃ RIGHT (wall)

after NH₃ - too much foam

13.066 g after H₂O₂

10.443 g 54-1 end

11:00 - running 301 SP on 54-2 (livizorazole) thus go
to our trial

Baldwin unit - moisture variation based on resistance,
fabric not contacting, probably better

Jack runs it

12:25 - still waiting, collecting fluid samples

Moisture applied is 11.5%, reading is 8%, drops to
6 if you push the fabric away
but buildup on 12 oz denim from selvedges
on wipers

a little bit of visible mist

~ 12:29^{:15} start

:30 out of KCC pH is 7.5, 88°F, Am 160°
change level to 14"

12:31:48 enter NH₃ chamber

22:50 leave NH₃

32:59 enters H₂O₂ crazy on back!

35:08 enters 17° wash box

36:26 leave 17° last, up to cans 38:00

38:20 down for takeup

Longleaf 812 C

Start w/ 3500 yds 54-1 old config, 1 pass

- increased peroxide conc. 30% (15% actual)
~9° and 17°

3P0's on 54-2 w/ modified threadup & pad level
(14" or 214 gal) 30% PEROX

fabric is below flashpoint of peroxide
Hannah Steed

See supervisor, Lyrank

P0 755993C - 54-1 control @ 30%

Purple tickets - 54-2 rolls

Level sensor is based on pressure (Px & KCC)

Rosemount

Bigger bottles: 14.35g ... windy [molid]

9:28:05 blue leaves entry spray, stop after
810 yards

Also running 5152 3 year trial on 54-2

9:30 - sample initial

some foam is KCC pad

Jawanna Burke - helping us cut

9:43:40 blue into A.M. chamber

44:40 blue out " " " 60 sec

44:44 out of Px pad → sludge 100 sec

47:14 into 1st wash box

~49 out of last wash box → steam can #2

51:08 half way thru steam cans

51:37 touch last can

52:18 touch takeup roll → full spray

Weights: bag - 4.142 g 9:56 AM

KCC - 26.116 g

20.658 g muddy wall

21.585 g muddy aisle

6.616 g after NH₃

8.550 g after H₂O₂

7.145 g end

10:20 foam pic in perox 54-1 pad

10:23:00 1631 yards on clock

10:27 foaming over fabric @ 142°F going in pad

ambient fab measures 109°F very arm 90°

123°F after KCC

54-1 Analysis

Need NH_3 temp, P_x temp, $P_x \text{ pH}$, speed for stirs at time

		stirr	Amt NH_3	speed	$P_x T$	$P_x \text{ pH}$	
3/10	0:36 - 1:42	961	130	33	150(N)	6.2 ↑	
	1:42 - 3:09	801	142	40 → 42	180↑	5.7 ↓	hot, low pH pH last??
	3:09 - 9:11	451	135	45↓	170	5.7 ↘	
	9:11 - 9:44	861*	135	46	160	5.9	*2 nd pass??
	10:57 - 3:31P	45	165	43	138	5.8	
	3:31 - 8:00P	85	170 ± 14	45	138	5.1 ↗ 5.9	first drop then??
short	20:00 - 21:07	301	↓ 135	50 ↓ 45	↓ 130	5.8	NH_3 not steady
21/9	6:45 start 2 nd pass!	Y					
54-2	3:00 - 9:19P	901	117	40-48(43)	70-163	6.2	
	9:19P - next day	301	116-133	55	135-162	5.5-6.7	Amt dep. on batch
54-1 7/23	21:3:19-4:13	20	?	45	?		not much time
hot day!!	4:13 - 5:49 18:45	451	155!	45	165M	5.0	
	18:45 - 19:55	315	156	35±6	160M	5 ↘	
	19:55 - 23:43	301	?	60	150M	↗ 6.7	

156 431L 413R - 419 - SNR

Back to 148 = 436L

154L = 496 → 487 R: ~~530~~ 536-537-538

Calibration: 0.191 reads .681 (0.181)
I was off by 0.010", should be 10 more

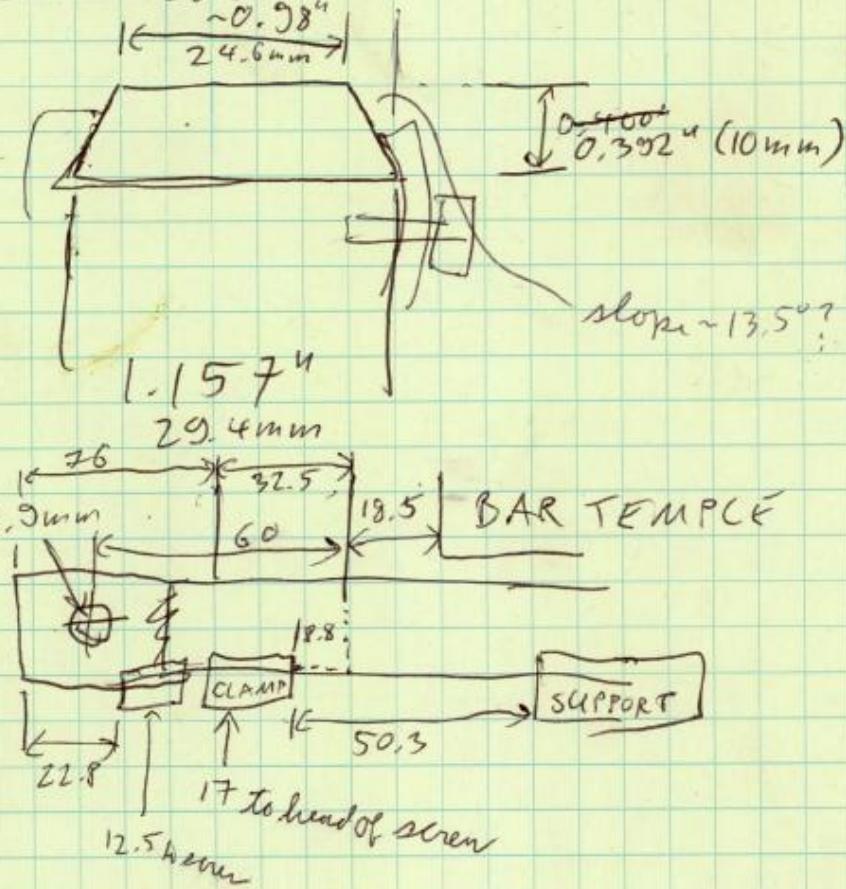
8/13 Gerrish - Floppiness

Style 2397

See One Note

Can we mount pin temples to back of bar
temple support bar? May just need a
small bracket!

Bar:

LOOM
187

Tensions:

168 vary 490-520, aluminum frame

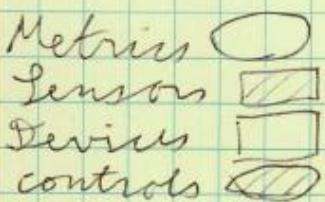
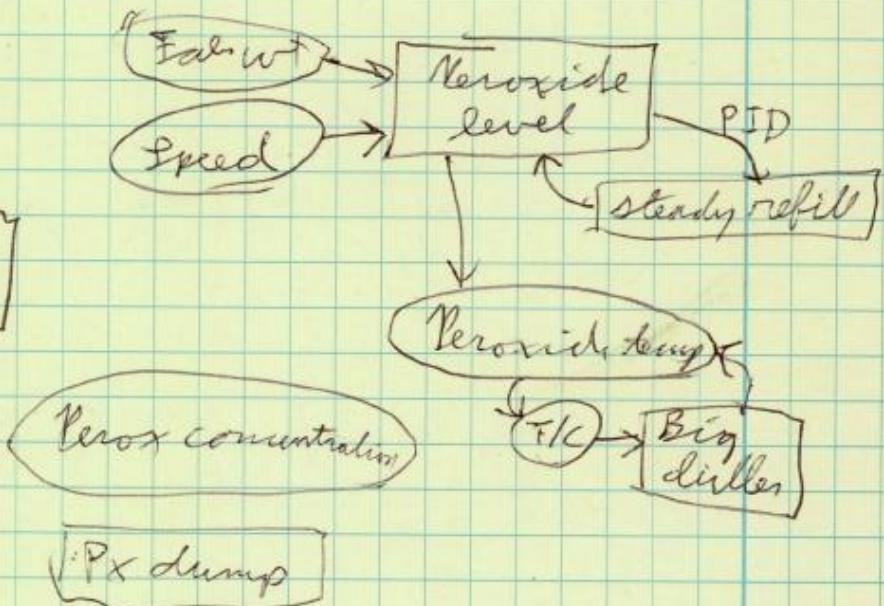
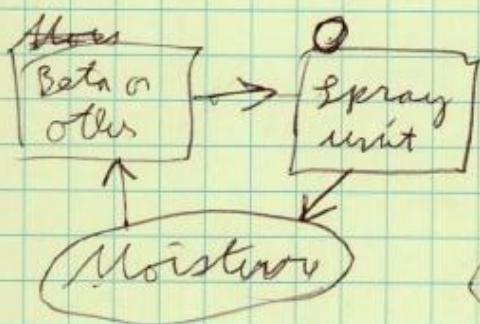
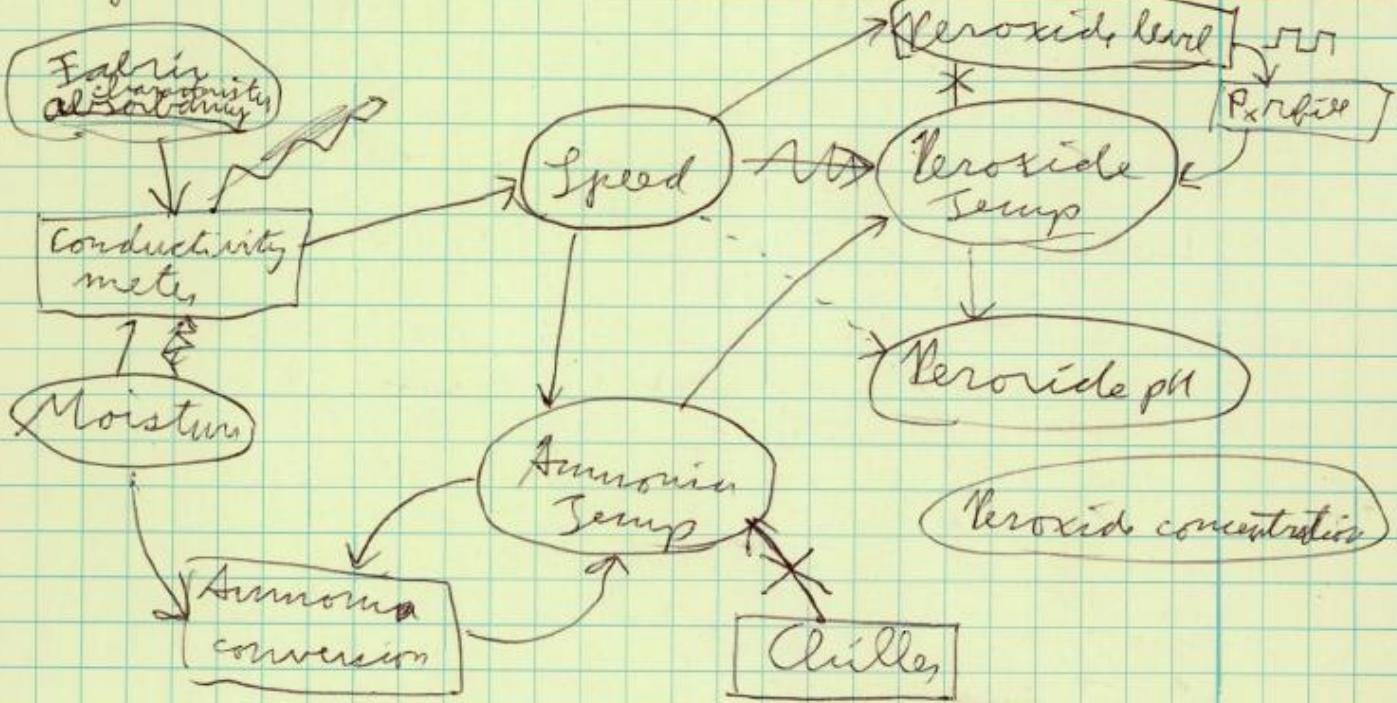
148 steel - bent 546L 542R } less problematic
151 stopped 446 442 2404152 476L → 480 → 466 → 476
477R → 489 → 497 → 484 → 489 start → 482 → 490 & 50sec
471 @ 64sec... 481 @ 90 491 @ 95 486 @ 1:50153 Vibrates, vent. 488L → 443 → 448
R 453' steady' and no ripples

154 L 489 → 470 R 445 steady & no ripples

155 L 448 steady, no ripples R 452 - 451 - 449
pretty good looking

Longleaf - KPM's

7/28



T MPC Add → sensor → conc or vacuum

Magnolia - Tsunami Maintenance

7/27

Magnolia is leaking - slow drip from drain
valve

⑥ retainer for pH probe is broken

Balast is ratty - Drew improved

No lamps or chemicals @ magnolia - leak
and white powder all over roses

Config: known duration 108 min
drain delay $10 \rightarrow 15$ sec

Danielle Brown (Withers)

Probe flush

Air Perm & Hydrostat test

6/16

Stahl	CFM @ 125 Pa	Permethane? mbar
12 gsm	163, 167, 166	12.5, 12.5, 12.5

15 gsm	142, 161, 152	14.0, 13.0, 12.0
--------	---------------	------------------

8 gsm	174, 183, 175	14.5, 11.5, 12.0 ↑ fast (60) moist 20 mbar/min
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RKW SE Hyper and Astra from Michael Scherer and Greg Johnson
 APTRA B145 Type 41000 16 gsm & 25 gsm

16 gsm	0, 0, 0	→ popped @ 70 mbar
--------	---------	--------------------

25 gsm	0, 0, 0	→ popped @ 78 mbar
--------	---------	--------------------

Hyper B140 Type 16002 - statics

* = over clear looking spot

24 gsm 0.00, 0.015*, 0.00*

MM: blisters @ 120 mbar about to pop

More Emissins charging

5/29

- recharged some prior good material to at 0.35° gap, 1 bar, 5mA / centered voltage ($\pm 17\text{ kV}$) result: not as good

Should we run asymmetric?

run again at 30kV / 30kV (top is 30.4kV , bot -0.4) bottom is current limit.

Humidity is 45%

Try $\pm 30 / -0$ vs ± 17

$CV180$ 0.35° gap

#11: $\pm 30\text{kV}$ setting ± 30.4 -0.4) 1bar

#12: $\pm 17\text{kV}$, 5mA $\pm 17\text{kV}$ set, 6.9 -17.0 1bar

#13: $\pm 30\text{kV}$, 2 bars (+24.7, -0.4)

→ 8.5 to 20% penetration

Switch to $CV0178$ (30gsm no serum) AV_h

RESULTS UPDATE:	#11: 93.36, 96.41, 93.53	94.9	89.1
CV180	#12: 92.15, 96.47, 93.40	94.3	88.7
	#13: 92.89, 95.77, 92.66	94.3	89.2

Go back to 1 bar, set 16.6kV , 5mA
→ +16.6 - 16.5 actual

6/4

Best sample was 60 gsm no serum, 20g, short piece $CV0162$ after recharge 5/29 was > 98%

Today, it's ~5% penetration

After first charge, removed 3.5-4% with bad spots around 11

$CV162$: raw 68.34% → 94.38% ⇒ 97.04 → 94.59

Test salinity charge theory:
charge once - test 1 row
charge again - test 2 rows

condition ~~17/18~~: $CV180$, $\pm 17\text{kV}$ (+17.0, -17.4)

humidity is 44%, 72°F (outside 88°, 47%)

/ remove 15/16. 14 was 2 pass charge.

Redo 17/18.

~~17/18~~ burned holes again! Move to $\frac{1}{2}$ " gap?
extrude

$$\frac{\frac{g}{min}}{\frac{g}{m \cdot m^2}} = \frac{m}{min}$$

a.u. m^2 width

Emissus charging-test, ctd

5/28

9:15: 32%, 46%

First set of bars only, 1" gap

Mixed control

Top kV	mA	Bottom kV	mA	
20	4.56	-20.1	4.5	
20	5.1	-22.5	5.0	no limits!

test some fabrics - highest resistance is best

11:00 AM - 46%, 70°F

CV 180 - #1 1 bar (first only)

5 mA bottom, 25 kV top

#1 1 bar 5 mA 1" 25 kV

CV 180 #2 1 bar, 2.5 mA, 1" 20 kV (20.3-16.4)

⇒ CV 180 #3 2 bars, 5 mA, 1" 20 kV (18.7-18.7)

CV 180 #4 2 bars, 2.5 mA, 1" 20 kV (20.3-6.0)

15 kV (15.2-11.0)

CV 180 #5 2 bars 5 mA, 1" 20 kV (18.1-18.0)

pull extra slow

⇒ CV 180 #6 2 bars 5 mA, 1/2" 14 kV (14.2-14.2)

CV 180 #7 2 bars 2.5 mA, 1/2" 10 kV (10.0-10.6)

CV 180 #8 1 bar 5 mA, 1/2" 18 kV (18.2-18.5)

CV 180 #9 1 bar 2.5 mA, 1/2" 13 kV (13.2-12.8)

11:45 AM - 45%, 70°F

Test with no fabric, 1/2" gap, 1 bar

kV	mA	kV	mA
5.6	0.61	-5.6	0.5
7.0	1.08	-7.3	1.0
8.5	1.56	-8.6	1.5
9.9	2.11	-9.4	2.0
11.3	2.58	-11.0	2.5
11.3	2.59	-15.7	2.5
18.0	5.09	-18.8	5.0
18	5.1	-19.4	5.0

with fabric CV 180 30 gsm + screen

" " " moving fabric

3 0.35" (17)

CV 180 #10 1 bar 85 5 mA, 0.35", 17.3 K = 17.1

↳ 5 PM 70°F 46% RH (50% on cheap gauge)

Emissus charging - tests

5/28

8:45 AM - temp 77°F 37% RH (not off)

9:05 72.3°F 33% RH

Top

Bot.

KV	mA	Lim?	KV	mA	Lim	gap
20	2.5	N	20	2.5	✓	1"
30	5.1	N	30	5.0	✓	1"
30	5.1	N	25	5.0	✓	1"
30	5.1	50%	15	5.1	.	1"
25	5.1		15	5.1	.	1"
20	5.1		15	5.1	.	1"
15	5.1		15	5.1	.	1" dial down
15	5.1		15	5.1	.	1" restart
3	0.07		3	0.07	.	1"
4	0.07		4	0.07	.	1"
5	0.32		5	0.32	.	louder
6	0.64		6	0.63	.	quiet
7	0.98		7	0.98	.	
8	1.42		8	1.42	.	
9	1.91		9	1.91	.	smell ozone
10	2.41		10	2.43	.	
11	2.94		11	2.95	.	
12	3.52		12	3.57	.	
13	4.18		13	4.18	.	
14	4.81		14	4.82	.	
14.2	4.93		14.2	4.96	.	
14.4	5.1		14.4	5.1	.	
15	1.3/5		15	5/1.3	.	unsteady

current control mode, 1" gap, 2 bars, empty

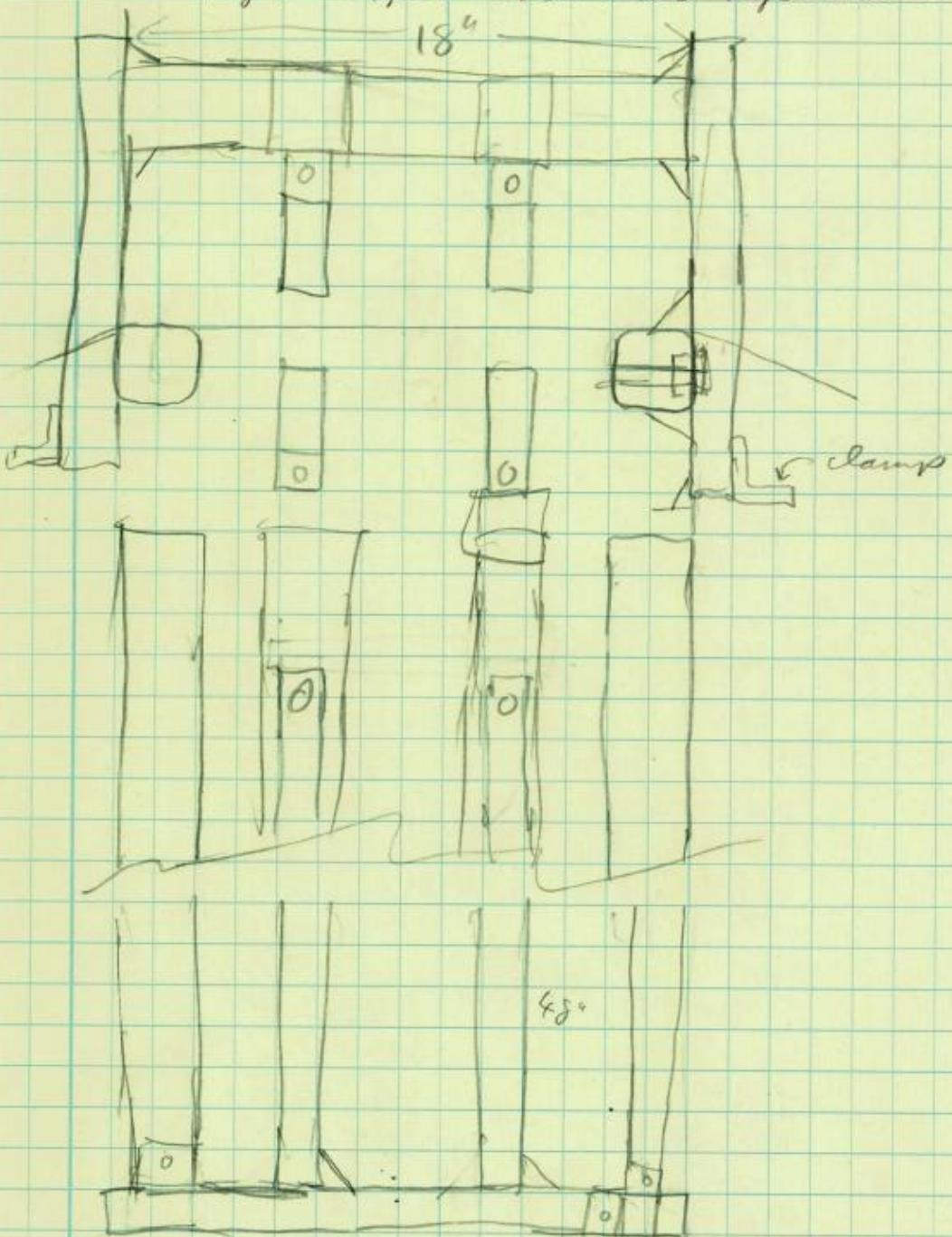
KV	mA	KV	mA	
0.4	0.5 (0.58)	-12	0.5	top has limit light
0.4	1	-14.5	1	"
0.4	1.5	-16.9	1.5	"
1.8.9	2.0	-0.4	1.5 (2.0)	bot is lit!
2.2	2.0	-16.9	2.0	
4.8 14.4	2.5	-17.0	2.5	no limits
6.8	3.0	-16.2	3.0	" "
9.1	3.5	-16.0	3.5	"
11.2	4.0	-15.0	4.0	"
13.0	4.5	-15.0	4.5	"
16.0	5.0	-14.0	5.0	↓ avoid limit lights

center voltage with V/I control? ~~not allowed~~

Longleaf - shrinkage

267 yarns across top of 451 exit
 - bunch is at slight angle ($6'' \times 6''$)

451 Peroxide - 54 to 2nd notes + 82 deep cut (mid)
 + 75 small notes + 31 + 23 + 17 = 282
 5.3% more 15 yarns in 6 inches
 2.5 per inch
 ~44 yarns per inch .. so 1 yarn is 20



Eminus - Tensile

4/21

30 gsm outside - CV0119 or CV0120

cut 4" wide

458 g clamp - held until I lifted - 600g?

840 g - no chance

604 g - tear $\times 2$

∴ MD strength about 500 g/4" @ 30 gsm

CMD: < 458 g

better section: < 604 g

Eminus - alcohol treatment

- try 30% IPA

- untouched & squeezed (weight it)

- also try Hills material

30% IPA - 150 mL

 \rightarrow 500 mL w/H₂O

Samples:

	GSM	series	WT		NIP
CV119 #3	30 gsm	No	2.10 g	32.57 g	N
CV120 #3	60	No	3.27 g	34.82 g	N
CV124 #1		Y	2.96 g	7.47 g	0.2 bar deln
CV124 #2		Y	3.15 g	16.70	0.4 fibres \rightarrow R
CV124 #3		Y	3.13 g	38.06 g 62.38 g	10 NIP
CV125 #1		Y	5.14 g	15.63 g	1 bar better
CV125 #2		Y	4.77 g	24.43 g	0.4 both... areas
CV125 #3		Y	4.94 g	62.38 g	NO
CV108	3	Hills	0.56 g	8.52 g	N.
CV109	2	Hills	0.60 g	4.77 g	N

Valway - X breaker, ctd

2/20

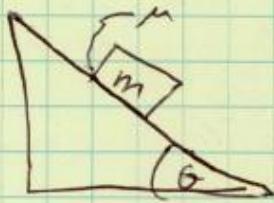
Incline plane test: $\mu = \tan \theta$

$$\theta = 20^\circ \rightarrow 0.36$$

$$15^\circ \rightarrow 0.27 \quad \text{given } \mu = 0.3$$

1.22

$$\theta = 70^\circ \quad e^{\mu\theta} = e^{0.366} = 1.44 \quad 1.44^2 = 2.08$$



11:15 close to starting?

12:45 server was reset. start w/ leader

70° engaged, 5 miles x 2, bay 100 --- 150 --- (read 250)

try 75 - 150

running but about 20° w/ big fluctuations

try ~~100-80-2+50~~ → kicked over 200

$$100 - 80 - 50 - 2 \ 150$$

50 m → 100 out - runs fine! crank up

$$75 \text{ m} \rightarrow 70 \text{ to } 160$$

try 100 --- not sure what's going on
Run 90° - bars fly quite a bit.

Probably better to reduce wrap and increase tension?

13:45 go back to 70°, start w/ 2462

$$\text{go } 50 - 75 - 100 \text{ lbs}$$

14:10 go 2397 in reverse 100 - 75 - 50

Valway - X Breaker

Start with style 2462 - 4700tcs Invista

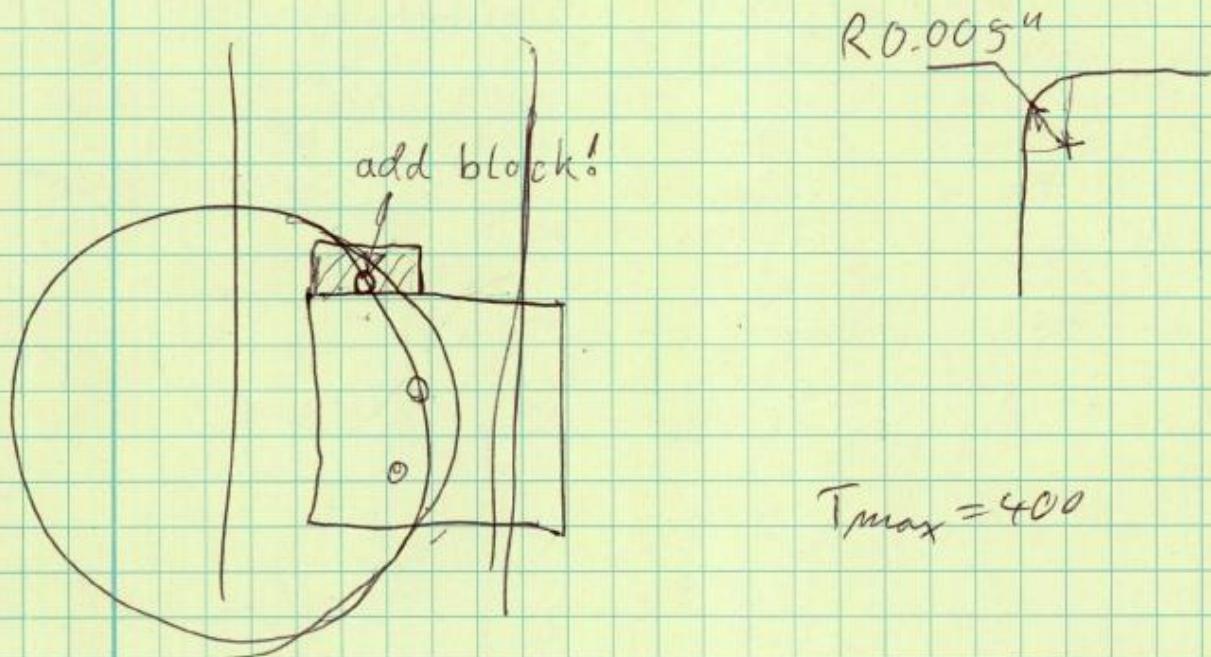
Locking plate: only works in one direction!

~~good for~~

Tough fabric at $\sim -10^\circ$ (can hold w/ old hole)
then engage 10°

Other way:

Tough fabric at $+35^\circ$, loath at $+20^\circ$
 \rightarrow can go up to 20° engage on new hole
 \rightarrow 40° on old hole
 $\sim 100^\circ$ back around to new hole



9:50 set at 5,5 and 70° engagement
waiting on A-frame / operator

$$T_{out} = T_{in} \cdot \underbrace{e^{\mu\theta_1}}_2 \cdot e^{\mu\theta_2}$$

$200 \leftarrow 100$
 $300 \leftarrow 150$

$90^\circ = \frac{\pi}{2} = 1.57 \quad \mu \approx 0.4$

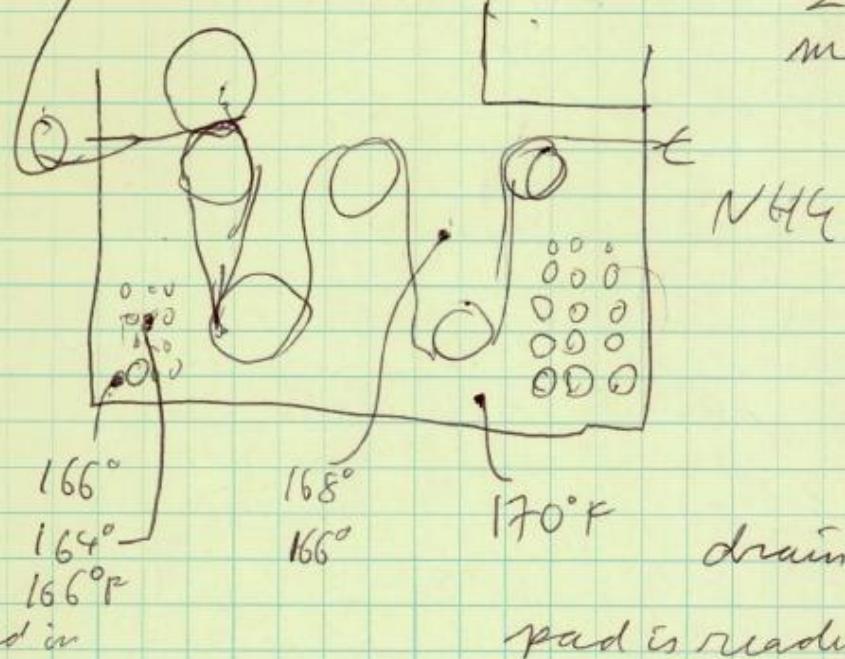
$\mu\theta = 0.628$
 $e^{\mu\theta} = 1.87^2 = 3.5$

$\mu = 0.3 \quad \mu\theta = 0.471$
 $e^{\mu\theta} = 1.60^2 = 2.6$

Longleaf Visit, ctd.

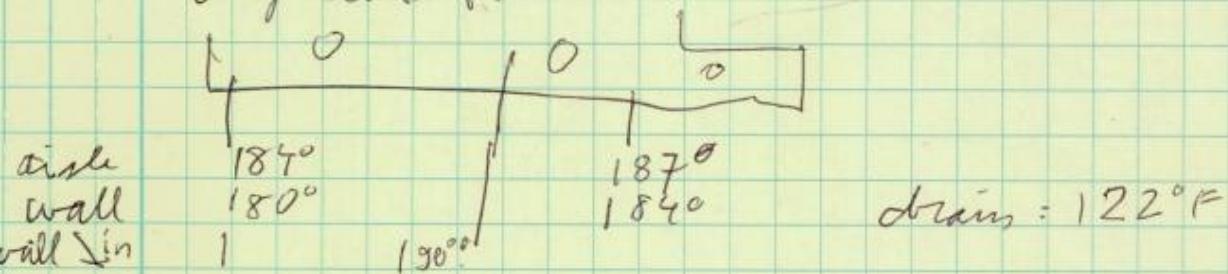
2/19

Range 54-2

2PM: use
meat thermometerspad is reading 151°F
pH 5.9

RTD calibration once per period?

