



# Cloudhopper News

Issue Number 62

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Good day People and once again its Newsletter time.

What a month January turned out to be. I started a path which has just got bigger and bigger as the month has continued. The subject? Well unless you have been away for the whole month, there is only one, Nylon verses Polyester!

I have sought clear concise factual information on this hot topic, and where manufacturers have made claims, I have tried to get independent verification of the claims and hope you enjoy the fruits of my labours. What I hope I've ended up with is a balanced view of the merits of both materials and if I do nothing else but make you question your future choices, then I have succeeded in my quest.

In my opinion, we are here in the UK so conservatively minded, sometimes it is easier not to open your eyes and consider another choice rather than choose the obvious one, and yet there is a quiet revolution going on with Polyester making a real hold on the general market, maybe not so much with hoppers, but then if you like me didn't realise Kubicek made them, why would you question the idea of buying a Czech Balloon.

## 1, Ed-Speak – Hydrolysis, Hydrophobic and Porosity.

I'm a composites guy, working with all sorts of blends of fibres in my day job. Yet when I started researching the merits of Nylon against Polyester, suddenly I'm talking to people who regularly quote me high scoring scrabble words with meanings I had to look up.

Hydrophobic for example is too long to be a scrabble word- but how many of us actually understand its meaning. Part of my research took me to a leading brand who used to make balloon type Yarn and suddenly I'm talking to people with "Ologies" and trying not to look stupid whilst constructing a reasonable rhetoric about salient points and suggesting that we the buying public have up till now had a closed mind to change. So whilst I have tried to remain Bullshit free in my analysis, please don't confuse me with the experts because clearly I've still got loads to learn.

**Steve Roake**

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Hydrolysis  
,Hydrophobic  
and porosity.

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Nothing

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Klein fan



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## **2. Essential Extra's / Tech Talk**

Easy and quick, received nothing so printing nothing!

## **3. The Features Section**

### **Nylon versus Polyester-by Steve Roake**

The future of ballooning as we know it lays in advances in fabric technology. Coming into ballooning with my background as a composites specialist in formula 1, I'm used to rapid changes in the applications of exotic fibres and finding the perfect blend of tensile strength with torsional rigidity is an everyday occurrence in my vocation.

Being involved in the cloudhopping scene, recent events have lead me to question the age old debate of which is best, Nylon or Polyester? Having been sent photographs from Tannheim Austria of a hopper owned by a Russian called Stanislaw Fuodoroff, and being manufactured By the Czech firm Kubicek who previously hadn't a product in our sphere of ballooning and knowing that the fabric used was Polyester, with weight and pricing generally favourable compared to products from the big three, it seemed an ideal time to question the marketing claims and see if I were in the market for a new hopper, would now be the time to choose Polyester over Nylon?

Kubicek is the only company in the world which develops and manufactures its own balloon fabric and has over 25years of experience collecting systematically know-how in that field. With British people having a conservative nature, why question the fabric technology? And why now? The claims of the competing manufacturers seem at odds to one another and in order to be objective, my view was that the only way to differentiate between Nylon 6.6 (the type used by Cameron Balloons , Lindstrands and Ultramagic ), and Polyester (branded Triumph by Kubicek), would be to collate the views of the manufacturers of the raw ingredients.



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My first task would be to understand the molecular differences between both products and having a Materials Scientist at McLaren racing, my first stop was Simon Batho who told me that neither was a complicated matrix and in his opinion the only difference was the hydrophobic tendency for Nylon over a period of time to absorb water. Having suffered Hydroscopic failure in Nylon poles myself, clearly this seemed plausible. However I wasn't aware that if you fly a Nylon balloon over an extended period with your whisper burner, besides the build up of soot you are actually shortening the lifespan of the product. Soot holds moisture. Clearly the use of urethane coatings will slow this process down but not stop the absorption. He intimated to me that it was probably more important to fly the balloon dry and store it dry than to worry too much about hydrolysis and porosity of the fabric.

Kubicek claim that their balloons can achieve high hours utilisation, in some cases significantly higher than Nylon comparisons, and having established that Invista Ltd.(a division of Du Pont) used to manufacture both yarns and furnished by facts supplied by Alan Noble MD of Cameron balloons Ltd which seemed to favour Nylon 6.6 , I decided to go directly to the company themselves to garner their opinion because the presentation by which the claims are made and used by Cameron Balloons was given in January 2005 by a Susannah Rayfield of Invista Ltd, and this seemed a bit out of date to me. Eight years in formula 1 is a lifetime and whilst fabric technologies move slower in ballooning compared to motor racing, and being a born sceptic, it seemed a good time to question whether or not the claims stood up to the test of time, and more importantly whether or not the situation had changed. In 2005 Susannah Rayfield suggested that:

- 1, Polyester is 21% denser than Nylon 6.6
- 2, More coatings means less porosity.
- 3, Nylon 6.6 is 30% stronger than Polyester.
- 4, Nylon 6.6 has better Abrasion and tear properties.
- 5, Hydrophobic Fibres. Nylon absorbs more water than Polyester but Cameron's claim Urethane coatings stop hydrolysis and thus reduces porosity.
- 6, Nylon 6.6 outperforms Polyester in terms of retained strength over a period of time by a factor of five.



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Whilst awaiting responses to these claims, I contacted **Iain Bradley (IB)** of Invista UK Ltd. who informed me that firstly Invista no longer produce ballooning yarn and that Susannah Rayfield was no longer working for his company. He was happy to forward the claims to the company's Technical Director in Canada for his appraisals and having telephoned Kubicek's UK dealer Crispin Williams at his suggestion I contacted **Petr Kubicek(PK)** for the Czech manufacturers views and reasons why they chose Polyester over Nylon.