Look at 54-1 (furthur in) soup 170° H₂O temp
running S/451 15° pass
very little foam

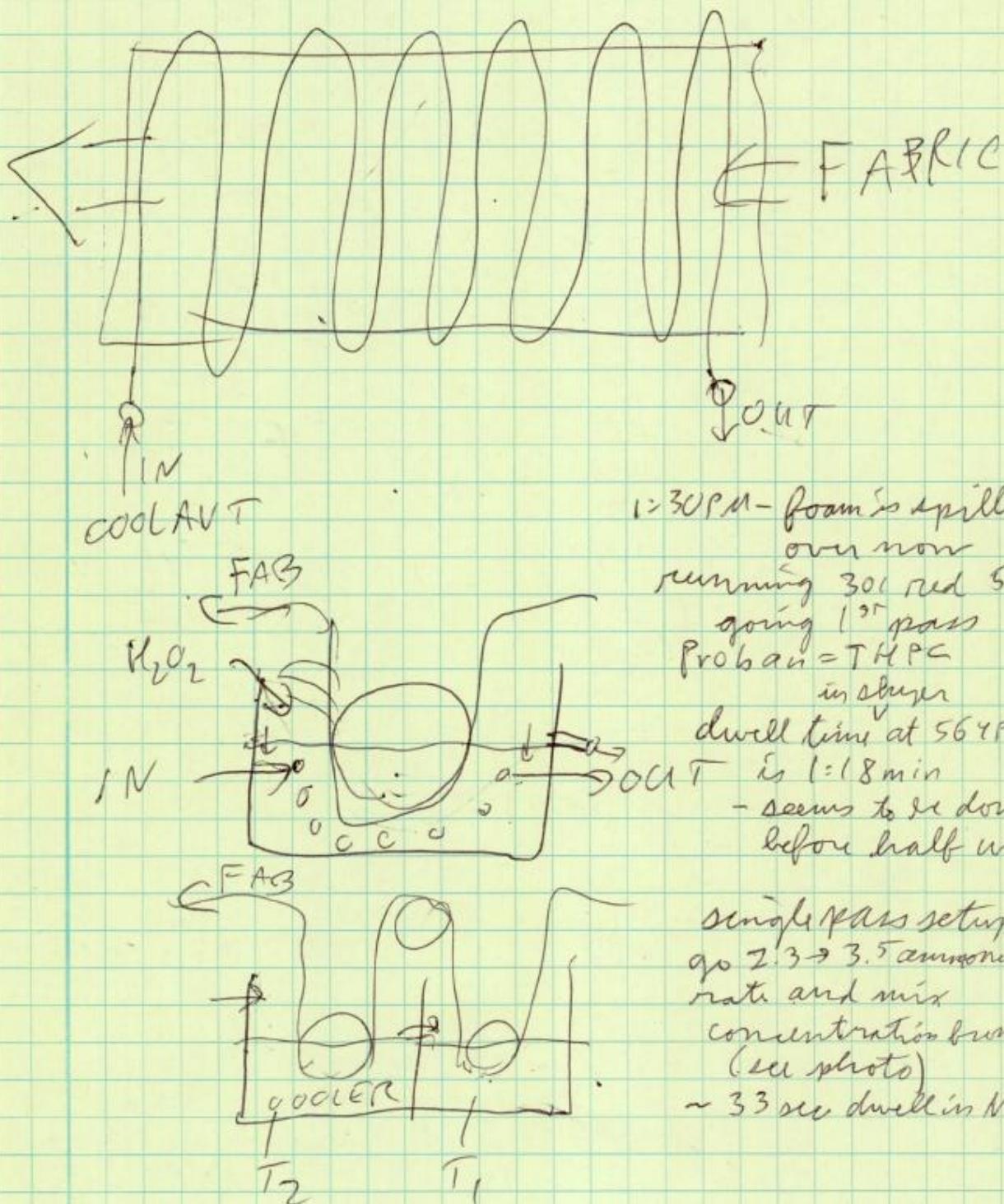


Longleaf Visit

pump recirculates the bath from bottom, drizzles it back on top (air pump) at 38 psi
ARO brand

Hannah Powell & Sixto

Pipes are 1" schedule 10 stainless



1:30 PM - foam is spilling over now
running 30L red 554cm
going 1st pass
Proban = THPC
in shaker
dwell time at 564PM
SOOT is 1:1.8 min
- seems to be done before half way

single pass setup:
go 2.3 → 3.5 ammonia flow
rate and mix
concentration from 100% to 0
(see photo)
~ 33 sec dwell in NH₄ @ 554PM

Gerrish Visit, ctd.

1/31

Tools again 4:25 PM

	L	R jet
167	470	400
166	555	537
166 AFTER	Adjust pressure on 166	to 60 TOP & BOTTOM
167 AFTER	546	540
154	544	540
	Adjust pressure to 60 RP / 0 BP	
	510 - tools loose	532

Gorisl Visit - Floppiness

1/31

Allen Meadows Samen - new PI

~ 15 looms running problem style

150 - 157, 161 - 167 (loom #'s) and 113, 114, 115

154 and 157 have been bad historically
limited access to information

2 of 4 were from 157 last year

156 - screen panel is warped on L side (catch chord)

155 L side

bottom of light panel - 543, square

top, square : (5) 45.5 top, angle 41

bottom, angled - 43 bottom, square - 41

bottom, square - 44 bottom angled - 42

spill fabric away - 43

coming down from loom, L side (catch)

12, but hard to control

155 R side (jet)

B sq - 30 Bx 30 T 1 30-35 pull & release

33, 35, 30, 31... 25-30 tap & release

changes could be in the fabric...

Measure all bottom of light panel

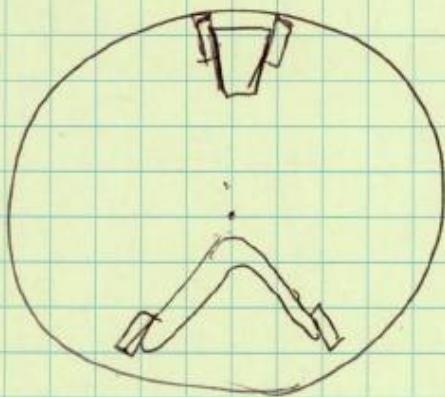
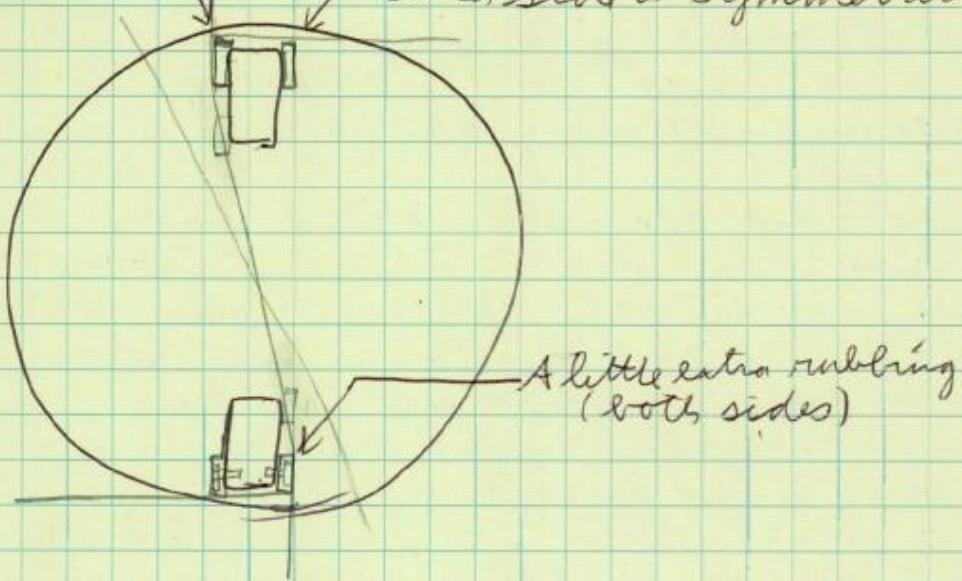
Net	Loom #	L side (catch)	R side (jet)
62 / 59	150	540, 37, 39, 38, 59, 38, 41, 43	43, 42, 41, 39, 40, 41, 40, 41, 40
51 / 47	151	43, 50, 49, 51, 45, 43-40, 45	50, 52, 54, 50, 15, 5-52
86+ / 70	152	510-17 (14) looks floppy wavy	32-28 (30)
68 / 50	153	30-35 (32)	48-52 (50)
54 / 42 M ₂	154	45-47 (46)	56-60 (58) - Right Run A > 100, B <
50 / 62	155	50 ± 2	38 ± 2
67 / 70	156	31-35 (panel bent)	30 ± 1
49+ / 66 M	157	49 ± 2 floppy wavy	31-37 inconsistent!
30	152	6-14 (10)	
1	161	99-80	25-32 rounded & box
1	162	70-80/505-510	385 round
118 / 135	163	480-485	465 "
130 / 88	164	470	512 "
70 / 80	165	530	520 "
60 / 57	166	540	543 "
130 / 200	167	490	400 "
105 / 70	152	495	530 "
147 / 55	161	460-453	545 "
117 / 210 M ₂	162	483	390 "
		wavy & loose	

11/10/20

X Breaker

Dual blade geometry?

Up to 30° wrap



Volarter Summit, ctd

12/4

Product Development Process (^{education: customers interests})

DR → Doug → Mike → Approval (4 weeks)

2-6 weeks creation high level screen

trial stage 20-72 weeks

prototype approval - 4-8 weeks

mfg spec approval - 1-2 weeks

production orders

marketing may get involved at trial stage,
usually at mfg spec level → marketing tags & videos

Michael - everyone has a marketing mindset
concept is baked into the project from day 1

Have advanced concept development

- things they don't do today

10 years on thermal responsive fibers

Doug McBurney involved if mfg equipment needed

60-80 DR's in process (max 180)

DR completion: 6-24 months

55% US, 40% Asia, 5% Italy

Strategic portfolio math? Rose - could do more than

Workwear: Professional, Safety, Dual Haz, Military

Power Dry

gas & oil

FR - biggest

Power Shield

Power Grid

Synthetic Fiber

Polarstar Summit, ctd.

No fiber migration

Submerged in river, marched dry in Alaska - or was
as dried - layered

Power Fill - for max warmth Z-stitch 100% PCR
don't need a scrim nonwoven 50-130g range
& can be squeezed into a coffee can

At the end, they want to keep the jacket

Thermal Pro - non-flame, flame. Fashionable
circular knit

Wind Pro - tighter construction ^{hi density fiber actual} 200 → 40-80 CFM ^{studies}

Hardface CC surface treatment - polymer, durability
rotary screen print - solid or pattern - acrylic & PU

Developed velcro Martindale test (gadi)

Power Air - harnesses warm air - fibers limited
into pocket - 5x less microshredding
won R&D100 award over 2 years development
weight is a challenge - Mike Rose right combo of fibers
15th generation - needs more work

WEATHER PROTECTION - Michael is expert

Wind bloc - laminated 40 CFM

Powershield - durability of woven w/ microfiber
5-12 CFM not 100% waterproof
PU system with PSA

Powershield Pro - add superior water column 5,000 mm H₂O
2 CFM air flow video

Neoshield - 20,000 mm relaxed heat & moisture @ low P
soft & supple 10,000 & 0.2 CFM no phase change

Finister in Korea

North Face has 1:1 competitor gadi:

You Tech has popularized 40,000 mm durability

Powershield Pro has much better potential

5000 mm H₂O is enough - hard to get the sale

Mark - Military

GEN III ECWCS levels 1-7 (intensity)

FREE - \$56/yard bright to extreme weather

80% of revenue - 40% margin on 4 programs

Style per platform: 1-8 65 styles for military

Have 4 \$8M SKU's as 80% of revenue - sectors of small firms

Development team: 14 people 6 engineers

Marina Kosera-Gastonia - perf outdoor knit development

Bill Patz - FR Workwear Tim Hoxha - Knit 3 Tech on finish

Polarter Summit

12/14

Polarter NPD presentation by Mibi's boss Doug Kellher

Warmer, tougher, cooler, dries

Somas Guerrera - in Australia

Guatemala, Mass, Tex, China locations, NH, Italy

^{TEXPASA} L'unit, dye, finish L'HQ L'unit, DF, lam

Economic
PONTE TORTO

L'unit, DF, lam

China JV with SCT Shanghai Challenge - rotary screen print

Guatemala: piece dye (disperse)

At 45-50% machine capacity right now seasonal

March-May pretty full, now around 20-30%

G & I are small

Jet dye, tent frames, not much woven

In China, maintain associates in the off season

Lab dyes about 50-100 weeks - Amy runs this Aimee La Valley

20 shades of black sales office in Maastricht

Tenoroma with 80 dye mixing stations

Lots of partnerships with big name customers

Core technologies:

Recycled plastic is big

BASE: power dry, power grid, P stretch (pro)

Karen & Michael Karen - went out of town, loud

Power Dry - base layer - wicks & disperses, soft & comfy

Modern layering system

Synthetic dries quicker than cotton

Dries gradient to power dry

How to quantify? Shaky answer MMT, hot plate dry

egdi - talked a lot

Power Grid - technical fleece - raised grid + dries gradient

↳ square fuzzy patches on the inside

Power Stretch - their golden fleece - knitting is critical
need perfect plaiting

Mibi: hole - have pilling issue, fibers goes on surface

Athleta came back b/c difficult to make

Power Wool - what is Merino wool on skin
using synthetic for faster dry & stability

DELTA - cooling for really hot days

- raised patches, moisture dispersion, hydrophobic/silic blend amplifies cooling spreads moisture on body, less sticky & clammy

Mibi: hard to explain, makes you feel better

Insulation: Fleece - elegant warmth w/o weight $\frac{100}{300}$ g/m²

High Loft - double Rachel slit knit + mapping

Alpha - for NATIC - long down insulation, thermal active insulation

Valway talc measurement

11/18

#75 for XRF - about 1 hour
 ATR - FTIR Attenuated reflection IR
 2 mm viewport

ICP is best/most exact
 - should be no problem

Echo patterning

11/19

Try the primer

- KE1604 + 10% CAT22259-60 (cured)
- add some more fresh brush on as adhesive
- also try the Dow adhesive

Primer #4: brush on, dry 10-15 minutes

KE1604: 34.4g + 3.4g hardener

110°C @ 11:00 AM - cure all at once
 11:10 - up to temp
 11:25 set to 150°C

Disposed of xiameter 2004-75

11:37 oven reached 150°C

13:10 samples out. look good superficially

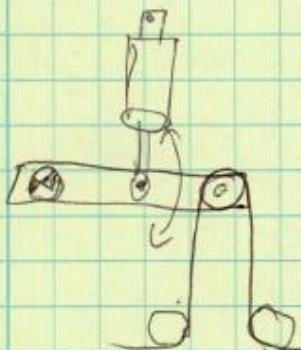
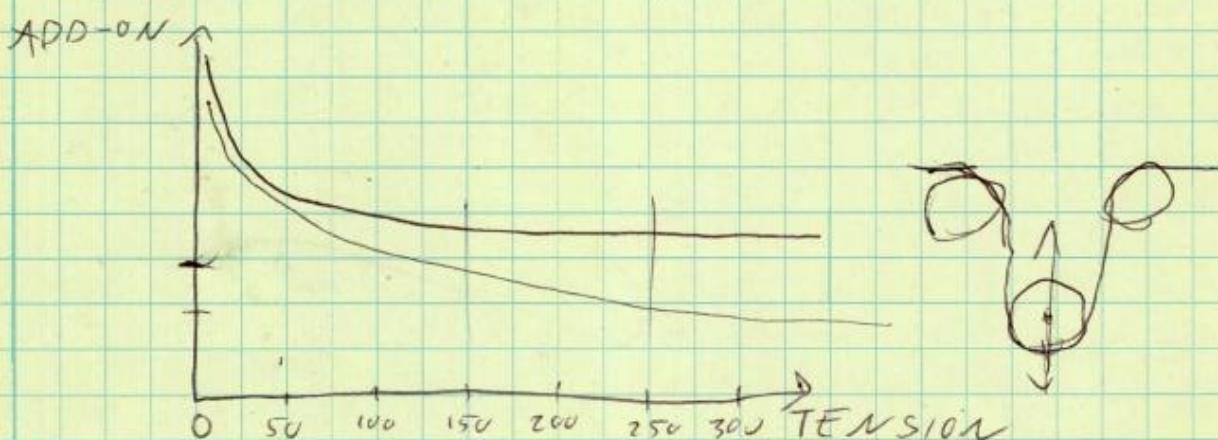
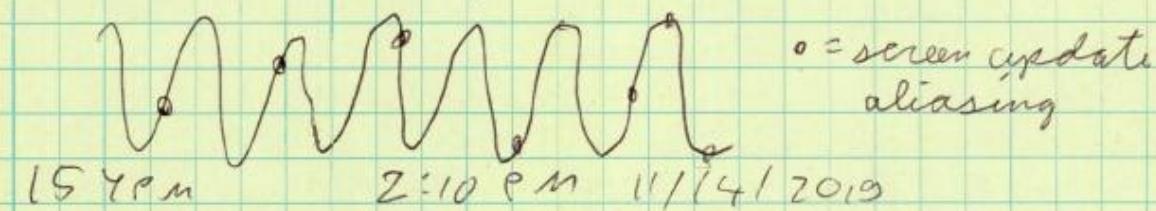
Both have decent adhesion, but not great
 Dowsil failing at both interfaces
 #4 works great, but delam@ cured face
 initiation is hard - some surface roughness
 would help on cured pattern back)

Valway Flight

11/14

Fabric bands - heavy
 Bands at 0", 9", 18", - , 36", 71 $\frac{1}{2}$ ", 80", 89 $\frac{1}{2}$ "
 98" (light), 108", - , 127", 145", 165"
 coated at 74 rpm = 252/min 28 rpm/min

Range 3 running RFC printer blanket 1954
 tension varies from 150 to 250 lbs



Nxt nano, ctd

10/31

limit to air handling

Monte-brich is in the chemistry

Multiple patents on fiber morphology

Have 4 chemists now, solving problems

Haven't had to invest in process

Dramatically improved over Nxtogen

$1.5 - 2 \text{ m/min} \times 3 = 6 \text{ m/min}$ original line design
air flow, forces on paper

paper wrinkles with 100's or 1000's of nozzles

get defects, slugs ... reduce force by slowing down
needs some engineering

get production going in ~8 months

drawing to startup is 6 mos

still on construction permit. TO is 6 mo lead time

should there be growth in other

growth would be 2° 21', 2022 \$6 is high... get to \$3.50
current military as tiny-special forces

Have non-halogenated FR film - early

Antimicrobial, bandage, acoustic treatment for auto &
aerospace

Transition to C6, long term get in block polymer
 Impact shouldn't be as big as on glass fabrics
 no water repellent additive if it's in the urethane
 HAP = hazardous air pollution

Blue signs tied to PFOA, PFOS
 transitioned all fleece to "C0" (fluorine free)

↳ appearance suffers
 regulatory pressure on fluorinated treatment, not PTPE
 TOUR

test equipment: Mullen Burst, Hydrostatic load,
 air perm, stiffness, boom machine for
 full fills cycle testing, bubble test → porosity
 inspection table - manual markings
 cut out and hot seal together

Michael: Polartec expertise in lamination (DWR!)

Q.C.: pre-check on every roll, final test

check weight on 3.81×3.81 samples L, C, R

thickness gauge 3634 testes

WIP is 128 cm^2

If too many defects → go somewhere else

Internal spec @ $0.26 \mu\text{m}$ filtration, end spec is English

Have to purge sometimes

different polymers for application - corrosion, temp, etc.

TPU, PVDF, PAN

Internal procedure for changeover
 not ISO certified

TIS19649 - RitterM passed customer's audit, but not certified

Did some PPAP on filter products

control temp & RH never had a fire

Yellow paper is FR rollers are electrically heated

↳ FR binder with cellulose

currently using antimicrobial fibers for medical product
 not OSHA VPP, annual training

0 recordables in 3/4 years, this year implemented elbow
 rolling out behavior based safety process PSM
 apparel sales only to Polartec

C8 - internal Milliken policy

C6 didn't quite pass Mullen burst & hydrohead

Have 2 C6's in stock to test, ... block copolymer not ready
 show differences between C6 & C8 - could do by end of year
 Shunlong has some names

Best film Alan has seen in a long time

Nxtnano, Ltd

(10/31)

Fewer issues with stripes, came back in 2017
 Made product for China
 can't meet at 0.7-0.8 m/min, de-emphasized again
 May have to negotiate spec or some issue
 could only meet 10% of demand
 3 cells, 1 non-functional (not hooked up)
 running 4/12 shifts Mon-Fri (96 hours per week)
 much more efficient not to stop
 Make 2 5gsm layers with bicomponent fiber technology
 to bond together \rightarrow got wash durability
 no durability spun onto fabric
 Have lamination equipment here
 spins, thermal lamination
 2×3 gsm is harder to handle
 have equipment to measure air P, WIP
 do their own compounding in-house
 slow inspection process
 microfiltration cells \$25/m² vs \$6/linear yard
 cost is driven by labor - 0.8 m/min is just no good
 some automotive is 30 m/min
 carves system wasn't designed right...
 will need to invest in pilot line
 Air management systems - emissions challenge
\$500K for thermal oxidizer
 4 people @ \$20/hour on c-line + 3 lamination
 $\$140/\text{hr}$ 0.75 m/min - need to increase speed
 could produce 5,000/month w/ 80% efficiency, 3 day+10L
 $60,000$

24×7 on one cell 151,000 two cells 300,000
 original design @ 5 m/min would do 1 million
 what price could we sustain?
 used to be \$7/meter/Hr \$5.25 elsewhere
 Toptex Semor was under \$4/meter
 Park embellished money, loaned to himself
 300,000 linear yards is limit, trying to reduce DMF
 filtration uses non-DMF ~~300,000 linear yards~~
 312,500 yards of single layer
 100 tons non-HAPS, 10 tons HAPS limit $720^{\circ}\text{F}/\text{yard}$
\$30-50K start test every 4 years run 50-60K/year energy
 300,000 CFM less HAPS - fibers get slower, weaker
 to attain WIP (water intrusion pressure), have to use fluorine
 combo of porosity & chemistry. Used C8, close on 66

Nxt nano

10/31/

Alan Smithies - VP of Technology

Monte McDowell - Owner

Justin Volpe - Director of Operations GM

Just getting into microfiltration - food grade
 micro venting compete with cast film - 4-5x flux
 ↳ automotive under hood headlights
 ↳ electronic - flashlights & toothbrushes, one on phone

Andy McDowell ... 35 people in company

In this bldg since 2013

Worked with Polartec in 2015-16

Have de-emphasized film for apparel - lower margins
 Neoshell 10g film is main seller

Toplex, Finetex history

Canadian business by Finetex spin-off? No films

Toplex did business with Samsung, sold black market materials, people going to jail

Mr. Park may not start another business

B&C customers are moving to us

400,000 m total (mostly 10g) grow 100K per year

North Face FutureLight - tai winds

↳ their ads ever use similar language

growth in high aerobic markets, could move into weekend mountaineers

Monte - avid hunter - Gortex is noisy

Filson - makes hunting gear

could put antimicrobial into filters

Milliken - Chemical, Textile, FC, medical

Ethisphere award

Monte - areas of crossover - medical - spun collagen

Plan - original intent was films for Polartec

- air perm, wt, water intrusion pressure

- had productivity issues 5m/min goal, got to 2.5 or 1.5

- visual quality problem - stripe

- bleeding cash, had to stop \$0.5M/month

- take picture of business card!

- waves in release liner

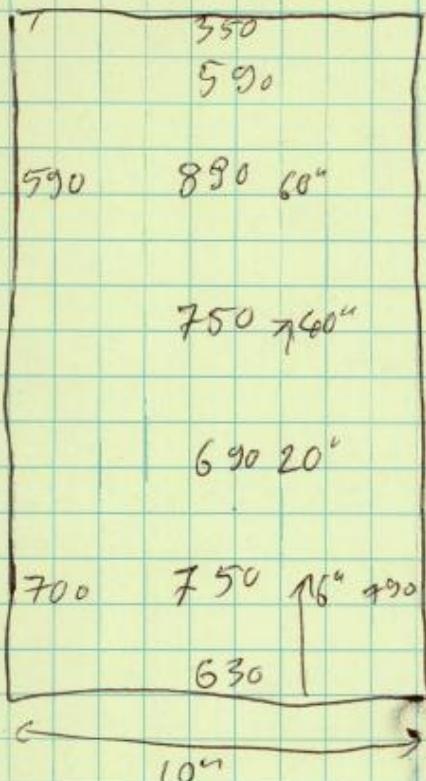
75 ft release paper through 3 cells - tiger stripes

- move to filtration to survive, 1 cell lines (1 not operating)

- now going < 1 m/min

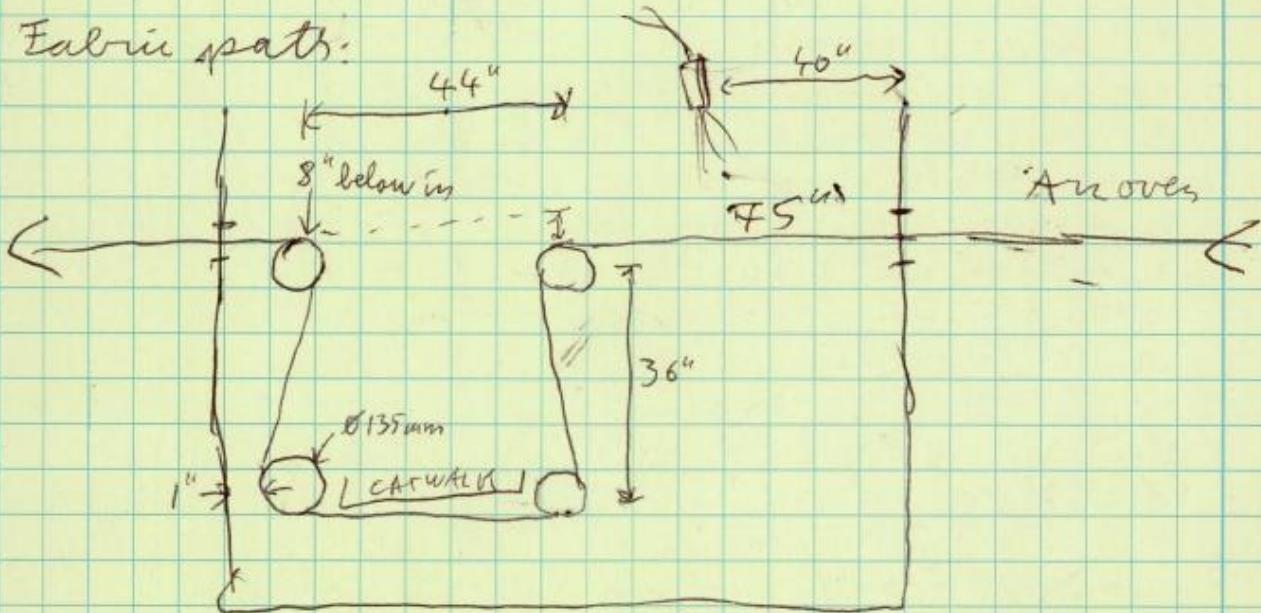
Walkway, ctd.

10/23

door: 78" x 10" gap w/wedge + top (20° 

nozzles have 2x 3/8" tubes
can regulate each one

Fabric path:



12-58 - start R8 coat 2 little balls on edge (heavy)
1#02 - no spireals, just heavy edge (~1") on left

1-04 - run out of coating

Fabric was quite wavy, but pins pulled it flat.
blade edge looks sharp
but tip is what matters, right?



Valway, etd.

10123

9:25 - breaker on "7" noise is fluctuating
tool video

east role before breaker (2 back) is bent ~2 mm
compensators are rocking a LOT

taleus is oscillating 8 ms (for better roll build)

10:00 - almost out. 10:02 stop

got sample 2462 loom slate

- set breaker bar to "1" (not engaged)

10-23 set BB to "11" $70^\circ \text{ wrap} \times 2 = 140^\circ$; 10 holes = 90° ?

drop temp from 180 to 130 zones 1 & 2 3&4 still 180
fabric oscillating ~ 1" at BB

got sample 0/0/180/180 no breaker

BB engages at 5, definitely not at 4 - 4.8?

$1 \rightarrow 10$ spans 90° (9 steps @ 10°) so $11 - 4.8 = 6.2 \times 10 = 62^\circ$?

"is brushing back edge - so maxed out (function of BB geometry) . . . " "

One style stiffer than anything - "TRW" samples

630d Invista - tight construction

$$41.7 N F \times 51.3 N W$$

with breaker AND I-beam: got to 28-30

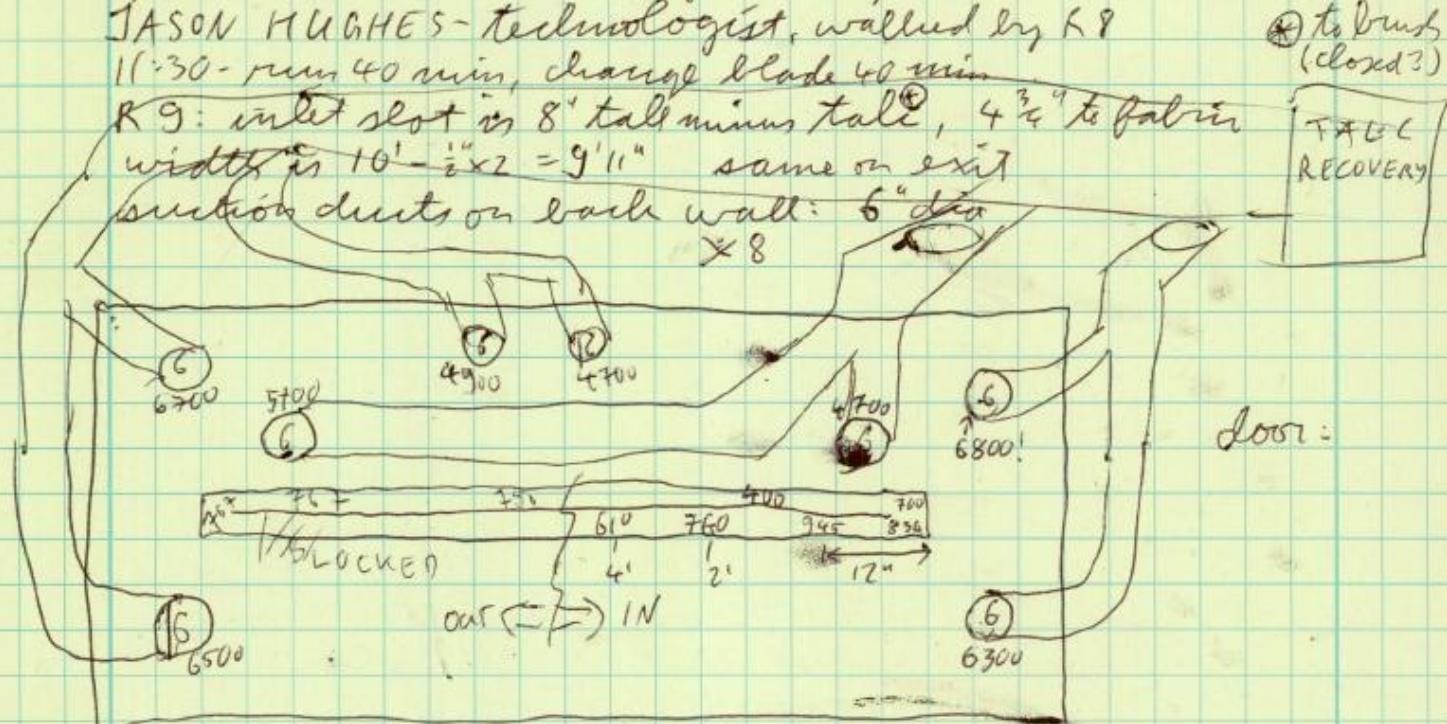
Garrison has 2 40° Fair, 8 yards exposure

JASON HUGHES - technologist, walked by 6:18
11:30 - run 40 min, change blade 40 min

R9: inlet slot is 8' tall minus tall², 4 $\frac{3}{4}$ ' to fabric

width is $10' - \frac{1}{2}'' \times 2 = 9' 11''$ same on exit

suction ducts on back wall: 6" dia



Air flows: see map

silly went on inlet wall almost dogged

Valway

10/23

3 styles - 2385, 2397, 2462

Talc spray - 8, 10, and 13 gsm² 50% solids

312385 - 630 denier flat dried R11, pretty good "equivalent"

- similar results Nylon (all) Invistayarn 2.5-3 lbs/in both
- 7.205g - 245 gsm, 40K y/wk

2397 - 420d PTHP yarn (Polyamide Hi Performance)

- haven't been successful, too difficult

- 220 - 225 gsm, 40K y/wk @grain: 18 YTD, ~ same

Valway 25

2462 in transition to replace 2397, same

construction w/ Invista yarn

- not as stiff, borderline avg 16-18N @ grain dry
21.36 F, 24.18 W average 21-22

Look @ seam combing too

Today: run 2385, then 2462 - ~~150 yds~~ diff temp
1000 yards (optimum)

R11 runs 60 yds

Fry within a week 6-8% moisture w/ vac, loom heat

JEFF STORY "don't talk moisture"

have run 280°F dry after zone 1 of 4

16 dry cans in 4x4 zones temp by zone

oil heat roll lid ~ 33" > 180° wrap (210?)

rolls certified by Carolina Integrated Solutions

Trustair Zuma dryer - bought last year

setting = 0, 0, 180, 180°F (no heat on top)

can set speed on 2 vs 1, 4 vs 3 ratio

run @ 100 lbs selvedges are wavy stretch 74 to 101%

KATIE WAERS (912) 660 5794 PI mgr all Valway - March

Talc - door open & /c too much vac

Riley - PI Range 9 Talc gauge 0 in H₂O

16 nozzles w/ atomization air + feeding air

clean every 5 hours for 20-25 minutes

not using talc brush

let off - dry cans - inspect - vision - guid roll - S drive - takeup

compensator after cans - 15 PSI = 95 lbs entry to Z1

same @ Z2-Z3 and end Z4 to cool cans (two)

at cool cans - insp. pull roll - 10 PSI = 120 lbs

breaker between C (cool) can and INPR (inspection)

Fabric is 71" wide

Dr. Peter Xie - team worked on odor reduction

PU additive working in China

laws around VOC emissions

GC MS does not correlate to smell - PCB vs %

No good aldehyde scavenger

Developed ~~AS~~ AS 88 - reduces both

Testing is expensive - use Toyota method

AS 88 version 2 → no formaldehyde detected

Very difficult to understand, slow talk

Mark Ragsdale - involved

Tammy Harris - Live Oak designer

carpets are woven or tufted

DDI = digital dye injection 1974 - patent

1360 colors using HSV spot color process

Excellus was ~~2000~~ DPSI 23,000 vs 400 for Millitron,

Went to natural color model

Colorwads won best of NeoCon

then Colorfield - top selling collection \$130/mm

- custom design at Detroit Marriott

Emily Michaels - Cable Mat: Blowable Technology

Average 5 ft a day on smartphone

46% of people would rather work an extra day than give up smartphone

MaxCell & VisDivide are pulled

"I need to be an octopus"

→ go 2000 ft in an occupied 2" duct blown at 60PSI

we make Duct Sox

Project Pufferfish

Have several folders, sew final, put in field
commercialize Feb 2020 at BICSI

VisDivide Air - Nylon film

Drew Morris, Warren G, Troy Sines, Dale Willis

Keith Keller - Delta Max 5000 a

3 types of PP hPP-homopolymer, shrinking

RCP - random copolymer ICP - impact copolymer

ICP is tough high melt flow has less impact strength,
especially recycled

increase MFR, impact, or both Used in recycled resin
developed white chemistry (no yellowing)

used Delta Max with Hyperform to improve MFR, Mod, Impact

Jason Sprinkle, Scott Green, Industry, Xinter

Halsey - board says 2025 plan ambitious thinking org, org + geo, dev

COI 2019 FALL

10/11

National coming out day

Dimitri Smirnoff - California colleges UCSF, Carlton College
grandson of Roger MillikenBiofouling - Dr Anthony Brennan
learn from sharks, not whales?

Sharks have dermal denticles with grooves

Patterns inhibit growth - Sharklet

Structural color - Morpho butterfly (blue)

Shinogwala - Aloron - monovidescent superballs

Melamines - colors that don't fade

Companies using Aloron - sequisters

Ade functions not nouns

Fireflies have nanostructure to guide light

Kennedy & Harting - Aloron - heart-like pump

"nature's design principals"

Biospired design has grown since 1995 bigly

Green chemistry - Anastas & Warner

gazelles can pivot on a dime. Milliken should lead
cellulose, keratin, clitics, and a few polymers
mimicing most natural structures

FR based on citric acid cycle - to Halsey

Very good at answering questions, thoughtful

Sanjeeva - 24 US patents PC&I

- make any active polymers
- PC & I teams is quite diverse
- future of laundry with no water?
- Lenco dyes - nothing new yet
- PET is 65% of fabric

additives against malodor - covalent VOC capture

care - cooling technology - rejuvenate in wash

SSCW-2 additive wet water

why not wear cotton shirt?

0.5% of fragrance stays in laundry

Danna Ketter - marketing - we need to tell our story first
and others will want to leverage our brand

Christina Trevedo - sellable wound dressing

Lyocell had best absorption/integrity tradeoff

Rajib, Jackie on team Moisture pulled into fiber

- grows 20%, kept "periwound" dry AGILE

Sew Child - arc flash protection cat 2 daily wear

9 cal is in cat 2: 8-24 ... but protect should be 25!

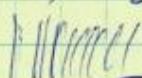
one material for break open, another for radiation shield DH Air

Hillcrest

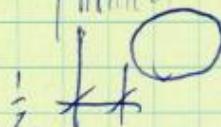
Tube positions

Line 1 R side (closer to office/wall)

Bottom = $\frac{1}{2}$ " in from card wire to duct (fixed)



Just over $\frac{1}{2}$ " away (radial)



top: ~ $\frac{5}{8}$ " from edge of card
wire to edge of duct
pipe ~~2"~~ ID, ~~2.5"~~ oval at inlet
 $2\frac{1}{2}$ " ID, 3" oval

Line 1 L side bottom = 0" over, $\frac{9}{16}$ " away ($\frac{1}{2} - \frac{5}{8}$)

top: $1\frac{1}{4}$ " in, $\frac{9}{16}$ " away. 1" further than it used to be!

Most choices are bottom ~~left~~ right

Braibut is pretty basic (to move fixed suction)

Line 2 - Deon R side (office)

TOP: $\frac{1}{2}$ " in, $\frac{13}{16}$ " away (fixed?)

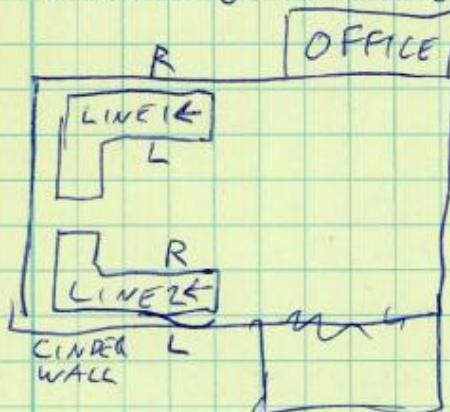
BOT: $\frac{1}{2}$ " in, hard to measure away - $\frac{5}{8}$ "? need feeler

L side (cinderblock wall)

TOP: $\frac{5}{8} - \frac{3}{4}$ " in maybe?? $\frac{7}{16}$ " away

BOT: $\frac{3}{8}$ " in $\frac{1}{2}$ " away

Line 2 bottom is on slotted brackets both sides



8/28

eSpin, ctd

Filters runs 10% - 75% @ 0.3 μm
 film designed to deposit on Syntex fabric
 Laminar at Brookwood - Polartec
 can add dot matrix

Have tandem cut off & sewing
 coating would have to be added
 spinning heads are obsolete - w/m 3.1 vs 2000
 - would add to get capacity - have span
 - can't even sample w/o PO

24/7, 4 engineers & 1 tech

685 or 50 ft/min for 6 gsm

100 gsm on 28" line is 3-5 rpm

can we work w/ line to reduce cost

Devon does cost model

Jayesh will disclose cost, +20%

\$170 + raw materials

Making exceed filters - pleated

Have 200's electron microscope

Measured 780 nm not 800 nm water

Finetek hydrostatic head: (9 Gsm)

method A: 60 mbar/min B: 1000 mbar/min
 air flow 0.605 cm/s → 1150 mbar (11,500)
 5 gsm (2 layer) is 9.7 cm/s, 5.3 - defent driven?

4 layer head: 45.4 mbar - broke on edge

- tested same material twice 0.38 cm/s

3:30 PM

Jayesh Joshi - Akron, DuPont, founded in 98
 Worked with Milliken in grad school
 Saibat Jaycar & Jayesh went to college in India
 Moshi? VP of Polartec research

eSpin has little money, unlike Finetex
 Most revenue from filtration
 Few sports garments - 25"
 Usually make single layer
 Make PTFE membrane

TRL 7 for Technology readiness level - garments
 200-300 garments . . . 50 garments in 1st round
 Buy from Jenopti

Make their own PAN - 40-50 lls

Will make Ionomers with new reactors
 Class 1000 clean room for medical grade
 62" line hasn't run since 2008

- used to make Vs, Kite - moved to China, Adidas, VF
 PU spin - solvent is proprietary
 Permit up to a level - would need thermal oxidizer
 to deal with emissions to run 24-7
 Either they invent or we buy equipment
 Goal is not to sell machine

Received 2 gsm material - very stretchy, but leads
 can add Fluoropolymer to solution
 - they buy from Dupont

Ashley - Chem E Engineer Spinning engineer is home
 62" machine speed?

Polartec wanted everything free

Moisture cure adhesives - 5% coverage - cure 24H
 or adhesive coating line

Adhesive fiber - bad air flow/pressure drop
 customers do their durability test (except Army)
 Electrospinning at Milliken - some lady

Jim to cover MDA project

Fibers: PAN, Nylon 6, norene 6,6, F-, PBI, Sulfone, PA
 commercial is 2 polymer for filtration

PAN 0.8 for airline - replace Nomex

Electrospin can do 3 polymers/diameters/cross section

Kansas company does wind turbines

Have plans for 120" line

4-52 ft/min

Enterprise

8/10

Look at cassettes, get new baseline, remount
 Bayonet = Threaded + 12 screws + 3 tabs + smooth
 Part is back all move together.



4 screws - omit one!
 - shoulder screws, no adjustment

Threaded ring acts as stop for bayonet ring
 Pulling should show gap between smooth ring and bayonet ring

Play in end ring: $3.683 - 3.741 = 0.058"$ (axial)
 There's wear in these cassette parts
 Inside edge is critical, outside edge shouldn't be affected by grinding

	engaged	removed	
Screen 8, Print side:	1.378"	1.378	3.550" total
9 PS	1.377"	1.378	3.540"
8 WS	1.372"	1.370	3.554"
9 WS	1.389	1.389	3.560"

8 has newest collar on wet side

8 PS 1.372" 3.551 3.552 3.560 / 1.383

9 PS 1.373" 3.547 3.548 3.549 1.376

10 PS 1.372" 3.558 3.558 3.560 / 1.375

. ~~8 WS~~ 1.372" off on 43bar on 6bar

3 → 6 saw ~ 0.006" change on 8 WS

8 WS 1.552 / 3.736 1.521 / 3.695 1.471 1.383 1.369

9 WS 1.459 / 3.634 1.436 / 3.629 1.425 1.397 1.385

10 WS 1.416 / 3.589 1.418 / 3.590 1.413 1.383 1.373

on on 5 4 3 2
6bar

11 1.395 1.405 1.430 1.440 1.449 back to 4

12 1.375 1.384 1.409 1.441 1.510

13 1.377 1.380 1.400 1.438 1.470

14 1.389 1.397 1.411 1.433 1.448

2 3 4 5 6

10:36 packing

up

~1 hour delay

ITMA 2019

6/25

MAHLO - Alan Lavorc

Most common - fabric distortion - optical
- shear and bow limit, warm, wet, dry...
camimage patterns on fabric

IR Pyrometers - 480F with no cooling \$1890
course count optical

Beta gauges - Enterprise Pendleton & Gillaspis
Airbags use NDC

Residual moisture - Ω or cotton
same resistance regardless of fabric weight
6-18 oz fabric works the same, measures %

Exhaust humidity

LED width control every 5mm XXXX//

- at edge of tent frame, outlet, how much it ~~is~~
Scanned sensing - any sensor measuring
center guiding

Hand held moisture monitor \$2500 Wira - may be dragon

SILTEX - laminating & coating Italian
uniform roll coats, on display
nobody to greet me - how did this get on list?

PIOVAN - rubber belt, 3 compounds offered
special machinery to make the belt (not ID)
incredibly nubile gray

Applicator can dye - that uniform
- not cheap

Problem is corrugation on FR finish - 3% solids
crusty dry on surface

Foam is under pressure - could do both sides

Should be adding lubricant - probably
evaporated working this since 1972

cost? Single applicator is \$300 - 325K 2 sides is 2X
would have to figure out a trial machine
that's wide enough

Magnolia has 3 units - one just replaced
won't foam alcohol

- don't need to. Use non re-wetting wetter

Phosphate of some kind

Putting chemistry on at Magnolia - water repellent chem.

Preston - we bought it wouldn't use it for dyeing

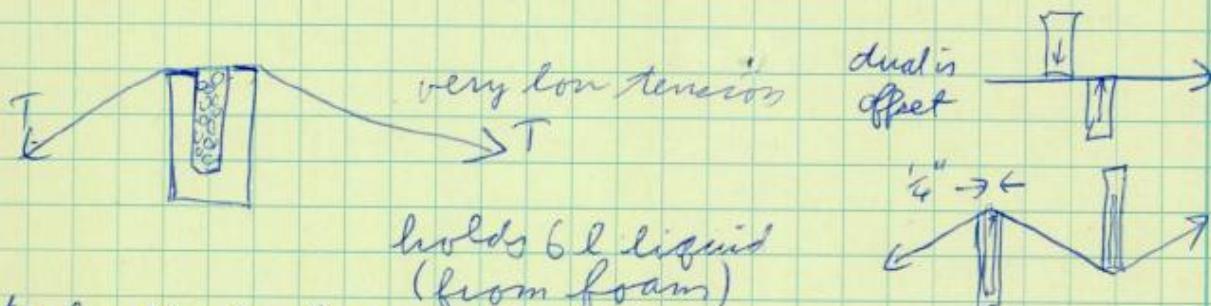
Parabolic foam coates @ enterprise, Gayley, Hatch, Sage
could meet at Stanton

Tent-tail warp project - sponsored by Wal-Mart

accumulator - 40-50 yards

working with P&A in Roxbury NC

Foam needs more dye, less water (dilutes with air)



turbo-flush: foam follows foam
no damage to fabric

did better than pad on uniformity S-C-S

Metering system to add chemicals into foam

Have soft rubber roll to feed VW into slot

integrated with R.A. Moore

Indigo dyeing for denim - laser treat to avoid
stone wash. No oxidation or wash boxes. Residence
time is N₂. "Indigo Zero" - sold 2 machines

Have array of applicators in lab - can prove out

Speed control in Sanforizer? Tension control, thread count via Mahlo or Vlava, overfeed control to 404PM in, 304PM out \rightarrow 25% compression (usually less)

DyeCoo - Chris Romanovsky & Steve Lubas are interested
prim per kg - \$200, but per fabric it's lower
<1% by weight of fabric vibrant great

BALDWIN - Wesley Clements - seems drunk
PW M nozzles to apply finishing chemistry
idea from Rich Stanford
why is spray penetration any higher?

AFFE - 8-9 processes in one
cutting, embossing, laminating
0.5 m up to 1.7 m
multifunction or dedicated model
£155K for big machine
max 400 strokes/min
scal pattern 60 m/hour 1 m/min
15 - 150 m/hour dep. on pattern
developed for leather
sharpen after 10,000 square feet 3X then replace
Jerry Gradaffi all made in Italy - Tuscany
brushless motors
13 years - sold 170 machines, 70% leather US & NY (leather)
factory in Tuscany was Pisa

MENZEL - Kent Bolick - in Spartanburg
MORRISON - partners Preston Aldridge
recommend measuring moisture online
UK Milliken interested in belt laminator
Made stitching for Hillcrest
could do plant tour - lots of custom design
NC state project to keep looms running while taping in warp
Dr. Leyam presented today
yarns split 2 ways - one end goes to tie-in machine
uses Menzel accumulators

Preston - talked to Hanna Lowell - Gaston Systems
 \rightarrow foaming technology
controlling moisture on fabric
foam on softener or water at 10-12% closed applicator

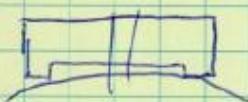
ITMA 2019

6/25

Only Milliken beam slips
 No spare between beams ??
 Rubber ring should help with slippage
 Proper procedure - preload springs, lock beam draft,
 release springs
 instruction book for machine

No springs in old system - >15 years obsolete
 - could retrofit on old machine

Are we sure it's beam slippage not warping problems
 Have had multiple visits for this problem



Lab technician on staff at Gilliland?
 He may have left.

Watch the drafting operation

11:50 SCHOTT & MEISSNER - thermal bonding up to winding
 Michael Stafa - not \hookrightarrow scale rec.

Jörg Eberle

Thermofix for acoustics

Alistair Deas - U.S. Rep - Allertex

Zack Kessler

\hookrightarrow Thermofix oven for honeycomb composite
 heat up to 200 min oil or electric heat
 up to 25 m/min sandwich panels

Lots of equipment - cutting, scatter coat, calendar

BRÜCKNER - tents \Rightarrow touches roll

Thomas * Moisture control: * WIEDERER

double shell steaming drum - concentric

Closed inner heating core @100°C prevents condensation

steam goes 100% onto fabric

40 m/min steam bus dosing limits - ^{not at 70 m/min} but 40 could work
 would recommend wet & can dry

would want to witness this Eros-applicator

BALDWIN - Swedish - spray applicator - individual

nozzle control - easy to clean - very precise

vacuum slot on cotton makes hairy surface

- PET staple maybe too

not familiar with hairy squeeze rollers - Mr. RUCK

ROBERTO on delicate products - low pressure - not durable at high pressure

Itma 2019

6/25

- Automatic powder dye dispensing for Pendleton
- H2-C105 - Menzel water control
- H1-A203 - Brückner shrinking machine,
- see Thomas, Ian, Fred
- XH5-D201 - Alt. ^{NW} SICKIN, Jakob Müller, Bianco, Tubetex
- ✓ - DIA Inc applicator
- A2-A209 - AEFPE H2-A209
- H1-B108A DYECOO - CO₂ dyeing
- H2-C207 MAHCO
- H18.0-B107 KARL MAYER - beam slip
- H15-D210 SCOTT & MEISSNER - Acoustics
- H2-C127 Siltex?
- H2-A204 Baldwin - spray system

KARL MAYER with Douglas McBurney & Mike Rose from Polartec

Tony Hooimeijer - President

Kay Hilbert - product manager Warp Units

Oliver Matthews

Michael Kierch

Kay: 4D beam 3 years ago start make 6 bar spacer fabric machine
EN - electronic drive for beams - next gen after EL 850 cpm
smart textiles spacer fabric driven by shoes but growing
Doug: upgrade? speed, width, pattern control

* Lutz Heinig mechanical engineer

- help used in elastic beams, not common


RADIUS
ON KEY
STOCK
ESSENTIAL!

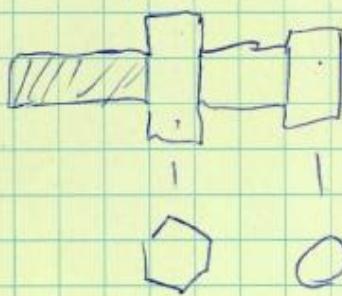
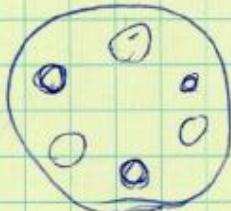


FLAT KEY
BREAKS OFF

- can retrofit, rivets
- screws common
- have jig to mount

beam coupling not from KM
U.S. uses 4.5" beams, others 6"

Fruit beams (AL) have no holes
usually sprung with disc springs

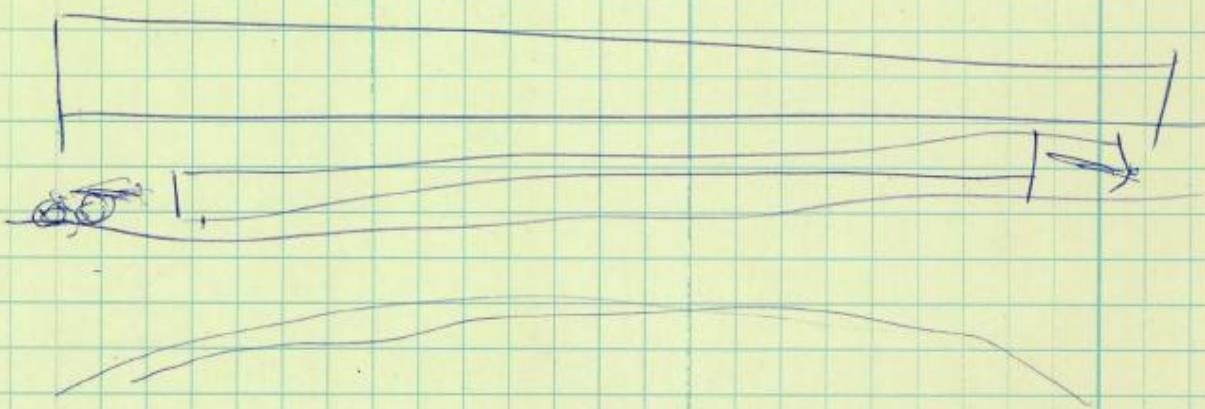
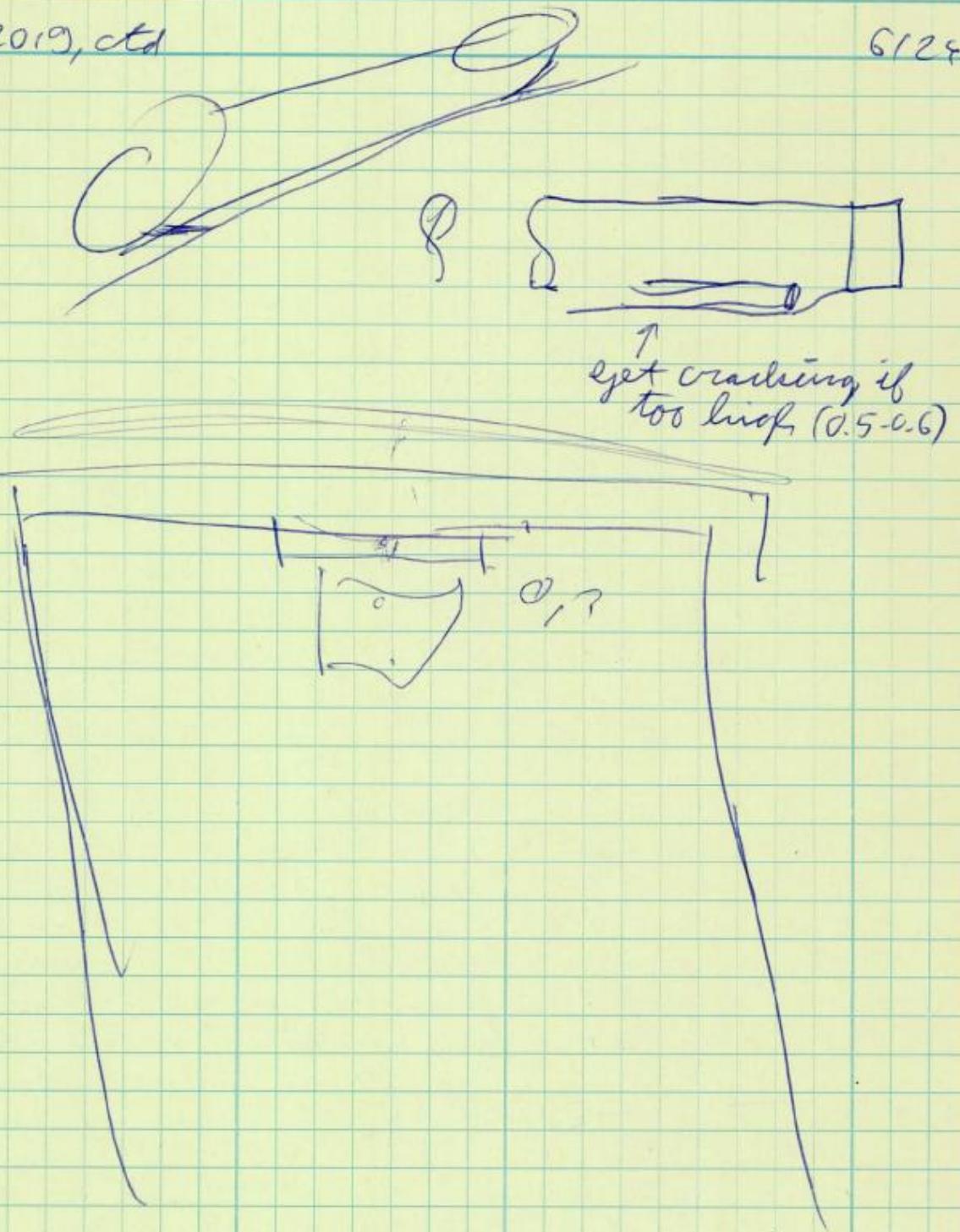


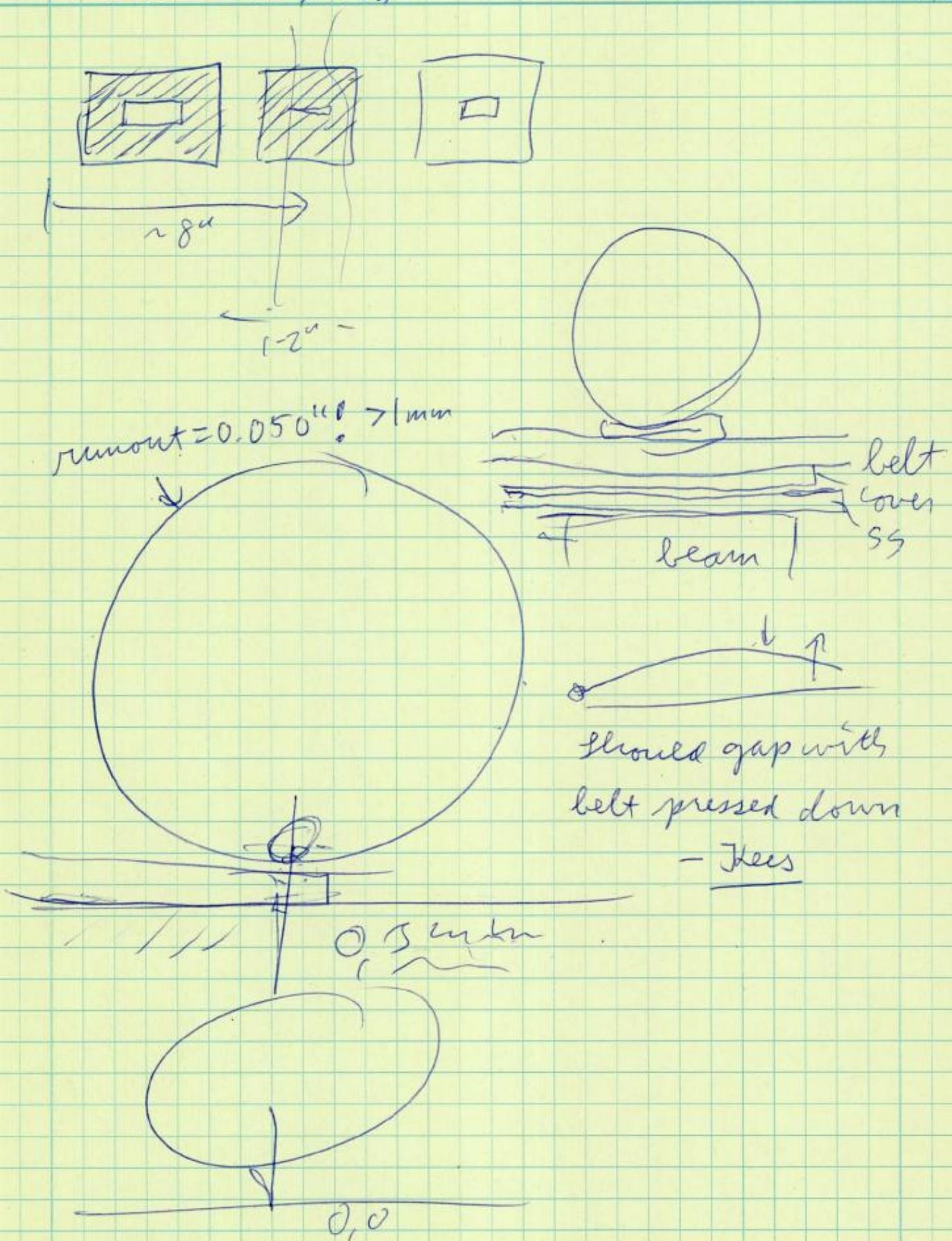
every beam has keyway
- maybe not in U.S.

Fruitting yarn may be
commission warped
- rent the beam!

ITMA 2019, ctd

6/24





Jhees - adjust 12 screws on springs to fix runout
 - but is that really true? springs are axial

IT MA 2019, ctd

6/24

SPG Prints - Henk Masselink - sold upgrade

Focus on end ring - reused or from client
 not glued in straight - could be out of tolerance
 should not be filing it down

Primary contact - Sangeeta - in Charlotte
 Sangeeta Sach dev

Presentation - new tech

Pegasus EVO, Ortho Screen rotary
 MEMS printhead, single pass prints, digital

Digital is cheaper under \$500-\$5000 per m
 - depends on # of colors. 1 color is easy on screen

Ortho Screen - match rotary to flat screen

Random Screen ECO

Digital: speeds going up, inks coming down

Another fish - splits cricket out of bush! Falls in water

Kees van Osten - sales engineer

Kevin very interested in this meeting - digital printing

Jennifer Harmon - specialty interiors - want prints

Javelin - €550K €3.2M for fast one

Enterprise screen printers upgraded 4 years ago

Europe is printing with blades

Nylon requires thermoplastic, not PVA

- buy from SPG

New Pegasus uses Sciemens touch screens & we have stainless shelves

Question around sprinkles in dryer

Sticks to 15/10 positions (5 unused - better sticking)

€1M, €12K for 15/10 vs 12/10

Kevin interested in another rotary, also digital

Springs inside screen head - 9 different ones

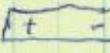
Squeegee designed for 18L/min - pump capacity

End ring should say Stork

Put screens in backward! Invitel LIR

Exchange screen heads

Set speed  normally +1.8% Promille

 belt is +0.18% faster than screen



Rolls synchronised electronically

There is a manual - ask Travis - e-mail Kees

Pressure set to 4 bars to match springs

Ortho screen should be released in 2-3 months



ITMA 2019, old

6/24

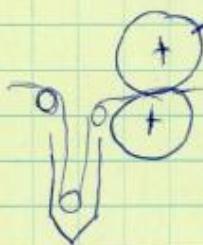
consulted - high end spray systems - may be too fine
- They will get back to me on brainstorming

ERBATECH - water extraction

Timucin Benal - Sales Manager

Rota spray system

5 roller w/ 92 shore - max is 70% moisture



can squeeze with special rollers
 fleece surface made by LTD
 Richard HAFF HOGGM company
 maybe 10% lower now German
 ROBERTO rollers KWF Hilger

ROLLIN - male rollers
 GOMPLAST - spanish rolls

vacuum - not good on cotton - more electricity
 they focus on knit fabric

PET - vacuum to 15%

- difficult on hydrophilic finished cotton
 wet on wet application of softener - heavy & light squeeze
 ↳ homogeneous moisture content

ZIMMER - Roland Graschitz

Innovations to prints:

- more accurate bearings. Enclosed ... use 3 points of support. Can retrofit their old medium which doesn't lock.
 - can coat back side of fabric
 - improvement to washing system
 - bar or plate over magnet. Bar rolls like S.P.G. plate scrapes. Plate has more DOF but works best for glitter. More work for operator.
- Registration? 3rd parties offer vision system
 His system stamp is registration at speed.

ITMA 2019, ctd.

6/23 ctd.

MCS & BREAKER MCS - Star Wash, Multiwash,
chem dispense, Dynamite Sprint rope dye

ALLIANCE - 3:1 liquor jet dye, not sold in US yet,
would work w/ Gaston County. Pascal Boisse. low tension

TUBETEX/CONSULTEX/TWP WAVE - ultrasonic wash box

Arne - split from Verbrat

TEMAFA/DICO

300-350 kg/m width @ 3 to 3.5 m

3D loftes - add up to 200 gsm extra fiber

Airlay - 5 turns \times 3 = 15 tracks

lay pattern on top \rightarrow 500 mm wide

Main card - negative pressure system everywhere
also has microguards on bearings

"NEVER ANY TROUBLE"

MATCH POINT TEXTILE - diamond Jet

diamond peach sanding machine

5-40 m/min

KUSTERS ZIMA Craig Newsome, Ken Krum

6/24

Lubras - general improvements / stretchy

raig: helper drives in washbox taken out by 2)
would've helped

They quoted vacuum improvement for mercerizes

Heat recovery sections from wash water - Torpedo

Ferr - not much R&D anymore, customer focused

Dry can circuit at Valway \rightarrow consulting
Wayne is contact \rightarrow broken into sections

- Buchholz

James Earles - asking about Mercerizer vacuum

continuous pre-scour? They can figure something out

Milliken has stringent specifications on TIR, etc.

Water recovery for entire plant or some ranges

Sustainability - have zero discharge equipment

Heat recovery payback usually < 1 year

Water extraction - pull roll - get to 50% moisture
with vacuum

Boiled into superheated steam box

vacuum slot is SS-innovation over plastic

Monforts - lots of technology

Alejandro back on 29th in Charlotte
PSP is Monforts distributor

jet dye

Suprater - horizontal with no lifter reel

- Smartflow TSF - 300 kg capacity
adjustable chamber - shrink width so it doesn't tangle
PET softens and collapses \rightarrow 300-50 kg

liquor ratio on cotton is 4.5 to 1

less electricity b/c lifter reel

adjust nozzle 1-5 mm

can run 450 m/min

run quick turnover - 60-90 sec on 100% PET

\hookrightarrow horizontal is ~~better~~ best for creasing

can order with Setex control - all are hostable
can add sensors

old Aqualuft ~~at least~~ 35% energy savings

faster cycle - 30% time saving w/ no change tank

water savings - more complicated

8:1 vs 4:5:1 water less dye - 10%
- even lower in PET (3.5)

COST: €125K base model

could work on a trial machine - take it back
if it didn't meet targets.

Make 1-6 ports (brochure says 9)

could sample 2 port

€350 - 380K for 4 port

Groz Beckert - asked for thinner patent needle
 \downarrow - talk about needle selection. A mes for everybody

6/23 Crealet / Rüti GEORGE NV DEGGER - Spartanburg exit 7

Sandus SYMTECH

Unit is \$6-7K, typically holds 44 ends, estimate
change 2x per week

Ran trial at Pine Mtn with Chris Durham that
didn't go well - old model, not enough tension
Also working on device for end tension control with
a stepper motor - out maybe this year

* Notify us when it's ready to try

ITMA 2019

6/22

10AM - LACOM - Arluis Schaire

gravure rollers on demo machine

epilopee lacom coaters offered to FC

82% coverage is max, with dots between the lines
- or solid

Sample: 100 gsm polyolefin

Automechan has one

down to 20 gsm w/ low viscosity w/differential speed
20,000 mPa·s or 30,000

= cps

impossible on nonwoven

lowest is water

Lacom evolution replacing what's at epilopee
→ coming to U.S. end of SeptemberGALVANIN - yarn dyeing TIM WALKER
have centrifugal moisture extraction for fabric
coming out of jetEPIC - Adam Laclain

- made ss belt for Superba heatset machinery
- replacement aftermarket parts for yarns
 - perforated metal - went to 2.38 mm holes to 1.5
- like to do wear part → punched in rows
- drags or sanding roll to smoothen
- perforate entire roll, cut to lengths (68 m)

Focus on ICBT equipment

catalog on website

add support & expertise, like to visit ~50 employees

twisting & heat setting stock in Dalton

reverse engineer & source 23 agents in 23 countries

Shaw & Mohawk are largest customers

corporate discounts for >\$20MM - 15% rebates

Adam visits often

Universities UL under highway hall 6

Aegteles has (cheap?) vision system

Orety - Stefaan Peclenkle - Hemp processing

- we would buy bales, but good perspective

Pizza & pasta near Monforts? looked good

Enterprise

6/13

8:45 Pre-production

check run-out

by tape |
wet, up | HP, up-5
6
7

8	$44 - 49 = 5$	$45 - 60 = 15$
9	$58 - 71 = 13$	$59 - 67 = 8$
10	$43 - 54 = 11$	$74 - 80 = 6$
11	$48 - 55 = 7$	$78 - 73 = 15$
12	$42 - 50 = 8$	$56 - 69 = 13$
13	$41 - 55 = 14$	$59 - 75 = 16$
14*	$41 - 60 = 19$	$50 - 69 = 19$

①

+ has new gear, same housing.

① Not perfectly + due to reads

Prints is SPG (Stork)

+ moving tank

Rebuilt bearing in 13, replaced 14 on
yesterday, 6/12, increased suction on belt vacs
Added cover to vac blower bowl

Measure sides of screen runout - too risky, no good fixtus

Pumps are STORK type SB 7-G SH Pump # 2015-45641 etc.
with Baldor 1 0HP motorsInk not printing all the way to end - μ may be too thick

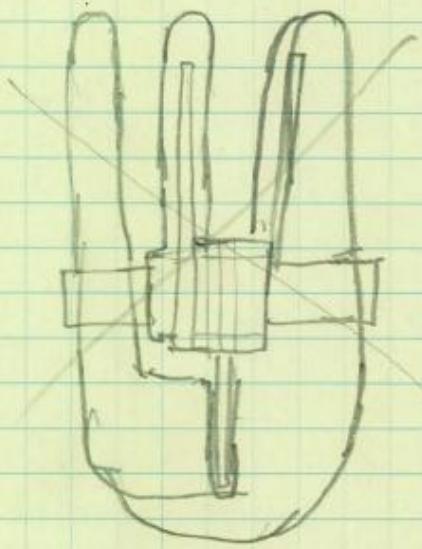
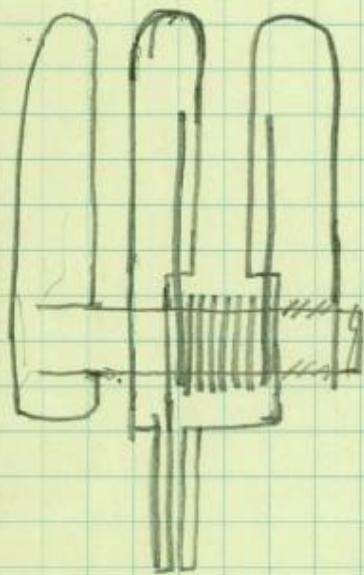
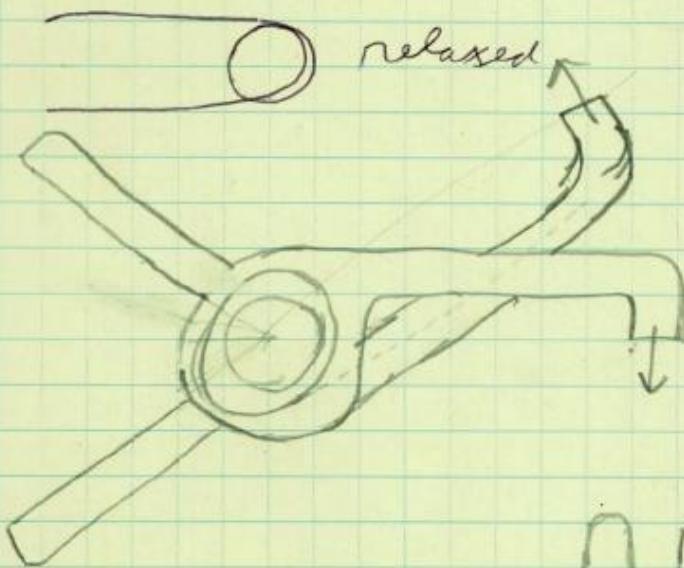
10:42 Screen 11 has speckled appearance on wet side

Brief OOR on edge - glue wasn't hot

End plates - make 10 more sets (20 total)

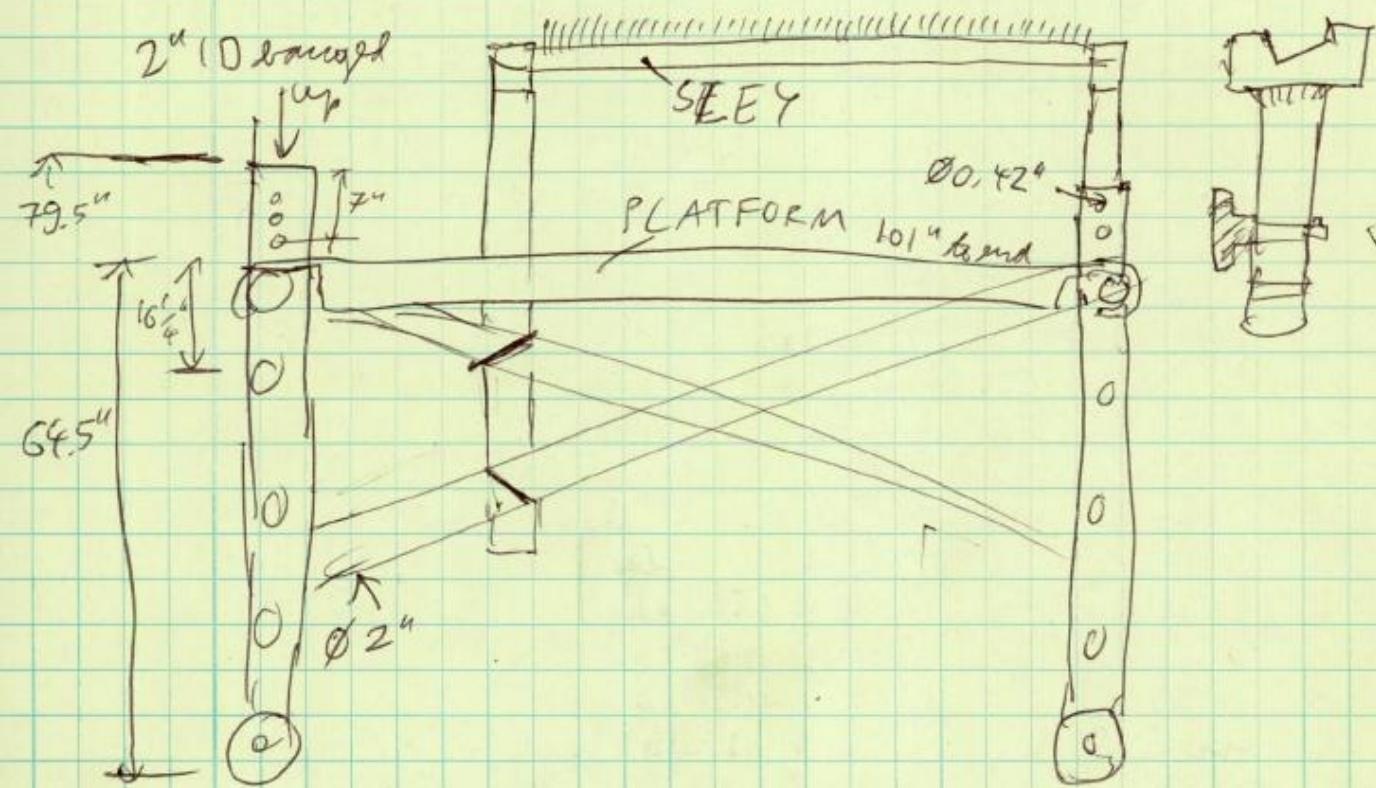
Gerrish - Floppiness

6/6



Gilliland, etc.

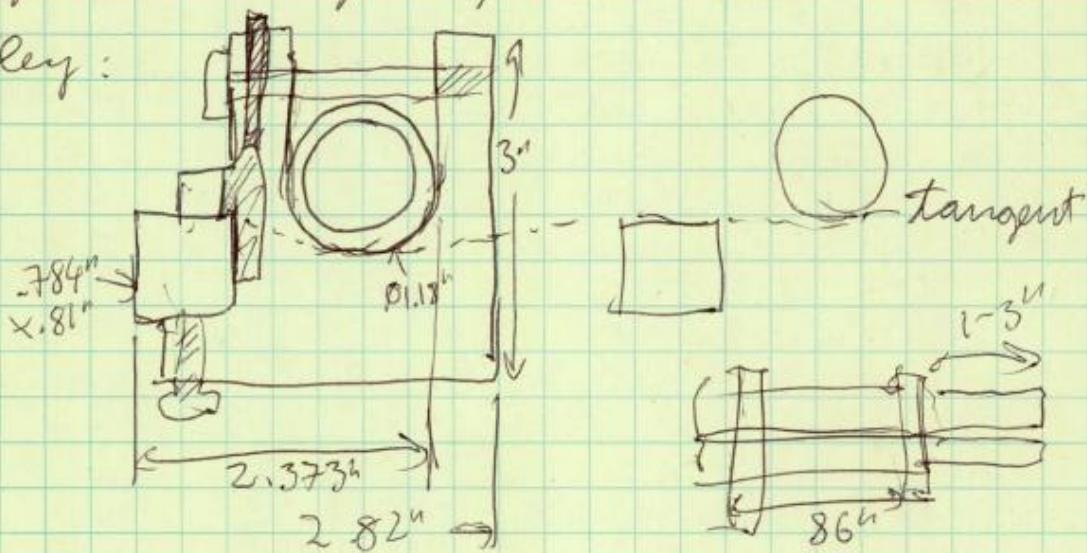
5/29



current: 30" deep + wheel,
beams are 72" x 40"

Machine: Beams to cage = 45"
space to fit in: Posts-beam 27"
beam street height: 100"
sley width = 91"
good working height 45"

Sley:



5/29

Gilliland

- #1 14 hours to thread 18 gauge machine
 - 554, only one, 256" wide
 $256 \times 18 \text{ yarns} = 4450 \text{ ends}$

Current: pull front stay wire out
 lay yarn in each dent
 have to slide stay wire as you go
 most often try to split 18 gauge
 18 gauge every warp-out almost every 8-9 days
 too much risk in splicing

Big books GB 523261

Thread repeat parts (ST guides) Malimo KL-1B-107-78
 Malu 3" wide
 Normally 2 thread 2 x 8 hours
 probably spend most time pointing up & taping 56L
 leaves 2-3 hours to be improved
 Not ergonomic
 3 other machines - narrower - very different

- #2 Catwalk to work from up top? Point-up up top would be better
 - position bar ~8' high, also need catwalk

#3 Talked to Gayley & Boiselle

Keypod washers

Boiselle used keypod shaft

"Keypod" shafts popping out - on hold
 MAYER collars - not torqued at Gayley
 different tightening bolt

Gayley - all they use is Nylon washers - Dustin - PI?

try to reduce beam slippage

They have split shafts, we have 80% single shafts

Washers: \$6.95 each waterjet cut outside

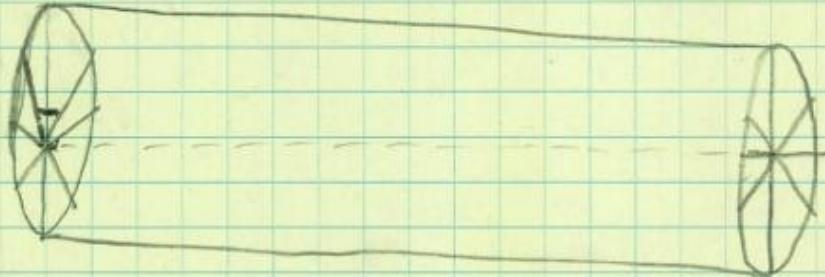
$$\times 500 = \$3495$$

5 sheets \$2500

Rubber washers \$15.50

Enterprise - Green Mechanics

Some screens are eccentric up to 0.052" (1.3 mm)
 Screen diameter is 8" (204 mm), circ 25.2" (640 mm)
 Pattern repeats every 87 mm
 worst gap range is 1.1 mm (old trial)
 0.7 mm (after adjust, film too wet)



$$\text{+} \rightarrow v_2 = \omega_2 R_2$$

$$f^R \rightarrow v_1 = \omega_1 R_1$$

is $\omega_1 = \omega_2$? $v_1 = v_2$?
 ↳ v_2 varies ↳ ω varies, screen torqued??

If velocities vary, pattern has microslip
 Rod fixes screen → all slip found to end

If ω varies, but velocity is constant, screen prints perfectly - system overcomes eccentricity. But can't act like nothing happened!

All depends on runout when it's engaged. At what point was the gap set?

Janesville, ctd.

5/21

11:13:10 in / :15 close 14:15 open

transfer with PTFE on top C1024.3

14:37 mold with PTFE close

→ probably zero air perm, smudged/closed channels

Probably take a few weeks to get this testing
After Vienna, Camry - 2022

Janesville

5/21

$$\text{lengths} = 96" + 50" \quad 1^{\text{st}} \text{ practice } 146"$$

$$371 \text{ cm} \rightarrow 140 + 140 + \text{practice} + \text{practice}$$

$$34\frac{1}{4} \times 17\frac{1}{4} = 2.1$$

440 @ label side, along extrusion

$34\frac{1}{4}"$ wide

IR oven: top 325 actual 366 \rightarrow set to 400
bot 450 actual 449

Dan Rauchholz, Todd, Mike Weatherholt

Do mostly contact heat, not much IR

Mold #2.2: 18.5" x 34 1/4"

280°F air Temp

10:04:20 go in 5:40 out 6:10 close 3mm gap
#2.1 \rightarrow 435 860 wide vs 870 ~2.9 mm

Mold #2.2 at 450°F top/bot, air is at 389/380°

air for 1 min

in 10:14:57 16:10 out 16:30 close

2.2 \rightarrow 442 32.75" wide $32\frac{1}{4} - 33\frac{1}{4}$

#2.3: 1413 mm along label film edge x 34 1/4"
temp 450 top, 400 bot

10:29:01 in 29:13 fully in 30:16 - 30:24 out
30:46 close

\rightarrow 2.3 is 1400 after 0.9% shrink
width is $33\frac{3}{8}"$

250+92 = 342 cm long C1024.1

L = 140.5 W = $34\frac{1}{4}"$

same settings: 450T / 400B

10:47:12 - 25 in 48:35 out 48:50° press (video)

C1024.2 a little warmer - 360°

10:54:05 in 55:10 - 55:18 out 55:34 close

C1024.3 - leftover 610 mm

C1024.5 - mold 450/400 350° surface

in? out 11:03:28 - 32 :50 close

a bit folded - had to adjust (wavy or press) more AP?

C1024.4 - 1A = 06 close

11:07 mold C1024.6 on hot press 60sec @ 410°F 6mm

11:08:49 lift 8:08 close

\rightarrow spread away film

Enterprise

Measure TIR runout on screens
wet side (\leftarrow) \Rightarrow HP side
7 - 15 mil, nut was loose

8 - 7 mil, 9 - do-over on tape

$$9: 23 - 44 = 21 \text{ mil}$$

$$37 - 43 \text{ next to tape} = 6 \star$$

$$10: 1 - 25 > 24 \text{ on tape}$$

$$90 - 8 = 18 \text{ next to tape} \star$$

$$(11): 78 - 36 = 22 + 36 = 58$$

$$73 - 27 = 27 + 27 = 54 \text{ no tape}$$

$$12: 70 - 30 = 20$$

$$75 - 92 = 17 \text{ no tape}$$

$$13: 16 - 7 = 23 \text{ tape, jumpy}$$

$$27 - 40 = 13 \text{ no tape}$$

$$(14) 57 - 109 = 52$$

$$75 - 127 = 52 \text{ no tape } \} \text{ bumpy}$$

$$14 \text{ with line #7 OCP7 screen}$$

$$83 - 120 = 37 \quad 5\frac{1}{4} \text{ in, past tape}$$

$$80 - 113 = 33 \quad 18 \text{ in}$$

69-76, mostly 69-72

38-60 18"

23-42 10.5", no pattern

-8-10 over bend

74-90, mostly <80

Zeiss Microscope Training

Power on

PC: rmc micro / Smartzoom 5

Wait for blink to stop (solid bln)

Smartzoom 5.exe

~ Be administrator

- Routine Exam <reboot abundly

- Acquire Overview

- Apply!

- Image Process - Stitch

- Auto Focus

- Set zoom by zooming in or setting in dropdown

- Image Process - stitch - [F] + on

- zoomout & select area

- acquire ... wait

- Add tool & measure

- Configure ...

- NOT "Save",  button & save image (as JPEG)

- Click "LIVE"

Look at camo fabric 0984 vs 1437

Stitch entire image @ min resolution

#1 Epoxy - Epoxy Casting, cont

4129

34g LY190 + 54.4g LS25LV 11:52 AM 4/29
 (54.6)

11:40 - put in oven @ 100°F

11:57 - set to 180°F 12:58 - cured solid

31.4g LY190 + 50.2g (50.5)

13:05 - heat to 150°F

13:12 - raise to 180°F -

13:18 - still runny

13:28 - still runny

13:37 - runny, go to 190°F

13:50 - take out

Thermoforming 400 in, 450 out

516

C1022 200GSM plate samples: left @ 25% / 40% heat
 500 in, 450 out → 72 sec (epoxy spot)
 25% / 50% - still took 70 sec! (epo/elt/metal)
 25% / 40% - 68 sec. Maybe 200GSM just takes longer
 (epo/elt/metal #2)

C1023 #1 - 25% / 50% - 47 sec lots of air flow

#1 Epoxy - Epoxy Casting

4/26

Try to mix Lindan with fumed silica

Hydrophobic: AEROSIL R812 degussa

Hydrophilic: CAB-O-SIL M-300 Cabot

3.47 g A : 5.55 g B. 9g total

Both go in - hydrophobic a bit easier, also was less lumpy

On 2nd thought, Cabosil is better,

11:22 start heating

11:35 confirmed @ 200°F

- not running! It works!

Epoxy down fabric

400.6 g A 64 g B = 16 PPA

Add 50g B (12.5%)

1.5% thin = 6g → glue fabric on

$37.53 \times 0.16 = 6.07$ 0.1 = 3.8 g 0.3 = 4.3 g

→ molded patches of 670 MT
with red silicon mold

Try again w/ good mixing

4/25

Lindan 11.31 g A : 17.60 g B 28.91

$13.12 \text{ g u/ Q-Tip} = 0.54 \text{ g}$ + 0.61 g (6%) no

→ 1.27 g Cabosil (4%) 7% - no, done

Not thickener 8% - good

10.69 g A : 17.10 g B

12.76 g A : 20.41 → 34.17 g

△ 3.31

add 2% = 0.68 g Cab-O-Sil M-5

1% = 0.34 g not enough

2% = 0.68 g thicker

3% = 0.51 still not thin

4% = 1.36 more

6% = +0.71 pretty good!

Mix again - runny again

7% - good!

care small amt of each 10:36 A in 200°F

10:46 → 190°F 11:02 → 250°F 11:24 → OFF

try letting sit for 24H..

Enterprise Leveling Day, ctd

814

- | 10:05 | Put guards on 5, 6, 15, 16 and installing last trays | | | |
|---------|----------------------------------------------------------------------------------------------|-------------------|-------|---------------------------------------|
| 10:24 | Inserting plastic magnet protectors | | | |
| 10:27 | Screwing for feeler gauges | | | |
| 10:30 | Ready to start head level | | | |
| | Magnets NOT on when gapping
gap measurement is over "soft" area - | | | |
| | "Magnet sleeves" - Plastic pieces to protect back of
the belt - push up on belt | | | |
| | No sleeves over rollers - first & last parts | | | |
| | Tommy to gap dry belt - I will record indicator
as-is and with pressure All units in mils | | | |
| Print | Wet | | | |
| Part | as-is | w/pressure | as-is | w/pressure |
| 7 | -0.004* | -49 | -10 | -77 |
| 11-40 | +0 | -60 | +1 | -42 |
| 9 | -6 | -71 | -5 | -69 |
| 20 10 | +0 | -26 | +3 | -25 * 2 point pressure
due to rock |
| 1241 11 | #1-24 | -80 | +1 | -49 |
| 2-03 12 | +2 1/1 | -50 ** | +2 | -23 ** rocky, not
stable |
| -25 13 | -12 1/2 | -35 ** (-20% -80) | +1 | -60 |
| -43 14 | +1 | -42 | +4 | -28 |

→ puts on guards, float gears, etc.
Not sure, but note, say most breeds level 0.04°, worst 0.13°
Head 14 is best on level - 0.01° both sides

3:15 belt is moving
3:28 fabric or belt (triple printed reader)
lowered screens - bars didn't pop off loudly when screens were placed down
crackling is normal - thermoplast - stopped @ speed

3:59 some colors out at start - corrected just before end

4.24 second production strike

Screens 9 & 10 were worst - couldn't get into fit

Chad Tressley - did most of the adjusting

Run diagnostic on 10, 11, 12 @107PM

-raise screen D

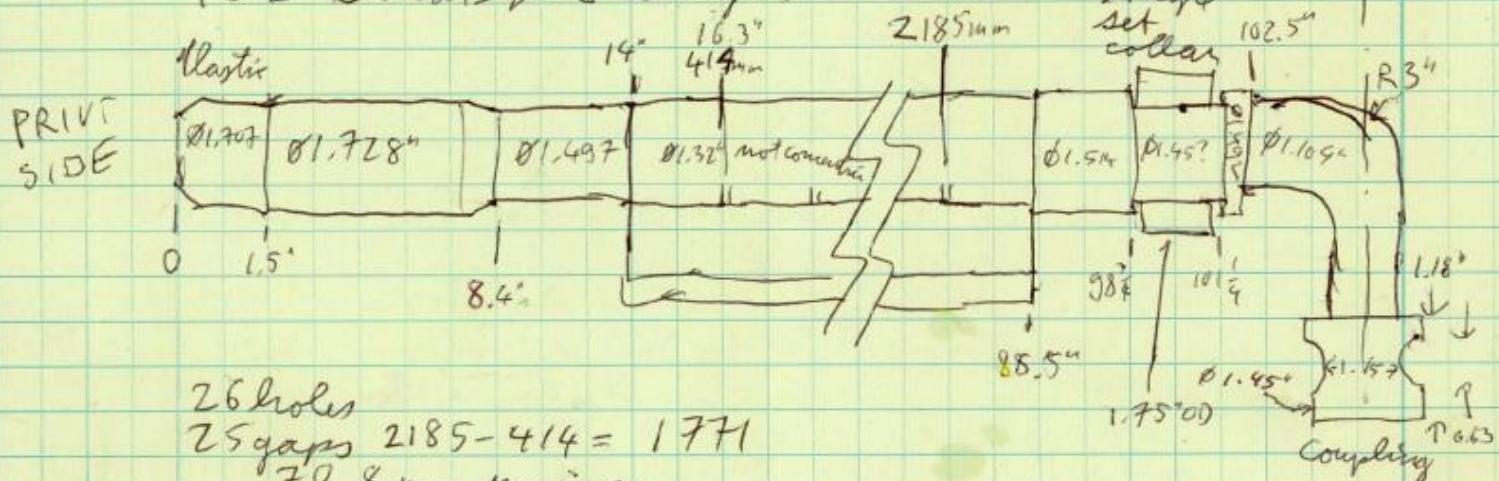
- Raise screen ¹⁰

- Clause 5
- go 307pm

Fabris is 0984 non-dark shade

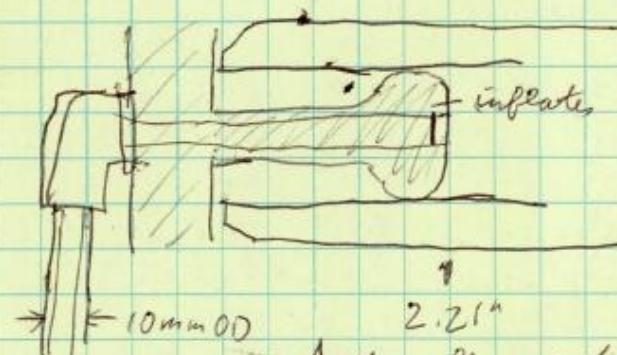
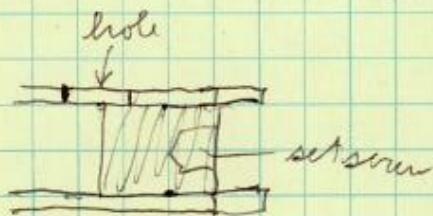
Enterprise Leveling Day, ctd

Squeegies: 1D 0.982", 0.986", 0.983"
102" straight lengths

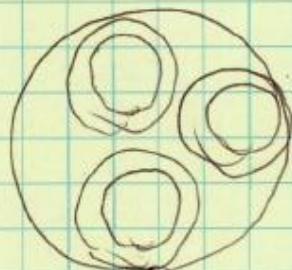


8:20 AM - almost done. Check front to back slow print wet

7	0.27° up ▽	0.27° ▽ up	AFTER: 0.01° PRINT!
8	0.04° down △	0.07△	
9	0.09° down	0.05°	
10	0.06° ▽ up	0.03° ▽	
11	0.09° △	0.05° ▽	
12	0.05° ▽	0.13° △	
13	0.10° ▽	0.10° △	
14	0.03° ▽	0.00°	



Actually seated
with 0.68" gap, 0.66", 0.75", 0.70", 0.89" (worn)



8:54 waiting on someone to get back

9:18 fixed #7 tilt - $0.27^\circ \rightarrow 0.01^\circ$ but tedious. moved to 619,
now need to raise to 622

9:44 Everything 623/622. Putting traps in.

SQUEEGER: little foam ball forced in when filling
air pushes it back to ~~off~~ save pasti

- Squeegies cleaned all the time for ink swap
Tommy's wins pretty impresses

Enterprise Leveling Day

4/4

6 AM - had to take more parts off, a little behind
 leave new optical survey equipment to set lots
 623 mm is average height

dry side was 1-2 mm lower - could make
 incline run that way

dial indicators - zero is 0.3 mm gap
 only read to $-0.012''$

... I would've liked more range, set to $0.100'' = \text{zero}$

- but this is simple

gauge is offset about 1" from center

everybody here - Gordon, Sutrell, Tommy, Paul ... 10 ppl
 $0.3 \text{ mm} = 0.0118''$

gauge reads $-0.012''$, won't engage

Position 7 - incline is $0.40''$

<u>14</u>	$0.02''$ on dry side	wet
7	$0.26''$ on dry side	$0.23''$
8	$0.02''$	$0.04''$
9	<u>$0.10''$</u>	$0.12''$
10	<u>$0.07''$</u>	$0.13''$
11	$0.04''$	$0.04''$
12	$0.15''$ up ▽	.
13	$0.15''$ up	.
14	$0.14''$ up	.

Beam heights varied from 620-625 (5mm)

slope across mostly 1 mm but ~~some #8:5!~~ #10:9!!!

#11-3 #12-4 #13-1

PS = print side #10 is 616 on PS, 625 WS

bigger gap to level on ~~Wet~~ side - flow to wet

7:15 starting wet side beam 7

Belt width is 80", height measurements - 70" apart

2 mm over 1780 is $0.29''$

Previous setting was with level beam to beam

- probably good in MD, not in CMG

- then set 8, 9, 10 "by feel"

methodology should be much more precise

Set head height for every style? Hopefully
 won't need to. Bolts should at least be fine

thread. Lock nut makes it tough. Frame is tapped

Also sets stop in retracted (up) positions

working on 11-wet side bit - close ~10 min, each pos

#1 Echo - Materials

3/29

Try various materials and adhesion to SS

Onyx FAST: Mix 1:1 vol Pot life 2.5 min, cure 10 min

1.2 A to 1.0 B by weight dark black

tare cup @ 8.67 g

15.53 g \rightarrow 12.94 g B

15:11 mix

Pretty runny - self leveling - but then stays there
some bubbles from shearing

tacky at \approx 4 minutes - peels cleanly off PE

strong ad to SS *Result: very hard, stiff but flexible.
could de-bond - would help to roughen surface. Smooth fail. Slow rise

Smooth. Set 960 Mix 10 A = 1 B by weight

19.28 g \rightarrow 1.93 g

~~Lime~~ Mint green. Bubbles pop & disappear.

Clearly more viscous. 15:27 pour

spreads slowly 15:50 still smearable

* too soft. Could use as mold material.

Epoxy Acast 670 HT 100A : 16B 350°F

slight epoxy smell

26.1 g \rightarrow 4.18 g B

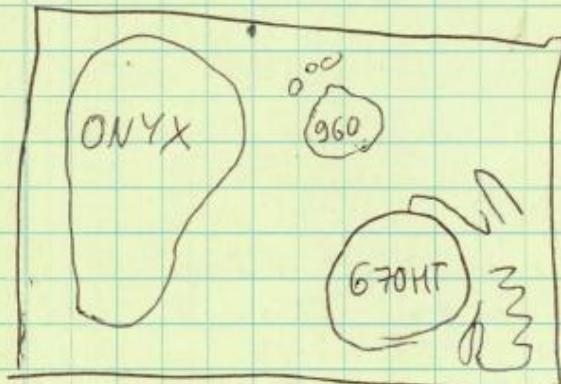
very long pot life - 3H

Almond color

* Result: very tough. Tendency to chip. Couldn't debond.
Pic in beaker was very flexible.

670 HT and Onyx both well suited.

Onyx is less viscous, harder, lower temp, less flexible,
less brittle (likely to change with post-cure), much quicker
setting. Lots of trade-offs.



Enterprise Trial #2, otd.

3/8

Wet side: 9 - solid support

- 10 - firm downstream, some tilt \Rightarrow
- 11 - low? (not as bad as dry side)
- 12 - some give
- 13 - some give
- 14 - firm $\Delta 0.19$ downhill
- 15 - rocking?
- 16 - rocking same

Gaps set to 2 mm right now on head

3:25 PM - one screen back in (Head 10)

Head 12 won't go in again - grind down some screen 11 has a crack

Now filing screen 3 lip will hand file

3:41 PM - finally in there

3:45 fabric on belt

Start 10 7PM

stop to jog green

\rightarrow no big effect

now adjust head 12 shown is here

CMD: far R corner is low $\Delta 0.12$ MD $\Delta 0.29$

MD ~~0.29~~ put in KK

$0.22^\circ \rightarrow 0.01^\circ$ MD, 0.01° CMD:

0.01° on dry side too

Raise & lower = 0.02° MD, 0.05° CMD

... some variation, level roles... def. $< 0.1^\circ$
adjust 12 reg.

turn off pumps - R ran out

Enterprise Trial #2, std.

3/8

Move magnet so 12 sits on rim.

H12 MD up	-0.03°	down -0.06°
	-0.03°	-0.07°
	-0.06°	-0.05°

11 is now on guard ever so slightly

Better level: mounted to bar

stand up 2" on ends ~1" in

Patrick Sutrell - new PI mgr - came from Hyundai, Helenst
operator: Joshi - broke magnet

Jesse - was here last time

10:18 - leader coming in

screen 10 is red 11 is green - 12 is blue

leader - pretty good

Good 20.

5 marked

20 early & late

raise, lower

5

30 early & late

raise with levels 10, then 11, then 12

all at 5

let with run down ... won't run out
in time

- sample start, mid, end

Ray 150 yards

$\frac{2}{2}$ set. Run 0984 - Non base shade
CMD MD

Head 10 $\nabla 0.21$ (dry is high) $\Delta 0.09$ (downhill)

11 $\nabla 0.09$ " $\nabla 0.04$ (uphill)

need to press!

$\Delta 0.24$ w/o pressure

$\nabla 0.08$, $\nabla 0.11$

$\Delta 0.21$ no pressure

12 $\nabla 0.07$

13 - some give

14  back corner touches

15 good but narrow?
all on dry side

Enterprise trial # 2, ctd.

3/8

Head 12 MD	down:	+ 0.03°	up:	+ 0.01°
		+ 0.04		+ 0.02°
		+ 0.04°		+ 0.02°

	1 st	2 nd
Head 5	A - 0.08°	- 0.03°
6	- 0.06°	- 0.01°
7	+ 0.01°	+ 0.01°
8	+ 0.05°	+ 0.09°
9	+ 6.08°	+ 0.15°
10	▽ + 0.20°	+ 0.23°
11	+ 0.08°	+ 0.01°
12	+ 0.07°	+ 0.10°
13	0.03	0.01°
14	0.03	0.03°
15	+ 0.03°	- 0.01°
16	+ 0.02°	+ 0.04°

up, fixed, don't work

Screens in & up, move magnets outside

H10MD	+ 0.01°
H 11	+ 0.17°
H 12	+ 0.13°

Note: having trouble getting screen 12 in place.

12 is higher - don't need magnet

gap $\approx \frac{1}{8}$ " - took photo on beam 1, $\frac{5}{16}$ " on beam 2! * between heads
move to wet side (1^{st} time)

12 gap beam 1: $< \frac{1}{16}$ " beam 2: $\sim \frac{1}{8}$ " maybe $\frac{3}{32}$ "

Head 12 wet side up: $\nabla - 0.18^\circ$ downhill!

H 11 wet up: $- 0.04^\circ$ down!

H 10 w up $- 0.30^\circ$ down:

cut Al bar to length, - won't need magnets

9:52 - screen 12 fits not turning

10 MD dry side up: $- 0.01^\circ$ down $- 0.13^\circ$ A
 $- 0.02^\circ$ $- 0.14^\circ$

0.00° $- 0.12^\circ$

11 up: $- 0.19^\circ$ down $- 0.19^\circ$ A

$- 0.18^\circ$ $- 0.20^\circ$

$- 0.19^\circ$ $- 0.18^\circ$

H 12 on metal pin up: $- 0.17^\circ$ $+ 0.20^\circ$
 $+ 0.20^\circ$ $+ 0.18^\circ$

OK from

Enterprise trial #2

3/8

Measure level-ness

cross beam at entry: 0.25° bi on ~~p~~^{dry} side,

Air bladders on, no screens,
 head 5 front dry side: -0.03° } (print bi
 1^{st} beam -0.02°
 -0.07°
 -0.08°

 2^{nd} beam 1^{st} 2^{nd}

Head 6 beam 1
 beam 2

-0.01°
 -0.02°
 -0.04°
 -0.01°
 -0.01°
 -0.04°

(print bi

dry side

Head 7 beam 1 beam 2

Head 7	$\sim 0.03^\circ$	-0.02°
8	$+0.06^\circ$	$+0.13^\circ$
9	$+0.13^\circ$	$+0.12^\circ$
10	$+0.25^\circ$	$+0.28^\circ$
11	$+0.11^\circ$	$+0.09^\circ$
12	$+0.10^\circ$	$+0.16^\circ$
13	-0.01°	$+0.02^\circ$
14	$+0.03^\circ$	$+0.07^\circ$
15	$+0.02^\circ$	$+0.07^\circ$
16	$+0.07^\circ$	$+0.06^\circ$

Head 10: 0.03° sloping up }
 11: 0.14° up } MD
 12: 0.03° up

MD with bladders down

10: 0.10° up, 0.13° 11: 0.13° up12: 0.02° upraise 10: $+0.02^\circ$, drop $+0.12^\circ$ $+0.01^\circ$ $+0.13^\circ$ $+0.02^\circ$ $+0.12^\circ$ down 11: $+0.13^\circ$ up $+0.14^\circ$ $+0.13^\circ$ $+0.13^\circ$ $+0.13^\circ$ $+0.13^\circ$

Gernish Trip #2, otd

3/1

Causality is reversed:

Fabric passes over temple

- tension(warp) increases! (counterintuitive)
- warp elongates, reduces crimp
- filling crimp increases
- filling length decreases
- fabric narrows in

On CC side:

- selvedge is floppy
- warp yarn must be longer
- no plastic draw, just less crimp(warp)
- more fill crimp
- less fill angle
- denser end count

nudging propagates back and increases μ ?

Edges have more friction in temple?

- pulling at an angle 

fabric thicker
more drag?
→ amplifies

For effect to be greater:

- warp is ^{other} looser, thus tension increases more
- warps elongate more
- filling crimp more
- filling pulls in

Then, fabric passes over drive and relaxes

- reverse effect
- warp contracts, increases crimp
- fill crimp decreases
- filling length increases
- fabric gets wider?

On edges, esp. CC: more of same?

- warp contract more??

Gerrish Trip #2

3/1

could do 3-finger floppiness devin on loom,
 pin masking devin for lab

try variable dent per inch reed - chunk

Louie's ideas - chain temple, caterpillar temple
 - catch yarns better

chunk to measure bow & length on 49x49, 53x53

jet side always worse than catch cord side

Pick count: Lumaometer Type F
 Fulcrum & Associates San José, CA

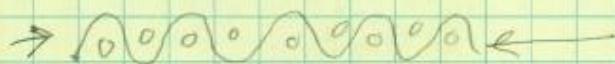
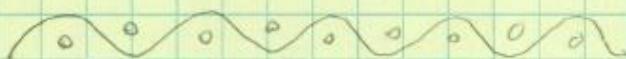
What happens to crimp?

At insertion/bend-up:

- ends of pick are loose, esp. catch side
- selvedges are floppy, warp yarn longer, fabric picks-ups (bow)

Going into temple bar & beyond:

- fabric needs in. Warp yarns at edge slope the most.
- Warp is denser on CC side
- If crimp is in fill, trying to redistribute to warp, fabric would get wider!
- ~~In~~ Today, ^{fill} warp yarns have more tension than warp fill and want to relax
 - Fabric wants to contract
 - warp yarns get closer
 - fill crimp increases
 - warp crimp decreases?
 - warp gets longer??
 - effect is greatest on edge??



Warp tension increases to takeup

- temple bar becomes (less) passive

Timmer Visit, ctd

2/27

INK is circulating through print head, down to the nozzle

- not needed in reactive & acid
- uses piezo array

Print head reconditioning

A level: 0-5 nozzles failed

Offer head performance center

Temperature control system for ink & extruder ports

No Mickey Mouse medium - stiff structures - I^3

double CMYK for double speed

Coloris pigment - 6 colors

140 - 1060 m^2/h

Open ink system - buy cheap ink elsewhere

Pigment.

4 to 20 g/ m^2 ink usage

Jennifer wants to do some trials

Small footprint - not a range

10: ~~4:05~~ in 55:10 - 55:16 out 55:34 close

a little warmer - 360°



Colaris, digital printing
 Reactive, Pigment, & Vat printing
 Colaris is next gen to Chromajet
 Klagenfurt - analog: coating, screen print, Valway coates
 Kufstein - digital
 Gordon Cannon calling in, K. Brown stuck in Mexico,
 Ed Lawrence, Dana Larson,
 Jennifer Harmon, Todd Moore
 Zimmer steamer & cure oven
 Kufstein: Textile, floor covering, narrow, digital functionality,
 specialties
 ink jet growing at 18% CAGR 3% of printing is digital
 - print fleece, nonwoven PET
 digital is 57% sublimation on (PES), low light fastness
 ink prices must drop below \$20/kg
 Reactive printing - dry 3X
 Pigment printing - dry 3X, but no water
 need to still drying some water but dry → g
 Need to pre-print to reduce migration, bleed, penetration
 post-coat for rub fastness
 Vat printing for cellulose HSO, dark shades
 lots of water high end products
 We print vat on screen printers (on NyCo)
 can be digitally printed
 acid printing is 4th option - not Zimmer
 Uses Fujifilm Dimatix Solvent head (in Colaris)
 4 head sizes
 4 to 96 print heads

Lestrales - Gilliland

2/18

Gasket problem - Beams run 10 days, slip 1x per shift

Designed to slip

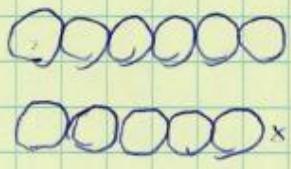
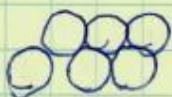
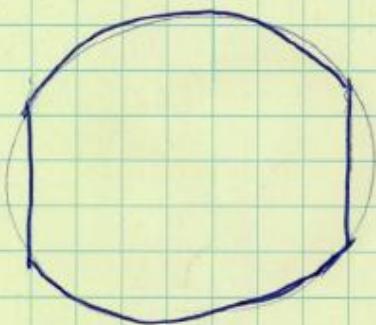
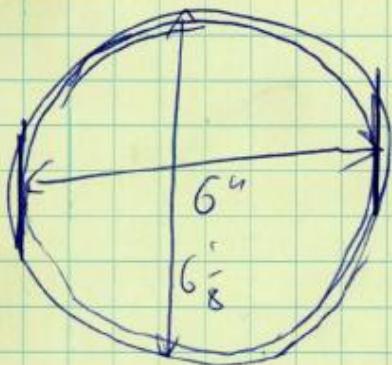
Beams can be 0.3" off in circumference

4 ply currently used on large gaskets (d15")
and thus don't wear

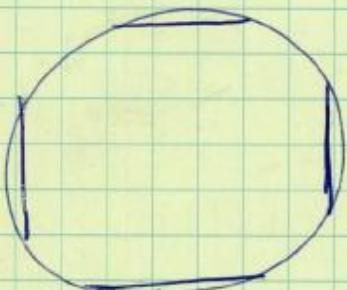
Rubber is better than metal

8 washers = 1 set

Wear resistant Nylon, Polycarbonate



Make it $6\frac{1}{8}$ " for trial



How many in use? CH guess: 150
→ last about 1.8 months on avg

Marlin: 653

Elizabeth: yarn is too thick, I would rather pass

2025 growth opportunities: non-apparel,
international

Steve Layton - Westex - acquired in 2014, added
Springfield in 2015

Flash fir & arc flashes

Bcat plan by \$16MM last year, looking good

Biggest risk: price of oil < \$50 a barrel

"Year of New Products"

Aluminum splash (Sunlong), European look

Partnership with Feijin in Asia

Stephen Morill - Marketing Process Value Boards

Show why on durable boards

Marketing Displays at Plants

Recruiting video for Songleaf - by Andrea

Helped hire P's at Songleaf - JJ

U&P Townhall

2/14

Halsey's Priorities:

- 1) Strategic Plan 2025 double or triple?!
- 2) Succession Planning - retirements
- 3) Corporate Sustainability Report (CSR)
 - Meg Ried will talk to customers
 - should be ready in June
- 4) Operational Excellence (MPS) - more emphasis
- 5) Digital enterprise - more data driven

Textiles: Airbag, Nonwovens, Napery, Military?

2018: "4% sales growth, best group is U&P"

U&P +8%, rev & good EBIT +7%, growth +13% 5 year

EPP 8%

NW +1% bedding filled by bed in box, MNWC margin challenges

Napery -16%

Spec Int. -5%

Airbag -1%

$\rightarrow 6\%$ $\rightarrow 7\%$ $\rightarrow 6\%$ $\uparrow 15\%$ $\uparrow 15\%$

Top 5 customers for U&P: VF, Cintas, Bramhall, SNC, you, military

Price increases were accepted

"Trusted Partners Protecting and Enhancing Individual Performance"

Michael Langley - financials

Revenue up 19% year over year. Some increase 20% prior

Longleaf up \$5 million

But quilting is U&P (from NW)

Erik Mossbrook - VF team Bad presentation

\$2B Thourtoor = Wrangler, Lee spin-off denim down 5%

let 30 people go, more to come, going to Greensboro

\$12B in VF - Dickies, Workrite, ...

Vendor managed inventory - some savings, now steady

Growth: North Face, Timberland PRO

Steve Jozey - Workwear & Performance Apparel

Power of the Uniform video - Cintas

losing revenue but gaining A GM

May be getting out of cotton

Outdoor retail show - EVO CHILL, stainSmart...

May be new brand around stretch wovens

Whitney Hauser - moving to workwear sales

LaElm - FR ACU - his son's uniform, other in navy

military growth 85-90 - 107 million in 2019

Enterprise Print - growth, soon to be loaded up

MultiCam License Agreement

Print working on Australian pattern

#6 Valway - Spitballing Trial, cont

2/13

Watch production - runs with round blade

Plan B: reproduce the good blade

- cut off ~ 5" and microscope

also get slice of mystery blade

12:20 Running 0.72 mm round blade 1486 Hz, 60 rpm

16x16 700 dtex (630 denier) 245 gsm 90-93 dB

other was 18x18, 470 dtex 185 gsm

0.72 > 13.7 mm blade expert 1013 Hz resonance
excited at 1463 Hz (1486)

Can clearly feel vibrations. No spitballs.

Style should start by May

10-20 000 yards pre-laund

2nd biggest flat volume

301246 cost dtex range 8

$$\text{RAO: } f = \frac{1}{2\pi} \cdot \sqrt{\frac{3EI}{L^3}} \cdot \frac{1}{0.23m} \quad m = q \cdot L$$

$$f = \frac{1}{2\pi} \cdot \sqrt{\frac{3}{0.23}} \cdot \sqrt{\frac{EI}{qL^4}} = 0.5748 (EI/qL^4)^{0.5}$$

$\approx 0.56 (EI/qL^4)^{0.5}$ Eng Toolbox

units:

$$\text{RAO: } \sqrt{\frac{K}{m}} = \sqrt{\frac{N/m}{kg}} = \sqrt{\frac{\text{kg} \cdot m/s^2 / m}{\text{kg}}} = \sqrt{\frac{1}{s^2}} = s^{-1}$$

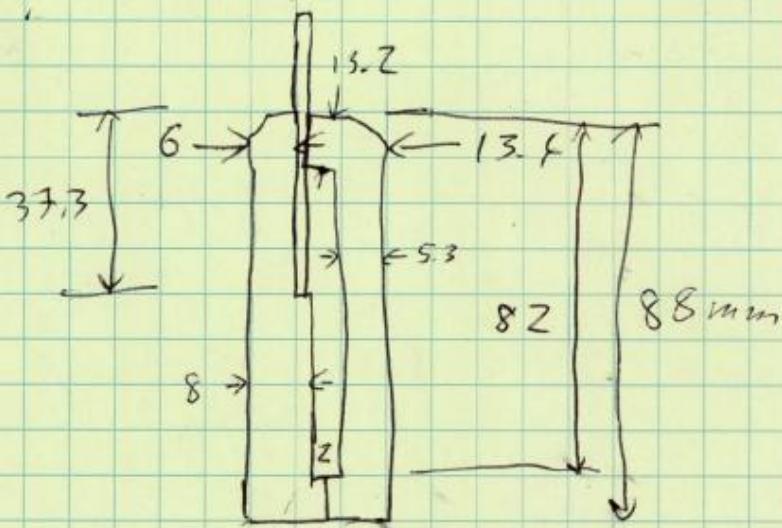
$$\text{ETB: } \sqrt{\frac{N}{m^2} \cdot m^4 \cdot \frac{m}{N} \cdot \frac{1}{m^4}} = \sqrt{\frac{1}{m}}$$

#6 Valway - Spitballing Trial

2/13

Blade geometry: 1.3 mm protrude 13.7 mm
 Range setup: -16 mm to 1 mm
 blade -7 mm

operators:
 Josh
 Anson



with spaces 6.5 mm exposed
 $3.5 - 1.3 = 2.2$ mm barking
 $13.2 - 6.5 = 6.7$ mm reinforced

$$18 \times 18 \rightarrow 1646 \text{ Hz}$$

$$13 \times 13.7 \text{ mm cantilever} \rightarrow 1827 \text{ Hz}, 677 \text{ rpm}$$

$$1.3 \times 14.5 \rightarrow 1633$$

$$1 \times 6.5 \rightarrow 8126 \text{ Hz}$$

Probably start in 40 min. 9:40

Background SPL 78-79 dB 88 dB w/ oven fans on

Coating - thin Etsu quick cure silicone

Start 40 rpm 9:51 - silicone started

40 dB - 88 1120 Hz antistat was on

45 9388 1292

60 88 1723

Turn antistat off, straight to 60 10:15

One coating gets to balls side, it's game over

10:32 try new blade* 60 rpm, antistat on - still bad

Round blade in steel holder does the same thing

10:58 setting up with J-blade //

- shouldn't spitball, but unreplaceable

11:08 start. Antistat is off

11:14 still no buildup

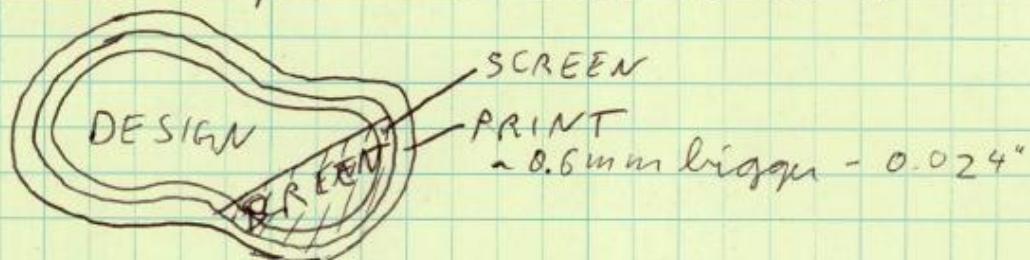
11:19 running production, but have creases 1680 Hz, 94 dB

11:26 run it out misunderstanding

#5 Enterprise - #1/14 Trial

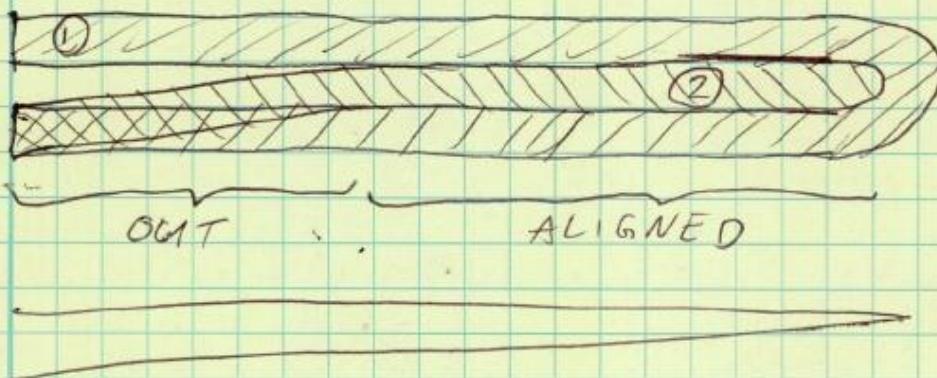
1/14

0.008" trap = 0.2 mm all around



Everything is 0.008" bigger to #1 screen

Actual rolls are 125 mesh, not 165
 $+3 \rightarrow -3 \rightarrow$ edge change is 3 rows, not 6
 dithered edges?



Lebanon Valley - (717) 273-7301

John or Gary Rhine - president

↳ brother Darrin Dishong - screen design
 195 mesh on 0984, 125 on PJ cloth

last year: 52,440 yards \$504,006 fallout OOR

#1 streak - 65.3K - water leak

#2 OOR - 52.4K

#1 " 12 13 1

#3 out of paste - 28.4K 2.1, 3.0, 1.2, 0.4 → resolved?

#4 lint repeat - 19.2K lint on screen

#5 print stains - 18.3K

#6 other - 11.2K

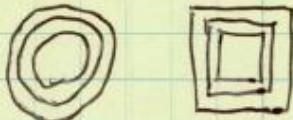
#7 blotchy - 5.9K...

A2C4 is worst - 16,987 yards 2228, ¹⁶⁵~~125~~ mesh
 3 PM - round 3 0984 ran out before set
 ran PJ cloth, thus speed up

#5 Enterprise - 11/4 trial

11/4

Pattern is 2x as big - 2 repeats around, 8 across
 9:15 Preparing for a 20 yard strike on thin fabric (0984)
 Lebanon Valley Engraving 717-273-7301
 Beginning with leaders Darrin Fishionry
 running heads 8, 9, 10
 3 colors 1 = dark brown #3 tan #6
 "B" "G" "T"
 3 = beige



On startup

S B: width 28.01 mm, ht of "O" is 26.3 mm
 tan gap is 24.7 → 0.8 mm bleed combined
 L thin line = 1.3 → fast is 1.0
 G: width 28.5 ht = 26.05
 thin line = 1.2 → fast 1.1
 T: width = 28.7 ht = ?
 thin line = 1.54 → 1.28 mm
 Fast: measure \times ears
 Br: $24.3 w \times 54.4 h$ slow → fast 23.9×54.2 23.6, 23.2
 G: 24.15×54.7 slow → fast 24.0×54.3

T:

0984 fast = 30 YPM slow = ≈ 4.75 YPM

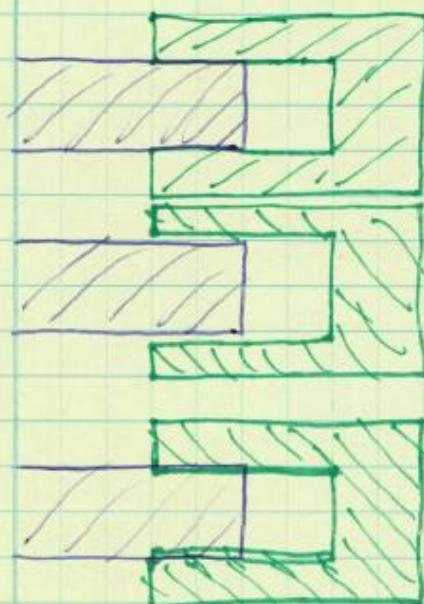
$140.9 + 69.6 = 210.5 / 9 \text{ blocks} = \boxed{23.4 \text{ mm}}$ actual
 estimate - ~~block~~ block width
 $1 \text{ mm} \approx +6$ (12 lines) 0.08 mm per line
 $+3 \rightarrow 0.5 \text{ mm taller}$

smallest width
 11:00 start 0984 slow, 0984 fast, 2228 fast (thick)
 S align some on 0984 @ 4 YPM
 L one screen at a time (1, then 2, then 3)
 O all screens print
 W → speed up to 30 YPM on 0984
 → fast on 2228 30 YPM for a few yards

#5 Enterprise - Patterns

12/11/2018

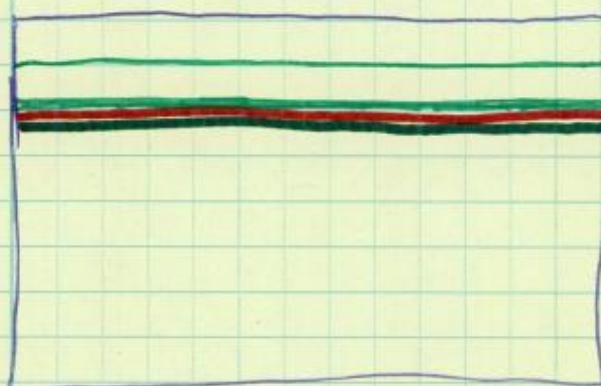
Concepts:



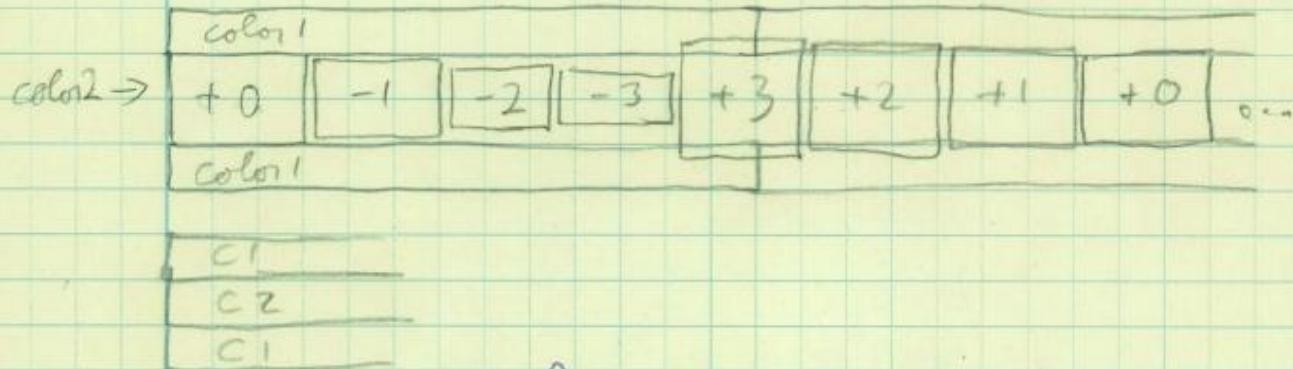
1 cm gap

1.0.4 mm gap

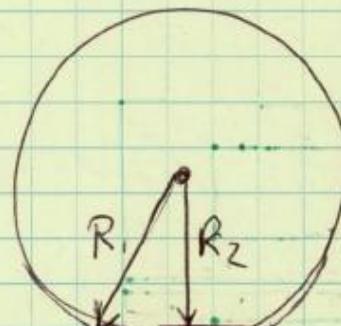
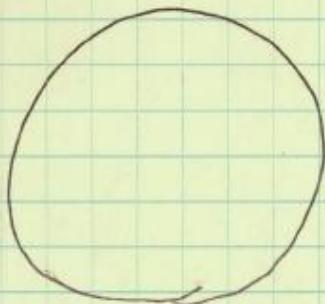
9.6 mm gap



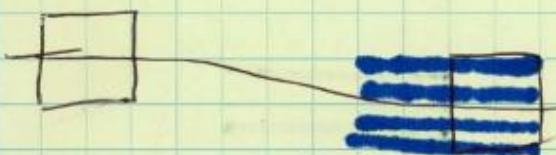
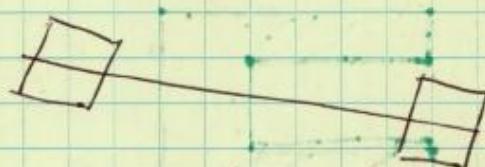
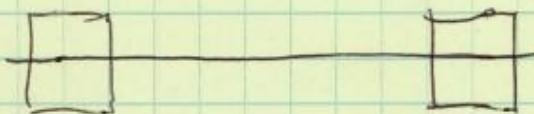
Simpler:



See Documents | Sketch works!
 Enterprise printing | Test Pattern B, +
 for final design & details.



Microslip?



bearings 175mm ID
182mm OD

0.412 - 0.420

0.365 - 0.509 on wet side

bearing spacing is 84-86"

bearing ~ 7"

$$.150 \times \frac{3.5}{8.5} = 0.006" \text{ movement? No!}$$

at bearing

enters frame pivots.

Grooves:

regular - 0.004"

stippled - 0.0045"

Regular holes: ~~60um radius 120um Ø 90um?~~

could look bigger than it is.

spacing: $106.5/5 = 21.5 \mu\text{m}$ horizontal

$92.0/5 = 18.4 \mu\text{m}$ vertical

radius 2: $40 \mu\text{m} \times 2 \rightarrow 80 \mu\text{m} \varnothing$

holes are hexagonal! $\sim 88 \mu\text{m}$ ID, $100 \mu\text{m}$ OD

$106.4/5 = 21.5 \mu\text{m}$ horizontal

$92.9/5 = 18.6 \mu\text{m}$ vertical (staggered)

stippled - has hex dimples, not all cut out

rad $\sim 42 \mu\text{m}$ 166 mm center-center

$561/4 \mu\text{m}$ vertical (staggered) $80.5/5 = 16.1 \mu\text{m}$ vertical

#5 Enterprise - First Visit, ctd

12/7

~~idea~~

When seam goes thru, pushes on weight of frame (250KG) and force of magnet.

Magnet bounces...

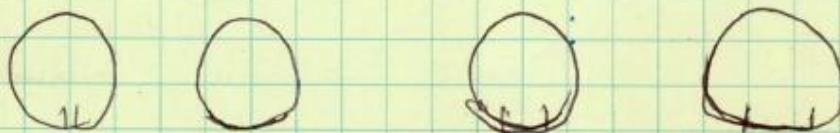
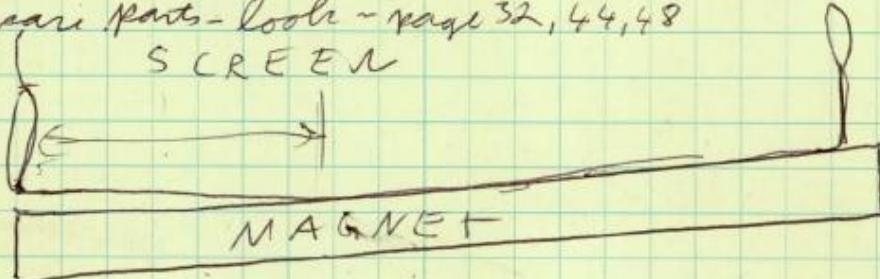
11:05 running 0984

position 9 (screen 2) has holes unplugged
still misaligned, but can cover it up

Today, 1, 3, 5 are floating around
stop to sand the belt.

use 3 tape screens

Spare parts - look ~ page 32, 44, 48



screens are ~ \$400. Could make test patterns

~~Had to bend 1 gear~~

Raised magnet bars, it screwed things up
↳ had to raise table so much the guard
interfered with the gear

8 Lugege bars is 1.6 kg < 12 mm

fabric is 62° 1.1 kg < 10 mm

Magnet force >> weight

Float bearings are radial ball

diagonal turns the gear!

X direction shifts phase!

#5 Enterprise - First Visit

12/7

Out of registration: repeat is ~24" (pretty bad)

Fabric width 64" (screen pattern w. 66")

Example on table: 2 vs 3 (dark brown vs lichen)
can't be fixed

defect @ 2.5" from edge - usually within 12" from edge
would replace float gears and it would "fix"
the problem - just moving them did something
ODR is about 0.4 mm

Adjust up & down (manual)

X, Y on keypad also O_z

O_x, O_y are fixed - supported by an airbag,
stopped by washers

Fabric ~ 0.3 mm thick - thinnest is 0.14 mm (0.006")
0.45 is A2CU - thickest 0.017"

- most forgiving

gap is set with no fabric to 0~~< 3"~~ 0.3mm
SPG store

Belt is 30 yd long, tensioned 4-5 mm

metal reinforce? feels very stiff

Adjusting height made difference

All ODR is startup, stop, or seam

seam usually settles in. Sometimes seams
push bar against squeegee

0.36 mm → 0.85 at seam w/overlap & thread

Overspeed? O = 1:1 typically run 1 or 2

changes speed of screens - clear

if running O, hear screens crackling

Travis - screens Fowler - Clemson

#2 & #3 screens are STIPPLED - gradient (brown)

64 cm circumference nominal

Hub is AL, ~ $\frac{3}{16}$ " thick

screens are glued in & taped - fits in gig

#4 has heavy section, uses more inl
ring locks into bearing

bearing has magnet at PICE AUST point to sync

blue eye sensor reads it

Running now 2013-2015 4 wheels design

now 95% is 7 screen

position has 5 LED readout - can be in between (2 or)

An bladder raises & lowers assy

#3 Festooler reworked Prototype, ctd

11/26

500 denier. Start in 1st slot, so different set + last = 13

$\frac{1}{2}''$ strip dislodged on L side. One yarn flew out.

10, but a mess

10, stuck, long entangled part

10, "

10, entangled a 4 times

10, similar. 3 weak, last strong

8, stuck, moved

10~~10~~ blew out?

5

10, moved

10, entangled w/ itself, almost blew down

2 at end

8-9/11 good

clearly way too much air.

New issues:

- Chop work not to spec
- Magnet lift up and pinches yarn!
- Magnets interfere w/ each other
- Yarns have bad finish
- Scissors stick to magnet - annoying

#3 Testrales - Reworked Prototype

11/26

Tommy widened grooves but misaligned the workpiece. Should have increased from 20 to 30 mil, went to ~50 mil.

Air supply can't keep up - drains cylinders in ~0.5 seconds.

Magnet strip flies off. Added extra magnets. Strip may lift up in spots. Strip does not fly off on ~~the~~ left half.

Quick results: 1000 denier yarn does not splice well, but 800 & 1200 d did OK. Tail length didn't matter.

Do a formal test w/ 10 ends, 0.5 seconds
No. 12 - slip L one and every other (R looking down wind)

Magnets blow off!

eval: 10 but slip, 3, 10, 10, 10, 2, 5, 10, 10, 3, 10, 10
8/12 good, but variable slips. Worst one was in center, didn't blow off.

Try again.

Blew up and dislodged $\frac{1}{2}$ " strip!

Forgot to cut tails in but most were stuck - wedged under magnet.

Blew $\frac{1}{2}$ " off again. May be affected by big magnets.

From left \rightarrow right looking in: ~~800~~* denier, new $\frac{1}{2}$ " strip

9, got caught by magnet

10, double tie

10+

6

1

3

1

5 - jumped over

1

1

7

3

3/12 good ones

~~800~~* denier, new $\frac{1}{2}$ " strip

10, beauty, caught

10

10

10, tail blew up

10, blew out

5, blew out

10, beauty, stuck

10, blew up

10

8, not stuck

10, beauty

2, not enough?

9 or 10 good / 12

*1440 dtex yarn

#1 Echo - Formability

11/20

Air flow before:

C 986.8 A (molded)	12.8 - 1.12	after:
film up:	14.5 - 1.29	24.1 - 4.56

C 986.8 B (molded)	12.6 - 1.07	
film up	14.4 - 1.23	20.9 - 4.06

C 986 A & B	5.76 - 5.60	
film up	6.67 - 6.11	25.3 - 9.32

C 986 B A	5.80 - 5.64	37.1 - 8.65
film up	5.88 - 6.62	

Previous molds were done at $170^{\circ}\text{C} = 338^{\circ}\text{F}$

Try 380°F setting,

(Stopper @ 25.1 mm + 1.7 mm = 26.8 mm)

drop 325° , 363° in 30 sec 1 min $\rightarrow 365^{\circ}$ 2 min $\rightarrow 366^{\circ}\text{F}$

$3\text{ min} \rightarrow 368^{\circ}\text{F}$, C 986.8 A, film up
looks good.

C 986.8 B, film down 30 sec $\rightarrow 365^{\circ}$ 1' $\rightarrow 366^{\circ}$ 2' $\rightarrow 367^{\circ}$
slow to place! May have had taper up

C 986 A, film up 30 sec $\rightarrow 370^{\circ}\text{F}$ 1' $\rightarrow 371^{\circ}$ 2' $\rightarrow 373^{\circ}$
looks good

C 986 B, film down 30" $\rightarrow 366^{\circ}\text{F}$ 1' $\rightarrow 367^{\circ}$ 2' $\rightarrow 368^{\circ}$

#2 Flex-Yarn test II

11/20

Test T400 and partial relaxation

Temps: 300°F, 320°³⁴⁰, 360, 380, 40°

Red = old 1/150/68 P/C Lyra black

Blue = T400 (nodular 1/300 and wispy 1/150)

Also use deconstructed T400 for critical conditions

Nodular: 298 mm - relax to 260, 235 no clips to 238

L inside to inside of mark

• 298 taut, relax 272, no clip 251, 295

oven 300 - confirm 302, fall 240, 276 in 30 sec

285 in 60 sec (290 oven disp) 292 in 90 sec

296 in 120 sec

Cool down

Blue: 220 no clip (less yarn weight!)

245 w/ clip more power/contraction?

Black: 120 no clip, 245 w/ clip

400°F Blue: 297 NC-230 w/c 258

292 - not as taut. 294 after-taut. 240NC, 261w/c

Black: 299 NC: 193 w/c 273

297 retie, 294 after-taut! 135NC, 251w/c

Red: 300mm, 102 NC, 123 w/c, 300 retie, 297 after

290 w/c → depends where loops are rel to marks

Red 2: 298 mm, set to 212, 210 after

200 loose, 212 w/c

Red 3: 297, set to 93 relax, 110 w/c, plan loose

→ 71NC, 78w/c

oven 400, confirmed drop 227 → 343 in 15 sec

354 in 30 sec, 364 in 60 sec (disp 380), 370 in 90 sec

373 in 120 sec (disp 374)

Blue 299 init → 296 mm after heat. Very taut

267 NC, 278 w/c. lost some nodes!

4

3 Black 300 init → 299 after

0 113 NC, 244 w/c

oven set to 430°F, stuck at 422°F (420 verify)

drop to 268°F, 375°F in 30 sec, 60 sec 384°F disp 40°F

120 sec 393/402, 3 min 398/401, 4 min 400, 5 min 401/402

#2 Eles-Magnolia 6514 trial

11/19

Clyde & Mark Bradley

9:06 slowed to 80°F M, took photo - bleach stains
 still at 100°F M
 Sample is 290 yards, with leaders
 Sample looks darker - singed (mistakes at Longleaf)
 Will run prep 4 next
 Second set at 102% - will change back to 101%

9:12 Pulling leaders into spray

9:15 still dark^{fabric} @ steamer 1 entry
 9:16 leaders burn

* I need a good flashlight

9:18 leader dropped into SSI

9:22 turning on L side

9:31 leaders coming out 1/3 450

9:39 in BS1 - not pretty

Planning to run 360°F on Prep 4 by opening
 the doors → Nope, drop to 300°F

9:45 waiting on BS finish 9:48 leaders out

Among 4 - fabric is on bad cores (too small)

plant will slow down Wed PM for Thanksgiving
 → try to run at 12PM

ID	0019686597 S\6514 GREIGH	
WIDTH AR	59.38	DESIZED LL
WIDTH BO	46.63	
BO SKG	15.6 X 22.6	
RETCH 30 SEC	62.80%	
GROWTH	8.00%	
RECOVERY	87.30%	
SELV.	SLIGHT PUCKER	
date	11/7/2018	

#2 Flex-Magnolia 65/14 Trial, ctd

11/19

- 12:06 Two rolls with different draw ratio & gara lined up on R4
Agreed on 330°F
3 got header of 1st roll
- 12:08 dropping into spray, seam not pretty.
Seam midway thru 1st roll - 37°
Selvedge wants to fold over (face up) →
Roll change from 64" to 62" mid way
- 12:31 Misclip, sid pulled in. Range stop.
- 12:34 Recommenue?
- 12:36 Start-stop-start
scrapping misclip
- 12:40 sewed in, start 2nd half
- 12:51 sample approaching exit steamer #2
- 12:54 another stop. took a few videos - looked OK
couldn't keep up width, adjust
- 12:56 restart "probably have 8 samples"
looks good after first set of bleach wash
boxes and in to more.
nice on takeups - just saw seam crease
now some long creases - start on L fluid
and walk out. No telling which draw condition
I'm looking at.
- 1:10 width varying from 60" down to 58"
- 1:11 near end of last sample, second to last!
- 1:12 start of last one - 58 $\frac{1}{2}$ "
- 1:13 last seam

#1 Edro - Thermoforming

11/12

CO987 (fuzz up)!

1.20 - 0.79

-0.29	+ 0.677	0.63 - 0.29
	0.85 - 0.35	
0.89 - 0.36	0.73 - .34	

1.17 - 0.82

thick: 4.55 [3.33 3.29 3.37] 4.92

CO988.1

less stiff? 100 gsm

9.73-2.0

7.21 - 0.67	9.79 - .69
7.13 - 0.82	
7.15 - 0.78	9.55 - .79

15.6 - 2.33

thick: ~~5.11~~ 4.92 [3.80 3.60 3.45] 5.11

CO988.2

100 gsm

13.6 - 1.85

9.82 - 0.53	7.48 - .50
9.03 - 0.61	
10.0 - 0.66	7.20 - .57

11.6 - 2.13

thick: 4.11 [2.75 2.72 2.92] 4.58

#1 Echo - Thermoforming

11/12

C0988.1
 C0986.5 496 in 490 out 15%, 150% 46 sec 450°
 calipers → ~2.8mm

rest: see One Note entry slow clamps
 C0986.5

9.43 - 1.79 [6.65 - 0.56 5.60 - 0.54
 6.73 - 0.68
 6.08 - 0.69 5.17 - 0.61] 9.61 - 2.21

thick: 4.36 [3.07 3.02 3.05] 4.63

C0986.6
 12.8 - 1.45 [6.52 - 0.51 7.03 - 0.45
 6.94 - 0.65
 6.49 - 0.57 6.54 - 0.50] 12.4 - 2.18

thick: 4.25 [3.00 2.76 2.94] 4.59

C0986.7
 10.7 - 1.59 [4.86 - 0.46 6.37 - 0.51
 5.52 - 0.53
 4.81 - 0.55 5.79 - 0.57] 9.85 - 2.19

thick: 4.12 [2.73 2.88 2.80] 4.50

C0986.8
 14.8 - 1.67 [7.77 - 0.55 5.79 - 0.48
 5.96 - 0.53
 7.51 - 0.62 5.99 - 0.56] 11.2 - 2.08

thick: 4.30 [2.88 2.78 2.78] 4.45

C0986.9
 11.4 - 1.54 [6.20 - 0.51 6.32 - 0.46
 6.88 - 0.56
 6.09 - 0.62 6.14 - 0.56] 7.67 - 1.74

thick: 4.32 [3.04 2.96 2.92] 4.56

today's set may be off by 0.13 mm

C0986.10
 10.3 - 1.62 [5.82 - 0.52 7.53 - 0.52
 7.48 - 0.52
 6.07 - 0.56 6.69 - 0.60] 12.2 - 2.23

thick: 4.21 [2.98 3.02 2.95] 4.58

#1 Echo - PFG meeting, ctd

11/9

Byron: would like to engage us on undercarpet vs German competitor (Evolor)

UC 2500 - cheaper, no chemical treatment
~ \$1/yd² depending on bags
saves one layer of web adhesive (30g)
coat both sides - chemist challenge
Evolor has draw issues
would be value add to control AF with carpet
Have 3000 yards rolls
Slip fabric producer

#1 Echo - Thermoforming

11/9

Air flow C 0986.3

②	4.76 - 0.53	6.70 - 0.58	
9.61 - 0.76	5.58 - 0.59		12.5 - 2.08
	4.75 - 0.61	5.93 - 0.62	

Thickness: (Had to turn AMES device)
4.50 [3.02 - 3.00 - 2.60] 4.1

C 0986.1 is best - more air flow, more even thickness
and 500°F is easier to control.

Try one more with 20% top heat

C 0986.4 30% / 30% settled in at 553°F oven in 500°F out 496°F 450° in 50 sec park in 20125% → settle at 463°F	④	6.69 - 0.47	7.54 - 0.49	
	11.6 - 1.65	6.96 - 0.57		12.3 - 2.10
		6.56 - 0.52	7.13 - 0.53	

Thickness 4.50 [2.66 2.73 2.50] 4.09
2.66 centimeters

C 0986.4 is thinner, a bit less air flow

Try one sample 500°F, 15/50 heat or lower, no plate.

C 0868 #2 - oven steady w/ 25% / 25% heat, don't go to 500°F (492)
heat @ 12% / 50%, oven in 500, out 494 62 sec

→ thickness 3.3 - 3.4 mm (far side) 2.6 - 3.6 (near)
do rest like #4. Can use #1.

25/125 → 491
Park 25/30 → coming up

#1 Echo - PFG meeting

11/19

Byron Bassett - Industrial
 Colby Meador - Quality Systems Manager

Chester Wanta Wies - R&D Chemist

Mark, Randy, Dan, Haz, Sara, Jeff

VOC's issue recently SVOC

Should go into production any day now

New non-blocking coating

pits on coated side are from collapsed foam

- looks like imprints

New formula is more heat stable

New products: ice protection after gravel with acoustic benefit

Nexus A1G - for Toyota
 laminate to base material

Acoustic

usually target 750 rays
 there are about 8000 rays

In-hydrophobic
 gravel proof

Use lower cost base weight with functional surface

A1G: 0.48 mm, fabric 60 gsm, total 120 gsm

21% elongation MD / 53% TD

US Patent 8,403,108 / 8,439,161 / 8,607,929

Don't know how it will play out in the mold

Mold at 375°F, 60 sec 410 max

100% PET spun lace can tack with 380°F IR

Chester hasn't tested for everything in spec

Not sure how it does at -30°C

85-90% elongation at 385°F

Cost > \$1 / yard² lower resistance is cheaper (lighter)

10-15% absorption improvement @ 1000 Hz in a cabin

Zephobin = hydrophobic

Took down to 2-3 mm, quite bouncy, did OK

Did poorly on plywood - too stiff

Strength - 175 N/25mm break

Spun lace fibers

Should pass red list

Solubles by mechanical encapsulation

Plant in Greensboro - 140' width

8000 rays is easier harder than 750 gsm

#1 Edro - Thermoforming

11/9

See "GEL Trial 11/1/2018" overNote

Target: 52" long target surface
 oven temp 500°, 25% / 50% heat 450°
 oven temp 600°, 25% / 50% heat 450°

Possible next step:

oven temp 600°, 50% / 50% heat
 or change temp target or time
 → check thickness & air flows

C0964.213 last time = 450° in 53 sec, 6.06 net air flow,
 oven probably around 530° and 25% / 50% heat
 thickness 3.4 mm after 1st pass (C0964.2)

3.12 mm after 2nd pass (C0964.3) 1125 gsm, 360 deg/m³

Also note: C0964 had 200 gsm coating

C0960 has 150gsm LOPE, typical 4.1 mm, 1050gsm

C0986 → 150gsm on M0422
 C0987 → 150gsm, fuzzy side
 C0988 → 100gsm

C0986.1 Start 50/50, reach 444°, 35/35% heat
 falling? → 40% / 40% seems to be close
 40/35, 35/35 - 1:42 PM - falling between 40/35 and 35/35 to hold
 oven in 500°, out 470°, 46 set (25/50)

C0986.2 Continue 50/50 (DOF = 315°C)

35/35 and door open - finally falling

282°C → 541°F accurate!

291°C → 556°F accurate!

304°C → 601°F display (580°F)

run at 3150 out 298°C = 568°F

454°F max (rising fast) in 18 sec

heat was left at 50/35 in

C0986.3 in 313°C 25150✓ conf

oven out ~555°F sample 451° in 30 sec

pretty saggy

C0986.1 air flow

★ 9.45 - 1.76

10.9 - 2.3

thick: 4.42

C0986.2 [2.81 - 2.93 - 2.77] 4.31

not as stiff

8.53 - 1.89

7.59 - 0.63	7.02 - 0.67
6.93 - 0.63	
6.24 - 0.57	6.82 - 0.60

5.82 - 0.86	5.21 - 0.90	7.81 - 2.34
6.44 - 1.02	5.70 - 0.96	

thick: 4.95 [3.39 - 3.36 - 3.39] 4.97 ⇒⇒ 4.42

#4 Magnolia creasing (synthesis)

11/7

1:07 Run prep only

no waves into PD4, no waves b/t cars

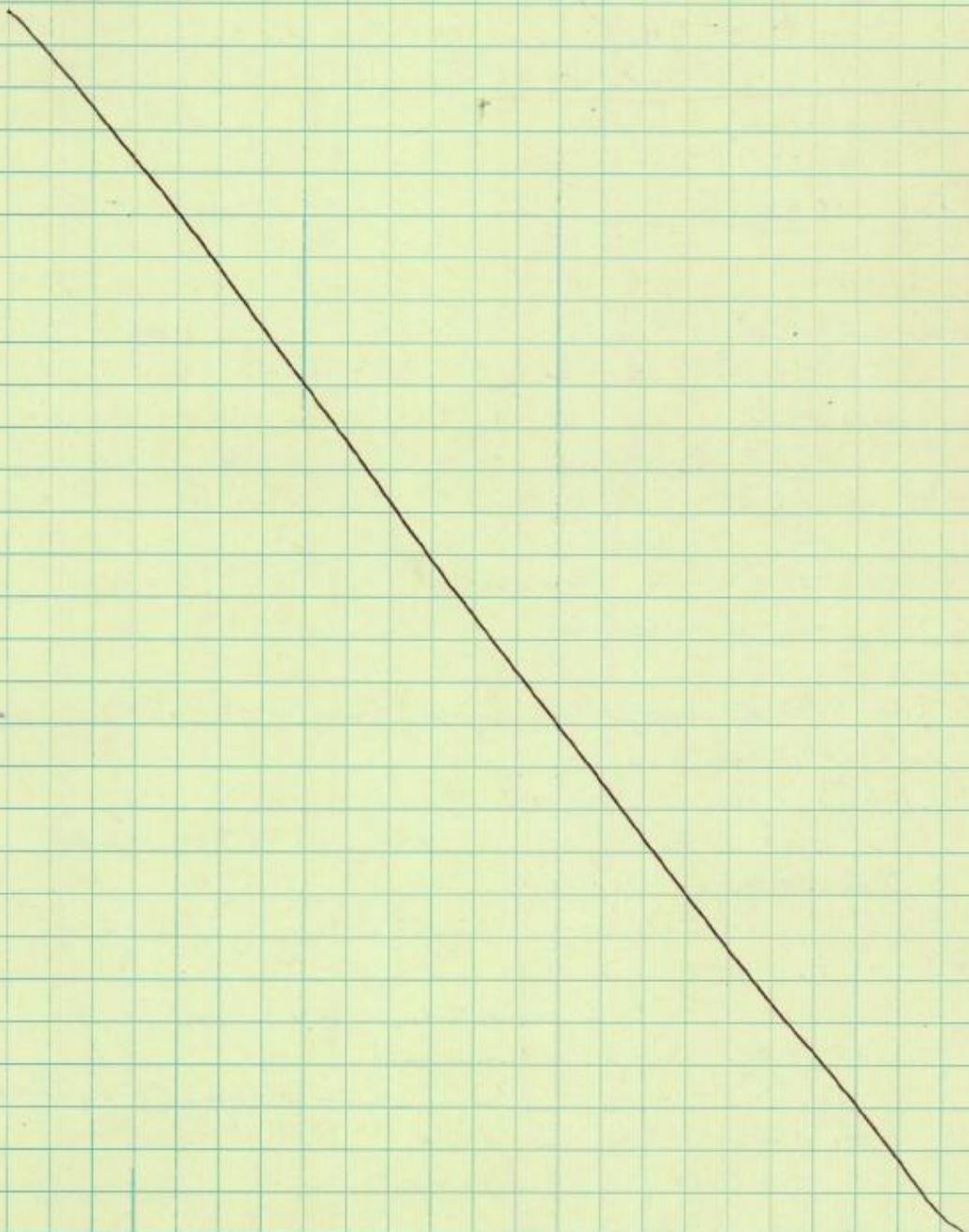
1:18 Production some creases were spotted
~ looking good

fold or crease ~2" from R edge

sells ~ \$9/yard heat set is 5-84

\$ 485K yards/period

↳ Patrick Prince can get me more info



#4 - Magnolia creasing (Typhoon)

11/2

Removed 2 steel bars

$$\text{steel} = 0.284 \text{ lb/in}^3$$

size: $1'' \times 4'' \times 22\frac{1}{2}$, a bit less, 2 bolt holes
 $90 \text{ in}^3 = 25.6 \text{ lbs} \approx 25 \text{ lbs each}$

$$82'' \times 1 \times 4 = 328 \text{ in}^3 \Rightarrow 93 \text{ lbs}$$

Compensators for steam cans just have roll w/ rolls are $5\frac{1}{2} \times 6''$ with $\frac{1}{8}''$ wall

Fabric is air jet woven

leader is loose on R side of range as well

12:40 - flipped fabric around.

sewing in 500 yds that haven't seen pin tenter

chain drive is leveling the compensator

- 11/7 Trial #2 - Start with 700 yards from clip 7
- full threadup
 - alignment tweaked
 - removed big wad of lint from pre-dryer &
 ↳ other styles are running better
 - style is [00042] 4832

Nathan pulled out the lint wad - 18" from edge
 had wavy shape

11:36 starting regular fabric, full threadup

11:41 still badering

11:43 cut fabric - 700 yards (?)

11:46 start pulling in for real out of soray)

11:52 - seam seam came thru 804PM

running with plates on (higher tension)

12:00 - ~~red~~ spooling pin in^3 , sew 3

12:06 - pretty ugly at seam, then good

- no floppy, no waves

12:17 - middle crease is OK, should pull out
 on first step pin tenter, DWR finish
 durable water repellent

10/22 #2 Flex - Yarn oven tests, ctd

color	oven	temp i	temp f	After heat	AH relax	Δt
Red	M	320°F	318°F	300	192 mm	5 min
Blue	M	(160°C)		300	205 mm	

oven init 329 - T/C ~~126°C~~ ^{moved} → 144°C

oven reads 318°F, T/C 147°C

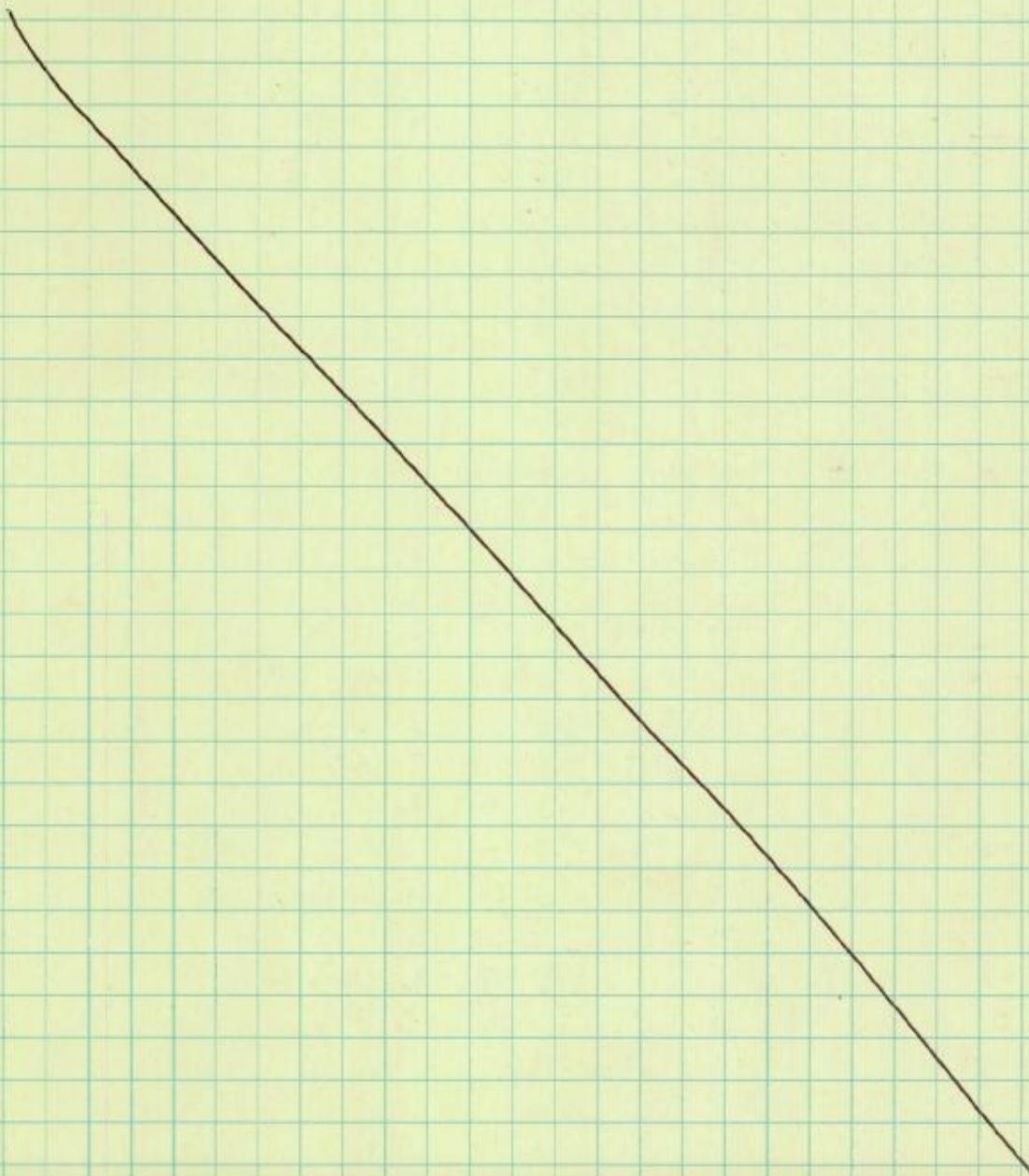
R	M	284°F	284°	299	193	5 min
B	M	(140°C)		301	195	

got stuck - drop to 270°F reader 124°C → 141°C, 143°C
final A=142

R	M	248°F	249	300	166 mm	5 min
B	M	(120°C)	124°C	299	170 mm	

init reader 119.5°C → 122.8°C

Paper clip = 0.3717g



10/22 #2 Flex - yarn over tests

AS759: 16/1 Cts + 1/150 168 Poly + 70d T582L Spandex

-Red

9-4: 13.7/1 Triflex w/ 70d T162 Spandex

-Blue

Mark 12" apart (305)mm

Relax: +1 paper clip

R → 122 mm 103, 93
 B → 125 mm (no clips: 105, 95 mm)
 for Mooven Yam

10-40 MP 221°F, Fishine 104°C

R → 125

B → 128 for Fishine over

M: 1 minute, drop to 296°F

F: 1 min, 199°C → 190°C → 180°C

after:

	A Heat	AH relax	BMR
R M (302-296°F)	307	178	125 122
B	303	170	128 125
R F (199-180°C)	305	173	125
B	301	168	128

R for F: 300 mm, relax to 110 w/ clip

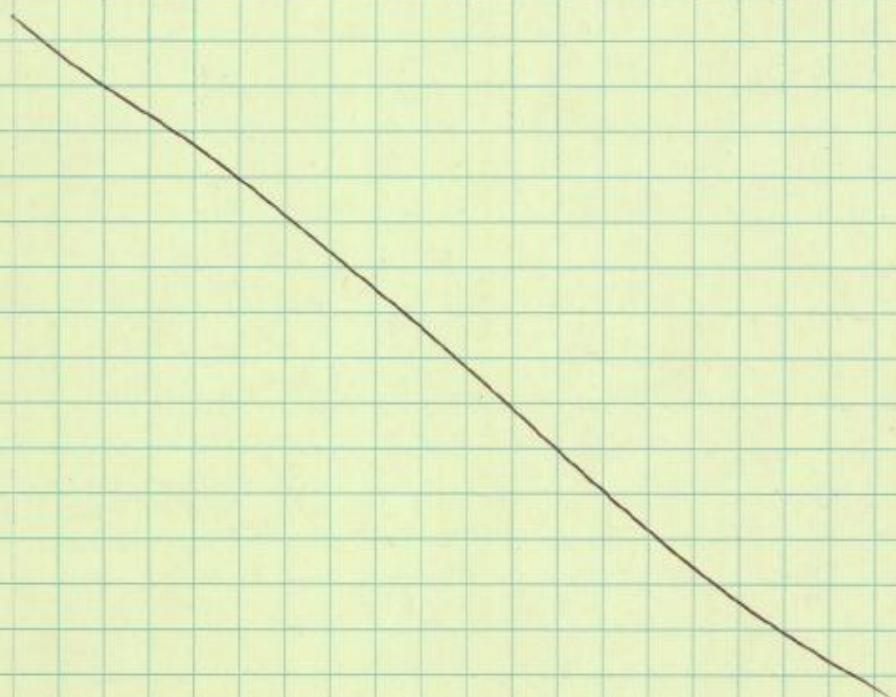
B for F: 300 123

	BMR	AH	AHR	
R F (201-194°C)	110	122 130	174]	
B	123	144 130	144]	
R M (320-311°F)	127	293	171	
B	124	302	151]	clipped??
R F (220-204°C)	123	298	198]	
B	122	300	190]	
B2 (hi tension)	127	308	190]	
R B M (338-	121 14	300	180	
B	126	304	205	
R F (230-211)	128	300	250]	
B	120	300	230]	
R M (356-345)	118	301	229	
B	110	298	220	
R M (374-363)	—	299	241	
B = 190°C	—	299	240	
R M (392-377°)	—	300	279 !	
B = 200°C	—	302	288	
R M (410-395°F)	—	300	297 !!	
B = 210°C	—	300	290	

#3 test tubes - Grilliland 10/15, ctd

10/15

- 10:10 C pulling #43
 10:12 start row #43. Took 3-51. C not taping back.
 10:17 C threading #4
 10:20 C start row 4. Crossing in rubber as shown ~~row 3~~
 10:25 4:31 and done! Pull yarns through
 knot yarns together to pull even. C out & tie.
 10:38 E resuming. C is back.
 10:42 C helping E and setting up splice
 10:46 getting last third down. Screw was tight and
 E tightened (righty tighty).
 10:50 setting up dueling splices. Ran on air line
 over from next bay. Should be easier
 for 152.
 Splice nozzle is about 4-5x longer than wide.
 $.125 / 4.5 = 0.028"$ looks much wider than prototype
 10:57 C started splice
 11:00 E started going in opposite directions
 $\leftarrow E \rightarrow$ DONE
 11:00:00 11:00:00 11:00:00
 last splice took over an hour
 still splicing - about 40% done
 1:02 must be on lunch break.
 C has 37" left out of 72"
 E has 34" left.



#3 Festivals - Gilliland 10/15

10/15

- 8:17 Cynthia & ~~Elizabeth~~^{watching} splicing first set on 151 using new thirds method. $\frac{2}{3}$ still up.
goal is to do machine in 2 hours
→ 3 splines in parallel
Old sley bars were 1 in. font and took 4 $\frac{1}{2}$ hours to point up - now - 1 $\frac{1}{2}$ h (cut 45 min)
All to hang beams before splines got here

splicing is better than thread for quality,
less waste → never know it had a splice
ends together - adds work to cut out
2-3 hours to splice everything

Started 5:30 based on official sheet

5 ends in 50 seconds - no waste removal

2304 ends (768 per beam) → 128 minutes of non-stop
splicing, no pointing

could use device to help present yarns

- picking them apart is half the battle

- splicing is a little too tight relative to the rest

- need to keep even tension

- 9:18 finish first third splice last yarn
move in ladder, move out spline
pull off ~~gleich~~ strip

- 9:21 pull up blade and slide into ladder
move beam side sley and position
don't roll back yarns - let machine pull
... break 15 min Cynthia

- 9:25 Elizabeth moved supports for machine side bars
start pointing up left section
pull beam 2, thread over bottom rollers

- 9:28 cut yarns below tape, lay in
time minus first 12" of 6 - 3 minutes

- 9:34 start beam 2 pull (already threaded)

- 9:35 cut @ tape 1 last 3" interpers w/ stand
Second row - 5:08, giving more trouble

- 9:41 tape bars, get #3 threaded & pulled

- 9:45 cut below tape #3. Cynthia is back, doing middle
~7 minutes, had to call Randy (break/cut - tape back)

- 9:57 E starts 4th row, C threading #3 2?

It's light - can't move outside section - E stops to hold C ladder

E pressing down plastic to open as she opens

10:08 redo some ends. 8:15 min to finish. E? break

#1 Echo - Wabash Pressing

10/18/18

Press 12" x 12" piece to 300 kg/m³Material = M422 / C960 (thin 4)
M421 / C959 (heavy)

Have 75m → total mm in gap

C959.3 1304 → 1454 4.85 0.191" 1.450"

hard to peel off PTFE sheet (slow). result 5.17 mm

C959.4 result 5.19 mm

C960.3 857 → 1007 3.35 0.132" 1.391"

final thickness 3.62, 3.73 (avg 3.68) + 0.32 = + 0.013"

C962.6 863 → 1013 3.38 0.133" 1.392"

adjust target to 1.379"

Final 3.45 mm, but wrinkled

Zero gap: 1.259"

Heat 400° 60 sec, cool b/t plates

▷ Thermoforming - Press again with 14.25" x 29.25"
ss plate, 1.5 mm thick. To raise pressure on one section.
Panels modified:

C0963.2 50 sec 466°F → C963.3 after pressing

C0966.3 77 sec 450°F → C966.4 2W, 2F 3x6"

C0965.3 45 sec 451°F → C965.4

C0964.2 53 sec 450°F AF 7.88 → 6.06 (-23%)

↳ C964.3, used up to punch 3" x 6" s 6W, 4F

C966.4 3.07 - 0.85 → 2.07 - 0.46

AF 3.13 - .78 → 2.03 - .42

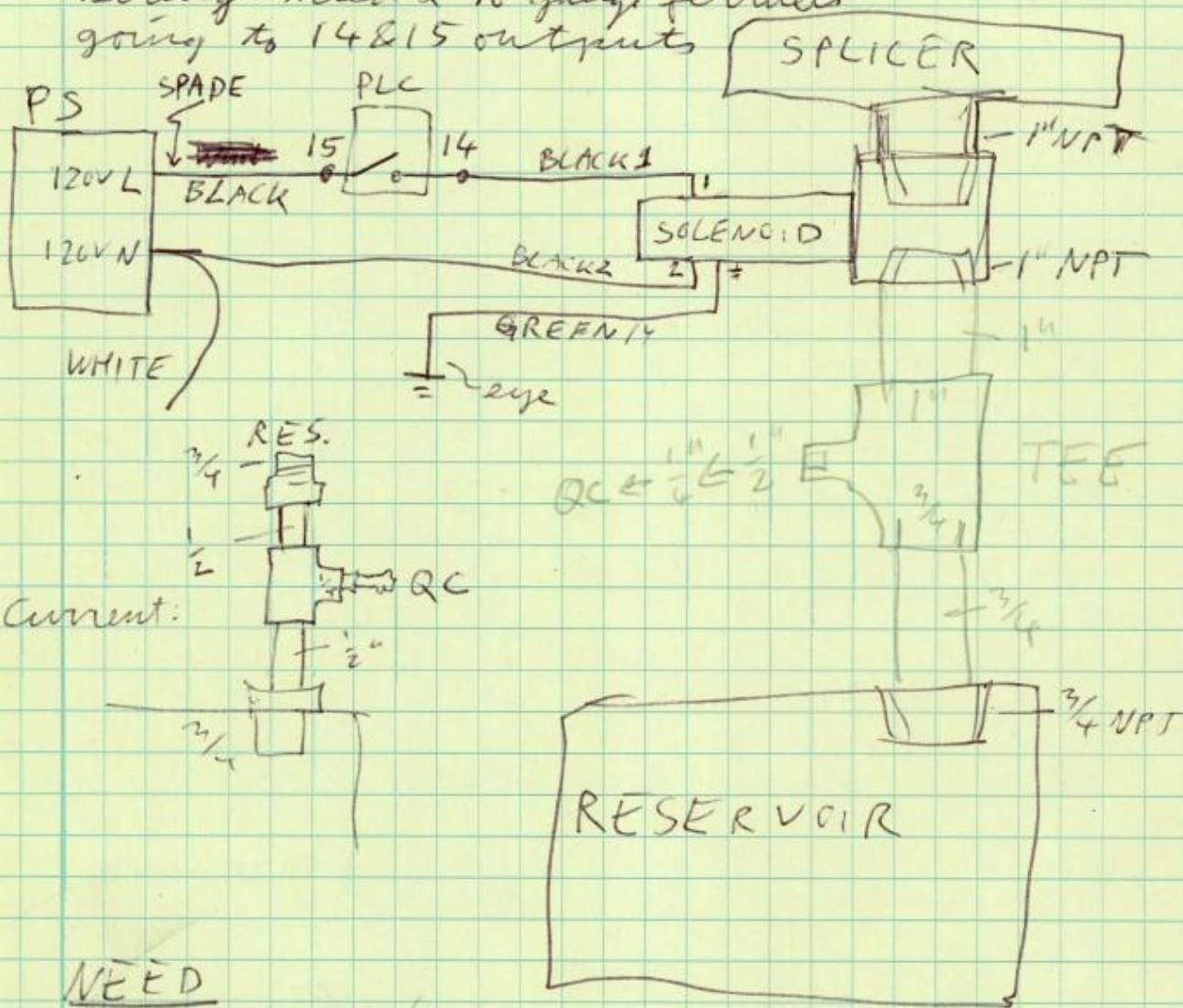
3.45 - .81 → 2.37 - .46

Heating: probably 25% top / 50% bottom

#3 Sestralis - Prototype Splice

10/11/18

Wiring: need 2 16-gang, ferules going to 14 & 15 outputs ✓ SP



NEED

- Spade for N (16) ✓
 - Rung for G (16) ✗
 - Block wire & nut to 14 & ferrule
 - Block wire PSC → 15 & ferrule, spade

- Tee - 1" NPT $\times \frac{3}{4} \times \frac{1}{2}$
 - reducers $\frac{1}{2} \rightarrow \frac{1}{4}$
 - nipple 1"
 - nipple $\frac{3}{4}$ "

Assembly notes

Need feed tube to swirl to
tighten down on baby

- Magnet tape $\frac{1}{32}''$ - pops right off
 $\frac{1}{2} \times \frac{1}{8}''$ - pops off

line 4

$\frac{1}{2} \times \frac{1}{8}$ - pops off

4 grooves

line 4
line 5

$1 \times \frac{1}{8}$ - OK! \star

4 grooves
black marker

Use stronger one, less defect prone

Still too much blow-back, poor splice

#1 Echo - Ice Details - Thermoforming, ctd

9/19

- C0963.2 oven steady @ 0/50% $\Rightarrow 478^\circ$ (door shut)
 start 506° 450° in 66 sec, oven final 475 25/50 heat
 C0965.2 oven 500 450° in 80 sec! oven 484 25/50 heat
 what is going on with heat??
 C0964.2 500° oven 452° in 55 sec, moderate sag (more than recent ones)
 C0966.2 495° 458° in 48 sec, almost no sag

C 963.2	4.9 mm.	1.8 - 1.1 to 0.6 - 0.5
C 964.2	3.4 mm	10.1 - 1.1 to 8.3 - 1.2
C 965.2	3.4 mm	3.5 - 0.9 to 2.1 - .8
C 966.2	3.4 mm	3.1 - 1.3 to 2.9 - 1.1

Resume

Try C0965.3 oven in 498, 25%/50%, oven out 453 9/20
 $\hookrightarrow 451^\circ$ in 95 sec, big skew in middle II
 cheat w/ oven?

- C0966.3 oven in 508 out 488°
 484° in 90 sec, sample fuming, pull in]
 C0959.1 oven in 524 out 482° no fumes
 450° in 73 sec almost no air flow
 C0959.2 oven in 530 out 522 heat 25%/60%
 451° in 52 sec guess 1-2 air flow
 C0960.1 oven in 550° out 542° 25/50
 450° in 56 sec est flow 7 cm/s
 park @ 25%/40% oven in 538° sag & fumes
 C0960.2 451 in 62 sec est flow ^{out 51"} to park 25/35
 C0961.4 oven in 528° accidentally heated 50/50
 for a few sec. Final 483° in 34 sec no fumes
 est air 5
 C0961.5 oven in 528° out 523° slow then runaway!
 504 in 41 sec but still flow ~2-3
 C0962.4 oven in 528° out ~520 more normal
 451 in 49 sec guess air 3-4
 retreat 50/50 oven in 550 out 551
 451 in 35 sec air same?
 C0962.5 oven in 531 out 512 runaway temp, fumes
 457 in 47 sec air flow guess 3 accident 25/35
 retreat 50/50 oven out 544
 532 in 35 sec air flow still low 2-3

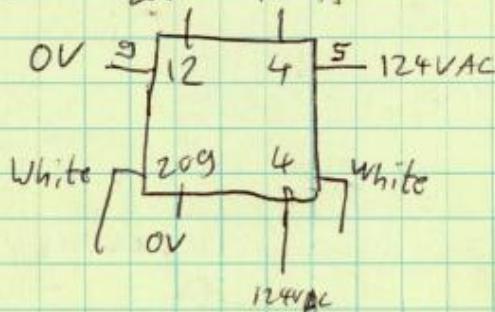
#1 Echo - Wabash Press

209 wire was 0V AC (checked DC too, o)
9 wire is at 24V DC

Wire 12 feeds 24V - If 12v off it had to come from MACD
^{back}

10/18 Debug Press hot, open 23.603", won't move

CR6: 25DC 124VAC



MACD lights: OK is on, nothing else

Press close buttons: DC in 0 and 1 respond, but
no other lights do

* Guard door still moves
PUMP was OFF

Press both buttons - light doesn't always come on - intermittent. No lock light, no press move.

10/18 2:18 PM - getting inputs 0&1
AC outs 0&10 are on. No response.
12, 13, 14 click on & off. - Heaters?
120V on 4&5 power is +25V
209 is 0V 12+25V, 9 is 0V, which wires 0V
REBOOT. getting inputs 0&1
AC outs 0&10 on. 12-15 click (heat)
when press: AC outs no response!
try again: 9&2 come on, light on
when release, 5 comes on momentarily
→ 9 goes to +25 and 209 to 12V AC

#1 Echo-2a details - Thermoforming

9/10/18

C0961 - #1 - 26 sec, 30 sec press (late close), 534°
oven @ 600° too small? ↗

C961 #2 - 18 sec heat, 30 P, 390°F, oven > 600

C961 #3 - 32 sec heat, 30 P, 469°F oven > 600 (sat)

let oven cool! oven ~ 500° S 15°

C692#1 26 sec → 359°, oven 515-525°
↳ has defent

C692#2 23 sec → 453°, oven 515-515
temp almost 360 thus runaway - sample
shrink or melt?

C692 #3 25 sec → 466°F, oven 515-534

All heat 50% / 50% TOP/BOT

150 rpm 200 rpm

Try again, get more air flow, heat 20% / 50%. 9/19/18
Panels to use: M0 421 - C0959(2) C0963(2) (heavy)

M0 422 - C0960(2) C0964(2)

drain- M0 423 - C0961(2) C0965(3)

front 32" M0 424 - C0962(2) C0966(3)

2 small snap hooks Train to 52.5" length

back 40" magnet to existing eye

C0963 #1 oven 493 20% / 50%.

release 375° (reached 386°) in 46 sec, 300 clamp
not hot enough! oven 510° 20150 450 in 69 s

C0964 #1 heat 25 / 50 over 500 451° in 50 sec

lots of sag... much more air flow! substrat!

C964.1 - about 3.5 mm C963.1 - about 5 mm

(air 12.5-1.4 to 10-1.5 air 2.5-1.1 to 1.4-0.7, 0.6-0.5

↳ replication C961, C962 (half each)

C965.1 oven 500 447° in 64 sec

much less sag - less air flow.

C966.1 oven 495 448° in 74 + 10 sec (463 max)

C966.1 - ~3.3 mm

AF 6.4-1 to 4-1.1

C965.1 ~3.4 mm

AF 4.7-1.2 to 2.8-1.2

#2 Flex - Invista Meeting

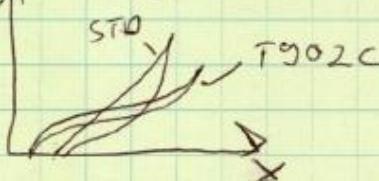
8/28

$T_g \approx 80^\circ\text{C}$ - should have good wash fastness
with the right dye

Lycra T-902 C low hysteresis, lower modulus

Fiber stress-strain $\frac{P}{L}$

Expensive yarn
hi temp stable



"ghosting" - color bleeding - in sublimation printed fabrics - working on it

T275Z - has carbon black

→ comfort index vs power index

competitive degrades to 2 Ci, 1 Pi after oil, 80°C, UV

T162 B is workhorse

Normally ship case of 72 pads, 4 lls or $\frac{1}{2}$ ll packages

Heavy denim is 36 per case

Lycra product list → sent to Lucas

Continuous Processing of Lycra

Up to 5% elastane

curling issues early are hard to correct

No 2 machines are the same - no std configs

scroll roll and bow rolls

bigger rollers help

Jom: heat setting made the biggest difference. Also redesigned the selvedge

Rob - more gradual relaxation

- considers more controlled tight strand steamer first

200° wash boxes

Rob - steam fabric before desize?

Mark: Tools helper drives off in desize section on range 3

May need to put back in?

pH should be > 4

Jerry - having shade consistency issues

Got good results ~~with~~ with T400

Rob - can go 10-15% above BO width

anything higher gives uniformity issues

90% in Europe is heat set - 166 L - 195°C

Steve: run trial with 3 different spandex types

Finishes? Can be adverse. T400 is more durable

#2 Flex - Invista meeting

8/28

Unsaturated fatty acids blend spandex

Rob Dewhurst - prep, dye, finish

Jack Krieger - sales

Randall Dickerson -

Cory Connor - boss

Emanuela Rossi - polymers

hol - portfolio overview

development around the world

plant in Waynesboro

4 pillars: beauty, energize, sport, XTRA life

↳ tests for each category, made up by Invista
sport → Under Armour

beauty → Hanes

Invista certifies fabric performance

processing is important. can't pass x-life w/o ^{good} spandex
whiteness & whiteness retention for beauty

Mostly knit drivers

↳ Not - woven is big now

spandex is robust to caustic, but add temp & tension
and you can damage yarn

T16LL - spandex goes through (problem)

↳ spandex is durable

Invista working on disperse dye technology

Syera fusion Fiber T-777F

- bicomponent can be fused to prevent runs

↳ specialty polymer w/ mechanical compatibility

T166L/B - smaller filaments have higher power

"power" is recovery power

XFIT - for bi-stretch

IR yarn for quicker dye heat-up and dry time

Aqua NRG - eliminate scour & rinse, less Si effluent

* 582L - used today by Milliken

↳ improved durability in processing, new

↳ "ideal partner for PET blends"

higher wash fastness

562B - low temp product - doesn't degrade

+ 275B - chlorine resistance for swimwear

heat set 185 to 190 °C

T400 - PET bicomponent 3GT+2GT, coils up

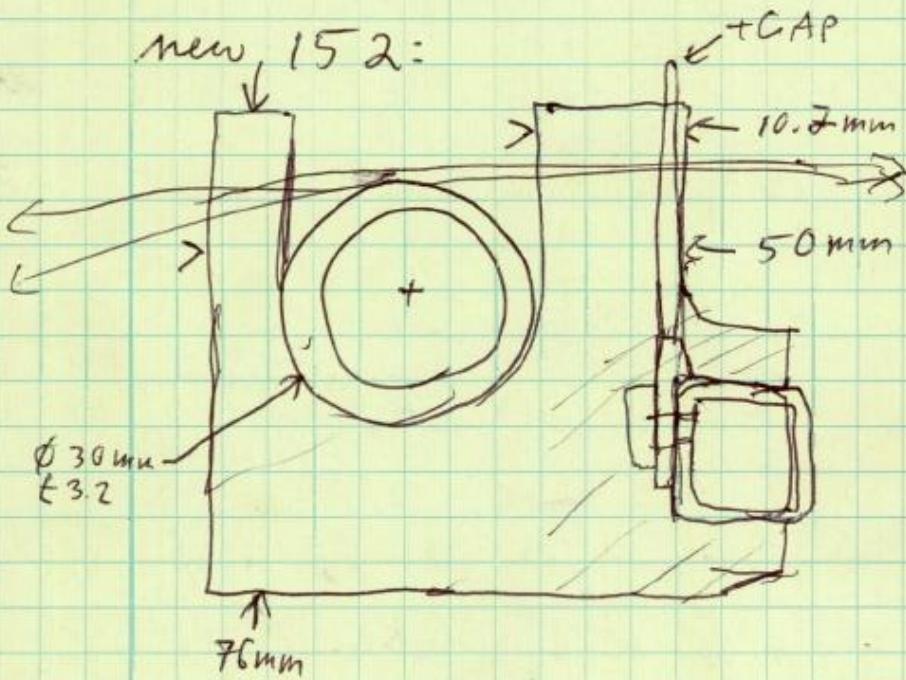
- unlike stretch, in between... use more yarn
mechanical

#3 Festrales - Gilliland 8/27, ctd.

8/27

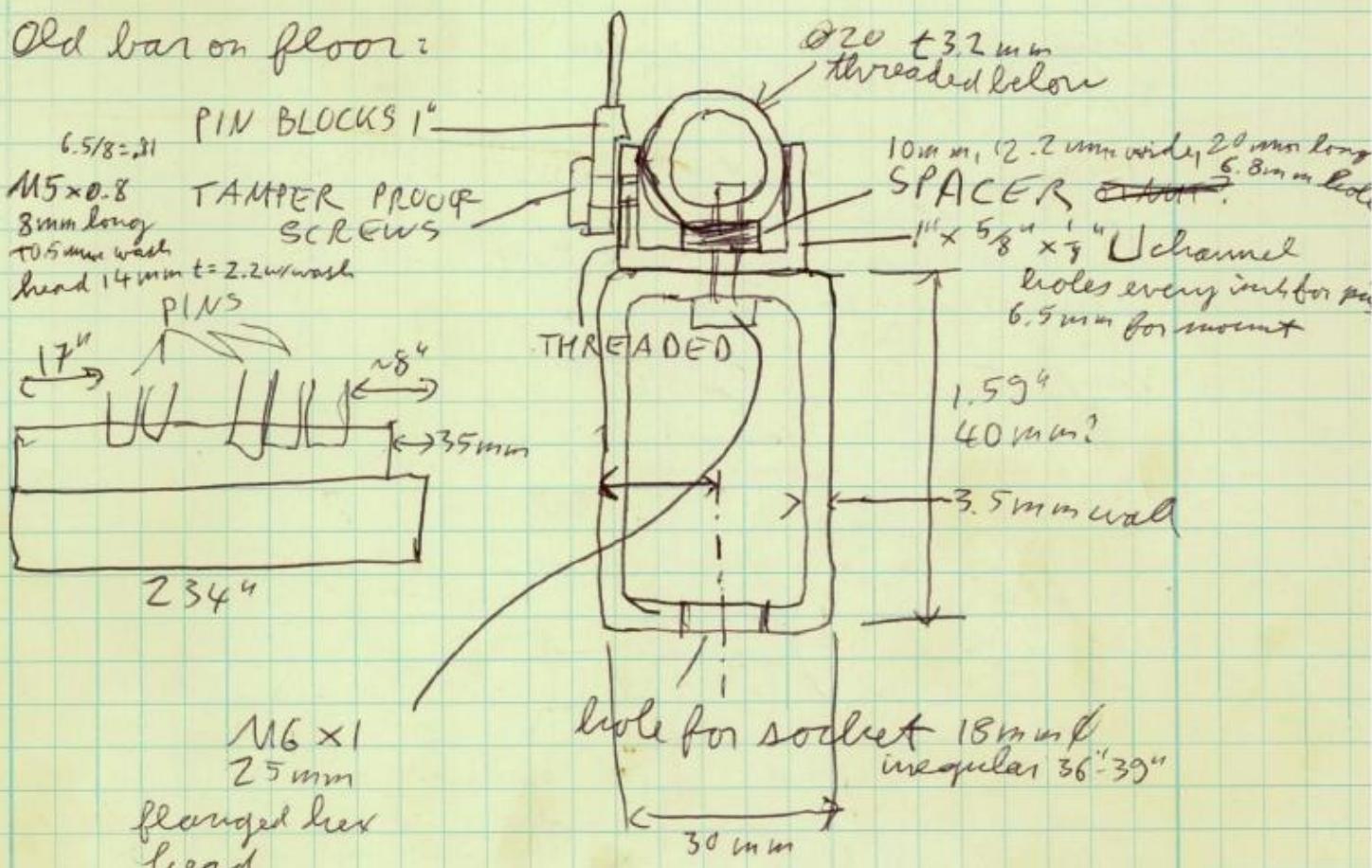
- 12:40 Plug air into 251 splices
 12:41 Start ... much break
 1:20 resume. Break was ~30 min
 Yura is on 2nd sheet of yarn
 3:08 352 - 3 sheets laid in
 251 - spliced just over half-way
 no breaks since lunch

new 152:



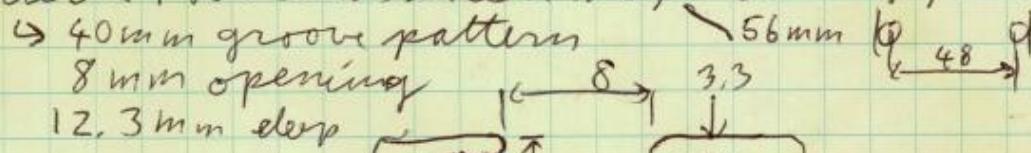
#3 Festrales-Gilliland 8/27, ctd

Old bar on floor:



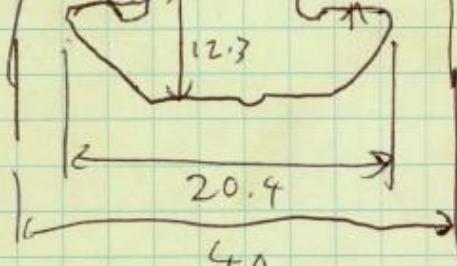
Pin screws: 4.2 mm thread minor? Get from Cloris.
only ~ $\frac{1}{4}$ " long - flush w/ channel

Issues: socket hole offset x, y $\sqrt{2.2^2 + 2.2^2} \approx 3.16$ in ✓
big tolerance - should be $\frac{1}{2}$ "
pipe not touching? nope
pin length enough? floor - 30 mm in use = ~32 mm ✓
pin block hole that big? R-9-4-0 block other slots quite big
check Robotunits hole or keep? 8 mm major, 13 mm back



Support bar on 354

\downarrow 40 x 80 x 4 wall
held in 45 mm gap
no support
254" long
span 242-248"



Install first
bar on 152

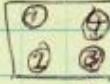
upper holes - 65"

hoist: hooles are 62" apart - configurable lower = 60"

24.

3 Festivals - Gilliland 8/27, ctd.

MYRIAM

10:19 ~~Metronidazole~~ sp is here, ready to splice ~2 years exp
pulling down yarns on  total

10:22 trim ends, start laying in start SW late
stop to talk 1 minute - probably offsetting
tape pieces 14", 13", 12", 5" on end

10:28 4 minutes - getting tape to lay back
10:30 threaded tape & pulling them.

10:32 lay in row 2. Stop for Q. Working & talking
pins are 0.072" Ø. 4 minutes again. 10 gauge.

10:38 still no work on 352. going on break.
72" reduce to 66"

0.375" spacing 166 ends over 72"? 0.434"
 $72" \times 0.4 / 0.434 = 66.4"$

11:04 still on break, just came back. Start ③
thread 3rd highest idle and pull them

11:07 start row #3 3:38 pretty accurate, no stops
↳ went back to fix some as she taped

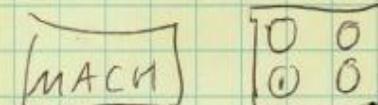
11:12 roll beam #④ throw over top Some yarns snag.
on holder arm.

11:15 trimmed, clean up. start 4. Guy asks Q
Activity on 352? ↳ 3:46 Puria start

11:19 push on rubber strip. Remove tape.
try to pull all 4 beams at once - got it
cut all tape, 4' hanging

11:26 pulling beam 1B

11:28 start layup. on 352, Puria greasing bearing blocks
↳ 3:54 for #1B

11:33 352 pulling beam 1B
pulling out... 

11:40 No Puria, 251 laying in 2nd beam. 4:42

11:42 Puria threading creel - pothly brush

11:51 251 on last beam

look at slay. 10mm socket to remove

12:05 Pulling 2nd set of 4 beams down on 251

352 ~~the~~ comb is different. wide blades
started laying in beam 1

12:10 251 straightening yarns

12:18 251 set up stands and pull down old yarns
loosen holding screws on ends. Got thick
Kevlar straps to lift. One in middle?? 9E5
Machine side pins are 9 gauge - going to 10

#3 Festrals - Lilliland 8/27

8/27

- 352 - hoist up (others hoist down)
 8:09 people in vests away
 251 - will get spliced at same time
 252 - 3 guys
 8:11 cutting warp sheet half way w/ scissors
 251 sitting idle
 352 has 6 beams
 8:13 Done. Spooling yarns back onto beams.
 8:15 on phone - 8:18 on watch
 8:17 moving hoist "use phone!"
 is black guy in training? Didn't know where
 to place the hook - yes, started last Sat
 8:21 Chris hoisting 251 beam
 8:22 second 352 beam is out, dropping to floor.
 8:25 lifting ^{1st} new beam on 352, 3 old out on 251
 8:27 New 352 beam is in, will move 3rd empty beam
 Chris bringing in ^{1st} new beam to 251
 8:29 Empty beam on cart stand. Stackable?
 4th empty beam coming out of 251, went left
 8:33 2nd new beam in on 352. Take out 4th old.
 8:35 4th old loads down. Get 3rd new
 8:37 3rd new on its way to 251 3rd new coming
 8:47 352 - 4 beams in, 6th old coming out (last)
 251 - 4 beams in 5th going out
 8:52 352 - new beam #5 going in
 8:56 251 - straining to push creel over to get to inside set
 Beaming is pretty efficient..
 9:06 251 beam #7 dropping in. 352 has all 6 in place.
 taking off style tag papers "beam ticket"
 hang on side of creel
 9:10 taking off brown paper wrappers
 9:12 251 beam #8 is in, getting old beams (3 left). Chris
 unwrapping. No tickets? "in front"
 9:16 definitely done with 352 beaming. Chris doing tags.
 9:21 more pin sled in. 166" wide (2 beams)
 9:24 getting last old beam from 251. All lined up, ready
 for forklift
 9:30 moving straps
 9:41 still waiting. 10 - gave tools to Chris 10:10 waiting

#1 Echo-Columbia Plant, ctd.

8/8

small calendar, light nips, into
sing

IR - calendar - singe

can bypass can bypass
check boards at every doff (hour)
fix if facing
singe has heavy lines
bad crash - board repair

line 2 board log - not updated since 4/6

Ryan's misting device is for edge trim

- runs tap water, maybe with lube

line 5 has edge blowers to turn in feathers
going into crosslap

#1 Edro - Columbia Plant

8/8

James Williams - quality manager

Formerly ~~Cardab~~ Rasbah

High loft, quilting, 5 needle lines

4 weigh hoppers for line 2

Blend hopper - not as good as Mix Master

Thick can card

All lines run similar denier fibers. Segregate by color

Double Doffer

Beating causes problems at crosslap

surface filling from dragging on outlet down ponds, up ponds

→ Similar to line 2 at Hillcrest, 1 at Lilar

PE IPA film from Cadillac / APT

Calender - set to 325°F

Slit edges, recycle film 'split'

nesting edge fibers before shredding

Product is Honda Accord floor SA layer

Apply foam to barrier

Columbia gets setup sheet - all settings

Line 3 - 3 weigh hoppers

thin can weigh hopper

Single Doff - less lbs/bowl down, down

large calender - similar heat set

Line 4 - 6 weigh hoppers similar

double doff - see holes, very patchy

down, down only 2 worker strippers

smaller calender, singles converted from single doff

5 - 2 down, 2 up, calender, singles, double doff

in different room, newest

option of film opener

Have water spray at weigh hoppers

No weight control - constant speed

variance comes from fiber - crimp level, finish

- weighs every roll

Double doff for wide lines - 5.5 m

Brother press roll - about 850 rpm max

Asselin needle looms vs Fehrer w/ scrims let off

but no overload iron access

All units ft/min 2nd up, 2 down but one down

is broken (brother stripper board) → 1 R box

#1 Edro - C-lab press (Walash) 817

High power is in the back, control power is in the front. Has to be booted up w/ door open to defeat the interlocks (to diagnose issue).

Working with Matt Burkhardt

Walash Service (260) 563-1184 → 5243

Suspect relay bad CR6, connected to 9, 12, and 209

Rexroth controls servo valve (Plates x/F)
HACD-1 position or pressure

Device Net sends setpoints to HACD-1 from PLC

Upper row is PLC I/O & CPU

SOL 11 does the work SOL-1, SOL-2 up & down

"SERVO VALVE" controls speed, takes +20mA signal
Blue SOL is on/off

HACD-1 lights: lock, OK, 01, 02 on

lock open - lock, 01, 02 off

close - lock on

- but slow-down pos 01/02 on

Theory - wing is CR6 output, into HACD-1

24V in pos control mode

209 is PLC coil - ref neutrals

(CR9 was fused!)

Reference voltage SOL 1 ⊕ (wing 13)
(1)

If 209 is off but 9 is on (24), relay bad

If 209 stays on, PLC is bad (R module)

SOL-1: clamp close

SOL-2: clamp open

SOL-5: decompress

9 - HACD enable
↳ check on screen!

#2 Flex-Yarn Analysis, ctd

8/6

Use less confusing lingo

$$Y = N \frac{\lambda}{2\pi} \cdot 4 \sqrt{A^2 + 1} E\left(\frac{A^2}{A^2 + 1}\right) \quad A = ? = A\left(\frac{x}{x^*}\right)$$

$$\lambda = \lambda_0 \frac{L^*}{G_0 + x} = \frac{2}{PPI} \left(\frac{L^*}{G_0 + x} \right) \quad Y = \text{constant} = Y^*$$

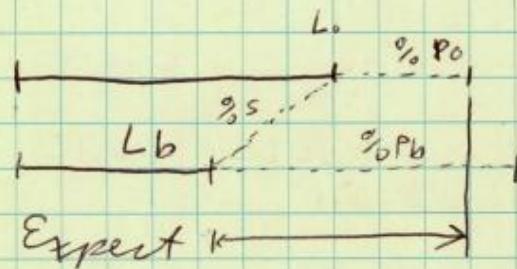
$$Y^* = G_0 + x^* \quad \text{Invert to get } C(x)$$

$$A = \frac{\text{thick}/2}{\lambda/2\pi} \quad \alpha = \text{thick}/\lambda \text{ as parameter}$$

$$A = \alpha \cdot \pi$$

$$\frac{L}{\text{thick}} = \frac{\lambda}{\text{thick}}$$

$$\lambda = \text{solved thick} = \lambda \cdot \alpha \quad L = \lambda \cdot N$$

2 unknowns, t and λ λ^* given from $t = 0$ 

$$L_b = L_o (1 - \%S) \quad L_o = \frac{L_b}{1 - \%S}$$

$$L_{f0} = L_o (1 + \%P_o)$$

$$L_{fb} \stackrel{?}{=} L_b \left(\frac{1 + \%P_o}{1 - \%S} \right)$$

$$\frac{L_{fb} - L_b}{L_b} \stackrel{?}{=} \frac{1 + \%P_o}{1 - \%S} - 1$$

#2 Flex-Yarn Analysis, ctd.

8/6

Calculate yarn length vs crimp based on a sinusoid

length of $A \sin(x)$ from 0 to 2π is

$$4 \sqrt{A^2 + 1} E\left(\frac{A^2}{A^2 + 1}\right)$$

$$A = \frac{\text{thick}/2}{2 \cdot \text{PPI}^{-1}/2\pi} = \frac{\text{thick} \cdot \pi}{\text{PPI}^{-1} \cdot 2}$$

thick = amplitude,
 actually closer
 to fabric-yarn

length, straight line: 2 PPI^{-1}



contraction ratio at any point: $\text{thick} \cdot \pi \rightarrow A$
 solve in terms of extension

$$\lambda = 2 / \text{PPI} = 2 \cdot \text{PPI}^{-1}$$

λ^* as straight line - $A = 0$ $E(0) = \pi/2$
 not right!

$$L = \frac{\lambda}{2\pi} \cdot 4 \sqrt{A^2 + 1} E\left(\frac{A^2}{A^2 + 1}\right)$$

$$L^* = \frac{\lambda^*}{2\pi} \cdot 4 \cdot 1 \cdot \frac{\pi}{2} = \lambda^*$$

λ depends on stretch: $\frac{N\lambda}{L} = \frac{N\lambda^*}{L^*} = 1$ $L = N\lambda$

Relaxed: $\lambda_0 = \frac{2}{\text{PPI}}$ Taut: $L^* = G + x^*$ gauge extension

$$L_0 = G = N\lambda_0 \quad N = \frac{G}{\lambda_0} = \frac{G \cdot \text{PPI}}{2} \quad N\lambda^* = G + x^*$$

$$\lambda(x) = \lambda_0 \cdot \frac{L^*}{G + x}$$

$$\lambda = \lambda_0 \cdot \frac{L^*}{L}$$

yarn length $Y(x)$ fabric length $F(x)$

$$\text{contraction } C(x) = \frac{Y(x)}{F(x)}$$

#2 Flex-Yarn analysis, ctd.

7/24

Actually, look at fabric.

$$\text{Boiled shrunk by } 5\% \quad L_B = L_0 (1 - 5\%) = K L_0^{0.8}$$

Now measure strain on boiled specimen
 Hold gauge length $L_G = 3"$

$$\epsilon_B = \frac{L_B + x_B}{L_G} - \frac{L_B}{L_G} \text{ make equivalent to original strain}$$

$$= x_B / L_G$$

$$\epsilon_0 = \frac{L_0 + x_0}{L_G} - \frac{L_0}{L_G} = \frac{x_0}{L_G}$$

~~$$\epsilon_B = \frac{K L_0 + x_B}{L_G}$$~~

$$\epsilon_B = \frac{x_B}{L_G}$$

clamped length is $\frac{1}{K}$ longer than original

$$\epsilon_B = \frac{K L_0 + x_B}{L_G} - \frac{L_B}{L_G} = \frac{L_0 + \frac{x_B}{K}}{\frac{L_G}{K}} - \frac{L_B}{L_G}$$

$$\epsilon_B = \frac{L_B + x_B}{L_G} - 1 \quad L_B = L_G \quad L_B = K L_0$$

$$\epsilon_0 = \frac{L_0 + x_0}{L_G} - 1 \quad L_0 = L_G \quad L_B = L_G (\epsilon_B + 100) = L_0 (1 - 5\%)$$

corresponds to

$$\epsilon_B = \frac{K L_0 + x_B}{L_G} - 1$$

$$\frac{L_G}{K} L_0 = \frac{L_G}{1 - 5\%} (\epsilon_B + 100)$$

$$\epsilon_{eqn} = \frac{\epsilon_B + 100}{K} - 100?$$

$$\epsilon_0 = \frac{L_0}{L_G} - 100\%$$

$$\epsilon_0 = \frac{\frac{L_G}{1 - 5\%} (\epsilon_B + 100)}{L_G} - 100$$

PPI for shrunk fabric?



$$\frac{40 \text{ picks}}{(1 - w\%) \text{ inches}} = \frac{\text{PPI}_0}{(1 - w\%)} \text{ PPI}$$

$$\text{Picks} = 2" \cdot \text{PPI}_0 / (1 - w\%)$$

} warp shrink
 $w\%$

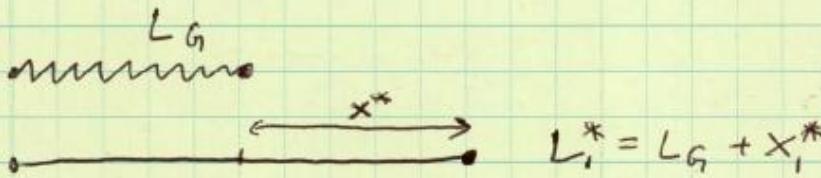
$$= \left(\frac{1}{1 - 5\%}\right) (\epsilon_B + 100) - 100$$

||
C

#2 Flex-Yarn analysis

7/24

Did we scale yarns right?
Gauge lengths = 10"



Find point at which yarn bottoms out

$$\varepsilon_1^* = \varepsilon_2^* \quad \varepsilon_i = \frac{x_i^* + L_G}{L_i}$$

$$\frac{x_1^* + L_G}{L_1} = \frac{x_2^* + L_G}{L_2}$$

$$x_2^* + L_G = \frac{L_2^*}{L_1^*} (x_1^* + L_G)$$

$$x_2 = \frac{L_2^*}{L_1^*} (x_1^* + L_G) - L_G ?$$

Need to find L ratio with equal strain state

$\Rightarrow 80\%$ of peak force (smoothed)

minpeak is lowest max (smoothload.) $N_{min} \leftarrow$ first equal L^* , then scale strain

Say 1st yarn breaks @ 4" \rightarrow 14"

2nd breaks at 2" \rightarrow 12"

2nd extension @ 2" (12" total L) equates to

$$x_2' = \frac{14}{12} (2 + 10) - 10 = 4" \quad \frac{L_1^*}{L_2^*} (x_2 + L_G) - L_G$$

at 0":

$$x_2' = \frac{14}{12} (0 + 10) - 10 = 1.67" !$$

$$\text{at } -2": \quad x_2' = \frac{14}{12} (-2 + 10) - 10 = -0.67"$$

$$-1.429" = x_2' = 0"$$

$$\boxed{x_2' = \frac{L_1^*}{L_2^*} (x_2 + L_G) - L_G}$$

#3 festivales - Gilliland 7/19, ctd

7/19

Yarn runs between two wires 

3:01 threading back wire thru

↳ protects bar from wearing out

~3:07 start threading 2nd bar

Moving pretty quickly

Lay tool on back while pushing wire

- Keep compact

At end, have to cheat - thread dense

3:14 Almost to middle.

Elizabeths angling piece to line it up

Some drop right in

- try 4x until it does (only takes a second poetry)

3:21 start last 16"

3:22 Done. Clipping wire bend & snips → 3:24

Cutting renegade filaments

Advanced roll w/drill, pull yarns down.

2 pulled out - split between eyelets?

3:35 Two maintenance guys + Anthony - putting quid bar in

3:36 Take off quid bar holding tape

3:38 laying loose yarns under bar to reach from other side?

Machine should take 6 hours, took 5.

3:43 554 has no front beams

#3 Festrales - Gilliland 7/19, ctd

Taking out old yarns just before new yarns

11:15 + getting step stool, come down

Cleaning up cut-off stuff (tape & yarn)

mostly tape - yarn goes elsewhere

cut out old yarn close to quid bar

pull out of 2nd sley

12:06 done cutting, clean out yarns

12:09 went up for something

Take off gear so she can pull yarns

Need to find 3 people

take out first 3 quid blocks to not hit

the drain made L 18-4-12 (W) (F)

12:16 left to find people

12:22 car there; operator here, take bar out
run dull, pull yarns down

12:29 lunch break. Next-thread hoolies

last, thread ~~quid~~ ~~bar~~ 20 gauge bar
cut yarn off @ tape

1:18 start threading eyelets

Have 9g threader to pull yarns & comb block to
thread, then pull thru! Some ends didn't catch
→ fix by hand

Hoolie in, hang over. Clamp tape. Turn block & thread
video was on edge - need room - gets easier
do about 2 1/2 - 3" at a time

1:34 ~24" done. Tool is tricky but still efficient.

1:37 new est on 554 is 4:02 PM

1:57 almost half done

1:59 start 2nd half (beam set)

2:19 554 is done - one of the front beams is out of yarn

Quit a bit left on back beams! Relatively speaking

2:26 651 down to end → do front & run some more

last few inches - hoolies are too wide

have to hoolie thru threaded holes

combing tool base radius looks sharp

- does mess up yarns slightly

↳ they advance beams to get past bad section

Unthreaded bad part will wire sley pin (2" area)

2:43 554 front beams are cut

651 fixing missed ends

2:57 cut wire. Some filaments in wrong eyelets

- Should clear itself up

#3 Festrales - Gilliland 7/19 ctd.

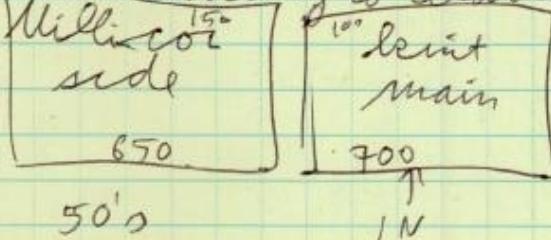
7/19

Beams on 406 are only 54" wide
 Extremely sticky substance on pinsley end
 from hot melt

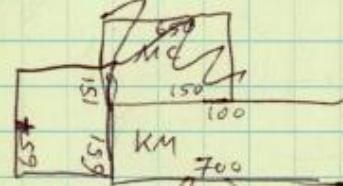
Have little T-shaped piece to keep hot melt from
 FLUTTER BAR breaking out

10:36 AM 554 scheduled for 2:44 PM 11:27 mon 3:26 PM

threading to change sley out



Screen matches layout



Hardest part on new machine
 is guide bar - yarn goes under & over
 sley bar takes longest

long sley bar w/ eyelets, move w/ hoist
 ↓ drop down is easier
like sley on 353 - take out sley w/ hoist

554 - takes 7 people

split sley on 551 - each piece weighs 22 lbs

→ make bar hoist liftable

7 people need 13 m in wrenches & lots of ladder

R-⑩ - 4-0 go on 554 bar

→ same hole pattern for all, also on 406

~~new wire, w/ wear marks~~

old wire - looks chrome-y

breaks once scored!

Flutting parts made by Saxonix
 distributed by Kerns - Liebau USA Textiles Inc
 Sley wire -

0.039" x 250 SS .039 x 175 SS Textile Specialties
 222" .039 x 222 SS Harry Hopkins

303 next to point up - waiting on beams

Waiting on quote for liftable sley bar

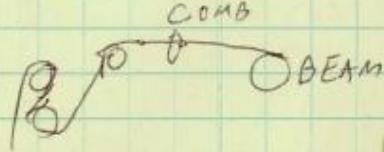
11:37 on 551 - Elizabeth taping bundles

holds tension with her foot, about 8" wide x 12
 machine has 2 beam sets @ 72"

11:42 - 5 left 11:43 start #9

~ 12' of yarn weight holding tension

11:47 done, threading big rolls



#3 Festivals - Gilliland 7/19

7/19

554 - currently 1:30 schedule

Working on 651 - totally different

Starting on 308 soon - threads from front

Chris changed to 55 wire

reading out to CT company

Wire is \$3 for 220"

Long bars are 87 - 265" - only for new machines

Other machines - connect in middle

Other wire broke between warp-outs

comes in straight PVC pipes

Clevus - they used to use TOTO on single beam

tie-ins. Only trick was setting up TOTO frame.

Use TOTO on Malinos - 1050 end beams

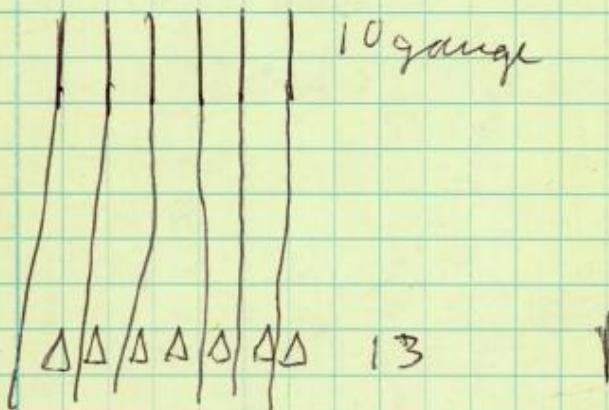
Other beams are 580 ends

Use as a flat tie

Only have 2 threaders who can use TOTO

↳ If you mess up one step, have to thread whole machine

Turns small job into redo

TOTO takes longer than thread-takes skillFirst photo - 651. Don't care how 2nd sley is threaded

Good threader lays bar in 30 minutes

Pin slays are 9, 10, 13 gauge

looking at 406

pin sley holder is inclined ~ 30 degrees

some pins are bent

Biggest concern is pulling old yarns
back up or splitting or taking out slack

Just that threader needs to pull out easily

many pin slays are vertical, more bent

↳ base usually better than tip

#1 Eclo-Thermoforming

7/2

M0323

M0186

Try to mold C0923 (x4) and C0924 (HDPE(50gsm))
on thermoformer - see instructions p.2

Also try to hot press a piece

TF: 52" - 53" across \times 56" long (48x52 plates)

turned on 3:10pm

actual size 27 \times 56 - cut to 53"

3-4th start TF - 30sec - not enough

C0923.1

2nd piece - 40sec - slow close (manual)

C0923.2

3rd piece - 40sec - normal close

C0923.3

C0924 - 40sec, normal

C0924

Press - 240°F, 1 minute, 3mm = 1.355"

1.226° zero + teflon = 1.233" set @ 1.351"

max P 1 ton - popped out briefly

2nd piece - 280°F, 1 min, 1.351"

3rd piece: 274/281/260/274

feels like wind flow... PTFE sheet left
an imprint on the surface!

4th piece: set point 275°F but taking too
long. Just run it. 255/254/263/270.
whatever.

#3 Sestrelles - Gilliland visit, ctd.

2:52 dropped in third beam. fits lower!

3:00 4th beam above us

407: lowers sley done, spreading out yarns
on top idler

706: eyelets done, going on treadle bar
only about 20 x 4 pairs left

407: R side is bad tangle, combing

3:14 706: cleaning up! Cintlyns and Elizabeth,
walking together
cutting old yarns

Tools 8 hours for 1 machine

16 hours for full Tubs put bar in

3:23 151: 6 beams in place, #7 coming.

3:34 7 in, #8 in place

Hendrichs - operator (4 months)

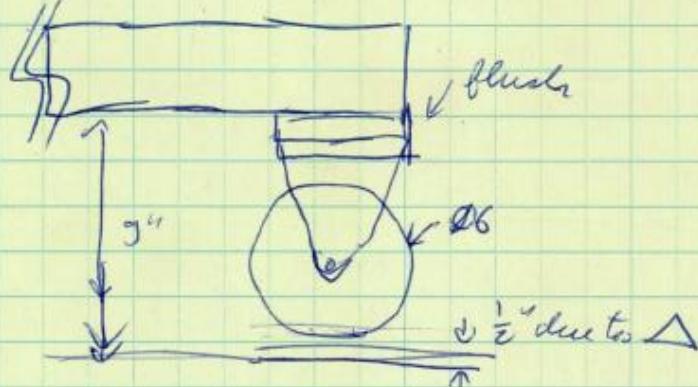
If yarns aren't spliced well, machine will
pull them apart when it starts

3:48 9 beams and waiting...

5:11 706: 2 men looking at bar, starting to put it in

407: almost done, about 2' left

5:15 151: 12 beams in,
wheels:



next shift comes at 8PM to splice
brahes - all ropes go forward to machine, with
hang in back near wall

#3 gaskets - Gilliland observations, ctd

$41\frac{1}{4}''$ for 43 gaps - $0.955'' = 24.4\text{mm}$

732 mm for 30 - 24.4 mm

need 3 bolts facing down sideways!

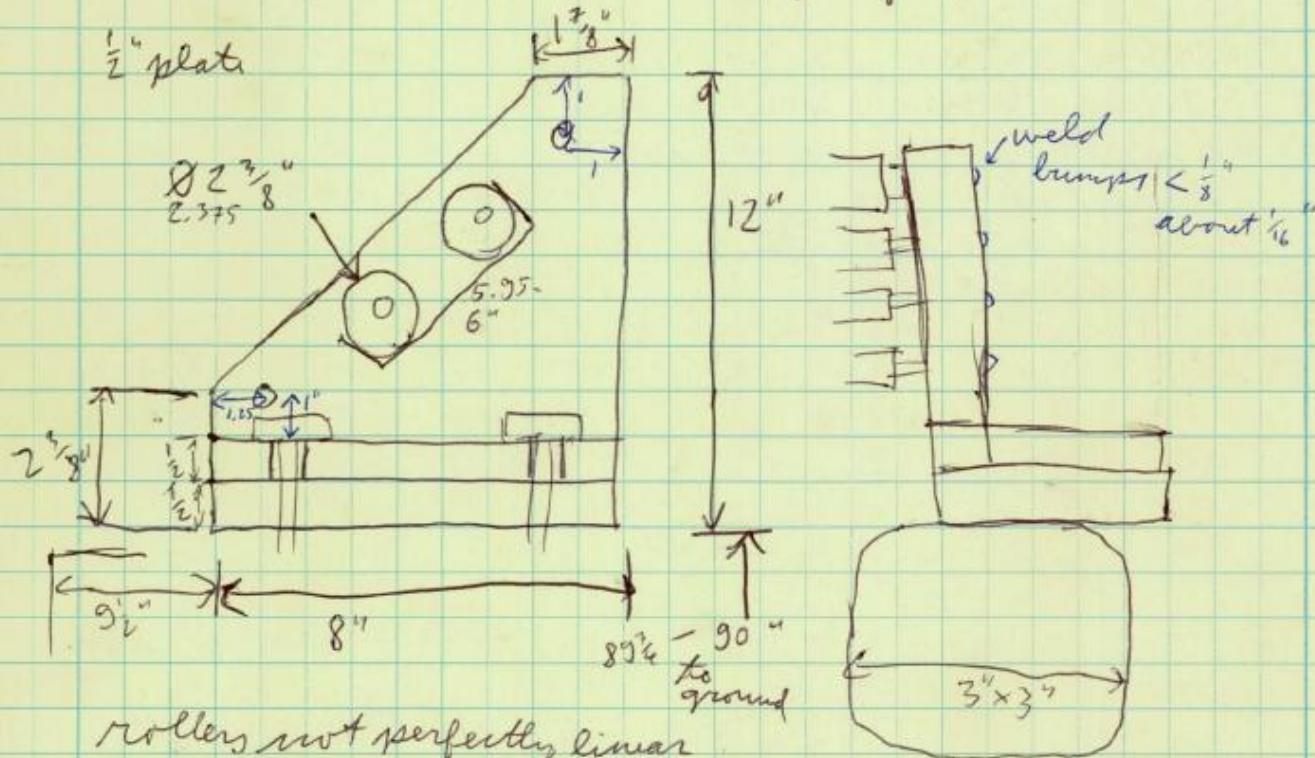
wrap with tape to hold in place

gaskets are about $\frac{3}{8}''$ deep

bolts currently extend $2\frac{1}{8}''$ beyond face

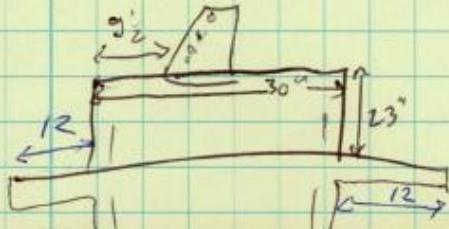
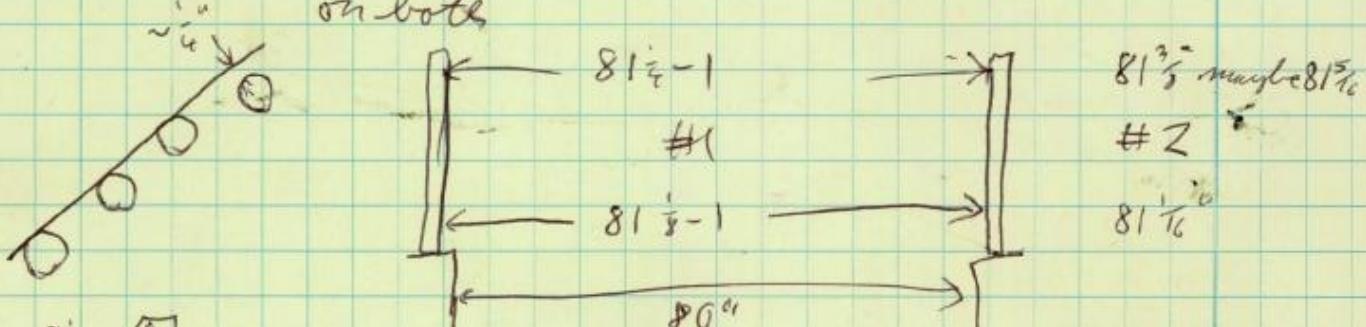
eyebolt plates & painted steel? Magnets are a possibility, but tape wedge isn't bad

2:25 cutting off love handles must interfere w/ 151
handles hit the yellow overhead breast bar
that carries the beam
New roller holders: not very square



weld lumps $<\frac{1}{8}$
about $\frac{1}{16}$

rollers not perfectly linear
on both



lower blocks: $28''$ above $\frac{1}{2}$ on $\frac{1}{2}$ plate
vs $23\frac{1}{2}''$ new design

#3 Teststrals - Gilliland observation, ds

712

11:46 OP got help for 407

11:49 fixing ends?

11:51 151: New raddles are here, no beams
steps are 2 5" high - is that enough?
Nice handles to hang on to
maintenance setting up beam weight,11:59 407 ready to tape full width
- except she does it in sections in case something is loose
About 8" wide - not exact

- LUNCH BREAK

12:45 Cintliya almost done running yarns to main slay

12:53 starting thread of selvedge yarn

1:03 $7 \times 4 = 28$ ends in

151 - still no beams.

1:13 407 has slay in place. 2 operators.

1st subsection pulled in

1:18 Elizabeth took over from Cintliya?

1:19 15×4 done = 60 ends (2 ply)~~Have~~ Have to grab 4 at a time, knot up after

1:23 still pulling in bundles

1:34 706 - Elizabeth threading a comb

1:38 resume eyelet threading

tools video. Pairing up plies and
knotting tails most of the time.

1:41 407 threading down slay

feeding in wire every few yarns to hold
working from both ends

Trying to keep ends taut to drop in yarns

1:49 Still eyeleting on 706. Cintliya needs Chris due to
machine issue

1:51 151 has first beam hanging (bottom mach side)

loading front first? back would seem more
convenient, room to walk around2:01 R half of lower slay done on 407! Cleaning up
some tangles?

2:07 706 getting close - but more mini combs to thread

2:12 2 beams in position on 151 - back raddles!

2:16 407 has ~ 2 ft left on lower slay

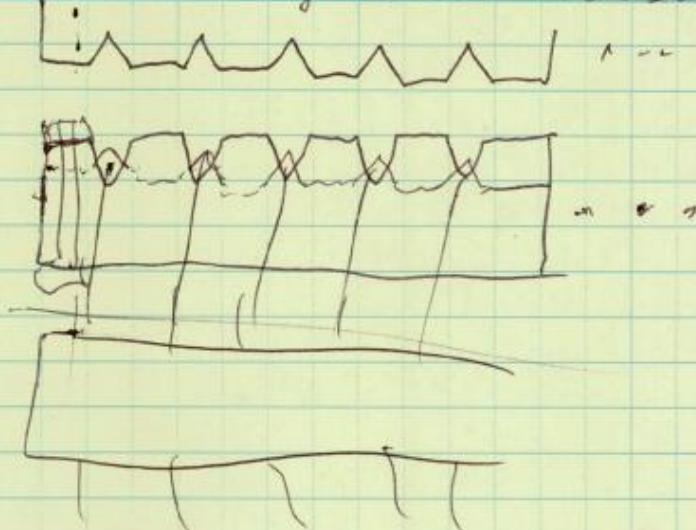
4 beams x 143 ends

2:19 706 taping last comb? no, 3 more bundles!

Cintliya threading barguid (aka threads bar)

#3 Test trials - Gilliland observation, etc

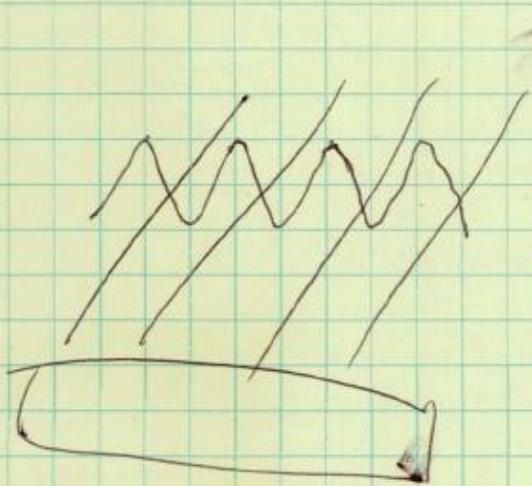
7/12



Chris - 2:25 min
very efficient
143 ends

Chris 2 1/2 vs 8

Pin slays cut time in half
554 slays are bad



- 11:05 start ends after tape & clean up, start laying in (Sw)
have to stop to cut tape over subsections where
sley is split - this operator needs less skilled
- 11:03 almost done - went back for one strip
- 11:05 5:35 to actually lay in 143 ends. taping back
703 - left quarter ~ 60% done
- 11:09 407 getting #3 beam yarns in position
- 11:11 start row #3 (Sw) - watching from afar 7:29!
- 11:13 taping back end section, start last beam
- 11:22 turned red, clearing up. start! (11:22)
pause to adjust beam. More. Adjust again. Did tape
get messed up? 9:48 this time
- 11:33 capping off comb. Says tape was loose. Happens
1 in 10 times. Probably got messed up when she pulled
- 11:41 cutting off tape. Straightening yarns again
- 11:45 walked away. 703 - left quarter done - working on main sley

#3 Festivales - spilliland observation, ctd 7/2

8:54 start #2 (3.2). tail fell down - racles are awkward.

~~This~~^{#4} is the one that ran out

8:58 start #4 - clamp at slay. No hools?

Person is spray painting the fabric

9:03 down \rightarrow for camera

creative tape to cage

Maria: "3 lead worst case"

Elisabed show me 706

Maria: old school method

Pull through with a hook, but is new - tape at rock

put in hook set

9:15 thread up 8 at a time - 7/8 worked

Maria = Cinthya Ramirez

Fiberglass yarn - makes you itchy

9:30 still waiting on beams

9:38 taped up 7 of yarns to move over, involving them - need to crochet to yarn doesn't pull back

It gets harder as you go up - more yarn, unergonomic position - overhead other operators not contributing much, cuts off tape

9:50 try "new" method - seems a tad easier

9:53 ~~X~~ ends done (2 sets, 1 row) 2 individual yarns

= 9:57 16 more 18 ends per row

9 hools per row would help

9:59 8 more in

10:00 $4+8=16$

10:03 $8+8+2=18$ more down

10:07 18 more - break?

yarn racks have pseudo-eyelets that can be threaded through

152 should warp out next Mon - best can

~~Stock~~ Thread-ups on 407 &

- 2 rows over from machine w/ glass yarn, eyelets

10:54 start rolling beam, prep for slay prep

10:56 take back first set of yarns

pull tail thru 2nd roller

10:58 tape in position

* Cloris already did now

#3 Testrals - Gilliland observation

7/2

Splices - start 8 AM - push in new stands to lay out
 (roll on one corner of +) 6 stands (3 sets)

8:03 get clamping bars in position 4 pairs per section.
 Cutlers - best operator → 2 on bottom, 2 on top?

8:06 clamp bars in ~~working~~^{going to get} 2 more threads

8:11 3 people here

8:13 2 starting on R side - threading the needle

- clamp bar came apart, warp is loose now,
 spool bad male part or bottom?

third person spinning beam to help & catch
 some yarns tangled on elbow, clamp rods
 cut about 2 yards extra after clamp
 ↳ no tape

8:17 start #2 break off beam

some yarns on outside of beam

bundle yarns into 2, stuff into cage

8:19 start #3

8:21 another person arrived. start #4

clamps need to be squeezed in middle

operators get inside yarn sheet if needed

8:23 clamp #4 fell down. Roll back

yarns tangled - new or just loose yarns on stand

Need rubber bands to secure clamps - bromeli bands

left to do something (- sley -)

(12)

Clamp bar rods stick out 11" beyond cage

(13)

They're back, deliberating. OP here will comb

Comb back from sley bar ladders not wide
 enough to read. What now?

8:35 try again - clamp at sley ~~and tape it~~ it hangs on hook

tape to sley ^{just enough}

8:38 push each over to make room for ladder. do
 middle section. 3rd person moving beam weights.
 this helped catch - caught up in middle
 load top bar first. Hung knot over side.

8:41 start #2 ↑ tarp blocking cage

- almost knocked off bar with next bar

8:44 start #3

8:46 start #4. Tari about 3 1/2 yards

8:47 move ladder, rods. Wheel brok, stuck - see pic

8:52 #1 down - missed some ends (2) - tied into bundle
 stands too close together. Feed interfere

base of clamp stands: ++

Master List of Projects

#1 Echo Ice Detach

#2 EleX

#3 Festrales

#4 Typhoon

#5 Enterprise

#6 Valway

#1 Echo - Vistamaxx evaluation

5/17/2018

Try to mold C0875 piece #3 (150gsm Vistamaxx or M0323)
 cut small panel ~ 10" x 12"

mold at 240°F for 1 minute

zero gap: 1.230" + teflon = 1.237"

3mm = 0.118 setpoint = 1.355"

11:21:20 - 11:22:20

see grid, but some areas quit filled

Try again @ 30 sec → similar result
 probably no air perm

Heat in oven @ 190°C for 60 sec

Try 4mm (sample ~ 4.4), no AC plates

Zero @ 0.979" 4mm = 1.136"

2:03:23 → 60 sec looks breathable

Heat in oven @ 190°C for 3 minutes

- very breathable

4mm, 375°F 0.985 zero + PTFE → 0.991

4mm = 1.148" 2:37:15 → 60 sec

Thermoform a piece

5/22

Thermoformer:

- Machine Power Disconnection
- Flip 3 toggle control power
- oven master on
- screw 2 & 3 - set all temps % 25% top
50% bottom
- turn on air valve for clamps far ~~left~~, left
- temp is 80-90 degrees off
- can't stop short of cycle time - hold "hold" button

First pieces: ✓ C0870 380° (40sec) 150PE flat belt
 C908 ✓ C0868#1 390° (45sec) 200PE belt

✓ C0878 - 40sec, too hot 100VM belt

✓ C0880 - 20sec, 460° 15VM ~~200VM~~ belt

✓ C0874 - 25 sec, 400, slow close (manual)

C911 ✓ C0871 20 sec, 400, good 150PE belt

C909 plain 150PE

✓ C0876 150VM - too small!

C0876 150VM flat

✓ C0875#2 150VM normal belt 390°

#1 Echo - VistaMaxx evaluation

5/22/18

Measure air flow:

C0908	C0910	C0911	C0874	C0912	C0913
C868#1	C870	C871	C874	C875	C876
1.46-.77	1.11-.62	.017-.016	9.18-2.26	5.76-.92	,03
1.96-.85	1.10-.74	.03-.02	7.14-1.48	5.35-1.26	.01
2.12-.76	1.16-.55	.02-.02	7.43-1.65	7.55-1.04	.05
2.36-1.00	.99-.61	.04-.04	4.72-1.18	5.54-1.08	(solid w/defects)
2.05-.96	1.19-.69	.08-.07	7.79-1.94	6.34-.91	

C0880

↓ solid PE

C880

C0909

6.84 - 2.45

.01

4.17 - 1.61

.01

4.17 - 1.14

.02

5.12 - 1.10

.015

3.60 - 1.54

.03

C0878

C878 " "

7.22 - .42

1.67 - .48

.32 - .23

.45 - .28

.13 - .11

	Ice	Bend	Inside	
C908	6	4	6	← all labeled CD
C909	—	4	6	1500pm! PE
C910	6	4	6	
C911	—	—	—	
C912	6	4	6	
C913	—	4	3	M0 only
C914	—	—	—	
C874	6	4	6	vs 10 mm!
C878	—	—	—	Actual is 8 x 40 mm
C880	4	—	—	bend: 20 mm/min
M323	—	4	6	100 mm open
TF				

98941 request

Tensile - Military
ASTM D638 IV die~~6 x 33mm mech~~

Actual is 8 x 40 mm

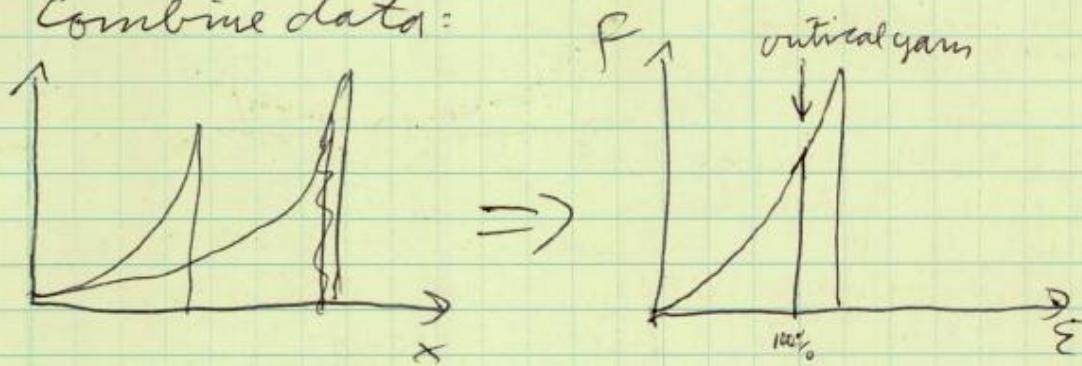
bend: 20 mm/min

100 mm open

#2 Flex-Yarn analysis

6/15

Combine data:



Get strains to line up - measure in 0.5% increments over available data.

- Find strain at critical load (peak^*)
- normalize ^{each} all strains to that
- interp1 force data in 0.5% increments. Return zero if out of range.
- save smooth load data in cell array

* back off peak or breaks to get into smooth region
 - use minPeak/2
 - but keep NormExt at 1 at minPeak for weakest yarn
 → calculate