Interestingly Crispin did come up with a couple of statistics which are interesting. In 2012 in the USA, Kubicek sold over 30 balloons to the US market compared to 42 supplied by Cameron's US division. In his opinion, this statistic alone will influence Cameron's to look at Polyester again for its product range soon. He also pointed out that each and every special shaped balloon made by Kubicek Ltd, is still surviving today, a small fact but quite significant.

Now suitably furnished by responses from both parties I will endeavour to deliver to you the reader an unbiased appraisal of what the various parties suggested. It was confirmed that Invista are no longer in the ballooning fabric trade having sold that side of their business to Premiere Fibres Inc of Ansonville NC and answered their claims made by their compatriot succinctly but **Petr Kubicek(PK)**, was prepared to expand further comparing like for like and adding data to his answers. Therefore I will just show you what was said by both.

The statement of comparing like for like is universally agreed that they are like chalk and cheese. Summed up by Hans Cord from Schroeder Balloons, on their website when they say "it is clear neither is seen in each field as winners. In Polyester it is the temperature resistance while in Nylon better elasticity of the tissue, higher tear strength and durability of the coating that are the key elements.

**PK** says "comparing PES vs. Nylon material is not very accurate. Field of technical fabric is developing rapidly. Possible disadvantages of base material can be eliminated by technology of manufacturing and final finish. Balloon fabric is composed of two basic components – the fabric itself (fibers) and coating. Some properties are affected by fibers, some by coating and some by both of. In addition there are several manufacturers of Nylon fabric – e.g.



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MEYER-MAYOR, Coating Application, Porscher, Gelvenor, Luckenhaus – with quite different characteristics. So if we are talking in facts we have to work with specific balloon fabric as different balloon manufacturers use different fabric. Let's talk about balloon fabric differences (final product) better than about Nylon vs. PES. I suppose we are talking about standard rip-stop fabric as a topic of our disputation here, not HTN (Hyperlast) fabric which we can discuss next time.

Into specifics; **Polyester is 21% denser than Nylon.**

**(IB)** of Invista agrees.

**PK** takes a slightly different view.

Nylon – 1.14 g/cm<sup>3</sup> [http://www.stelray.com/density\\_val.htm](http://www.stelray.com/density_val.htm) (Wikipedia says 1.15) PES – 1.34 g/cm<sup>3</sup> (same link as above). It makes difference  $1.34/1.14 = 1.175$  i.e. the difference is 17.5%. However we are considering basic material only (without coating). Yes polyester has disadvantage in weight (no doubt about it) but you can design the fabric so that the difference is almost neglected (fiber selection, amount of coating). Our Triumph fabric has average weight 68 g/m<sup>2</sup>, Mayer Mayor 64, Coating application 66 (measured by us in 2009) so you can see that the difference is lowered to  $68/64 = 1.063$  i.e. 6.3%. Now the theoretical envelope area by our BB12 (42,000 cubic foot) is 582m<sup>2</sup> so the weight difference using either Triumph or Mayer Mayor fabric in weight is  $582 \times (68 - 64) / 1000 = 2.33$  kg.

(So as you can see 2.33kgs on a 42,000 balloon isn't a great deal - Steve Roake).

To understand the second claim that "**more coatings means less porosity**" you need to understand the idea behind the coatings.

**PK** explains. Sounds feasible but the truth is different. Of course amount of coating applied to the fabric affects porosity but it is only one of factors. The porosity is also affected by fabric preparation before coating applied, coating composition and conditions during coating application. As a small example: If you put 5 coating layers onto fabric you will increase the fabric weight but





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initial porosity remains the same as fabric with 3 layers applied. Let me add one more note. According to our laboratory testing the porosity affects the balloon behavior in the air (maneuverability and fuel consumption) in values below 20 sec (Swiss test). All above it doesn't matter, if the porosity is 50 sec, 300 sec or 600 sec. The question is only how fast the fabric porosity drops under 20 sec.

**IB** seems to concur. Intuitively this is correct, a very light coating will in all likelihood give a higher porosity, although this would be dependent upon the coating technology.

Onto the third claim that; **Nylon6.6 is 30% stronger than Polyester**. My view is that the question shouldn't be which is stronger? The important bit, since both products will have been stress tested to ensure the loads of the balloons in service will not be exceeded, surely should be which is likely to last longest whilst keeping the properties that the raw material started with.

**IB says**, on a like for like basis, nylon 6.6 is stronger than polyester. There are additives that can be used within the polymer which change UV degradation and strength retention characteristics and different manufacturers will have their own chemistries to address these concerns. We had data to substantiate our claims, but obviously as we are no longer involved in this market space I cannot provide any new data.

**PK** explains his view.

I do not know strength difference of fibers itself however design of the fabric affects the strength of the final product. So again, let's compare the final balloon fabric. Triumph fabric has 680/580 N/5cm (warp, weft), MEYER-MAYOR 745/724, Coating Application 652/708 (measured by us in 2009). Let's compare Triumph and Mayor-Mayor fabric -  $745/680 = 1.09$  (warp),  $724/580 = 1.24$  (weft). Comparison to Coating Application is  $652/680 = 0.95$ ;  $708/580 = 1.22$  (weft). The average is around 15% not 30%. Initial strength is a useless value for hot-air-balloon application as it has no benefit for pilot. All strength calculations are made to grab-test value which all manufacturers have 13.5 kg/2.5 cm. The question is only how fast is this value reached in balloon operation. Answer to this question is very difficult as

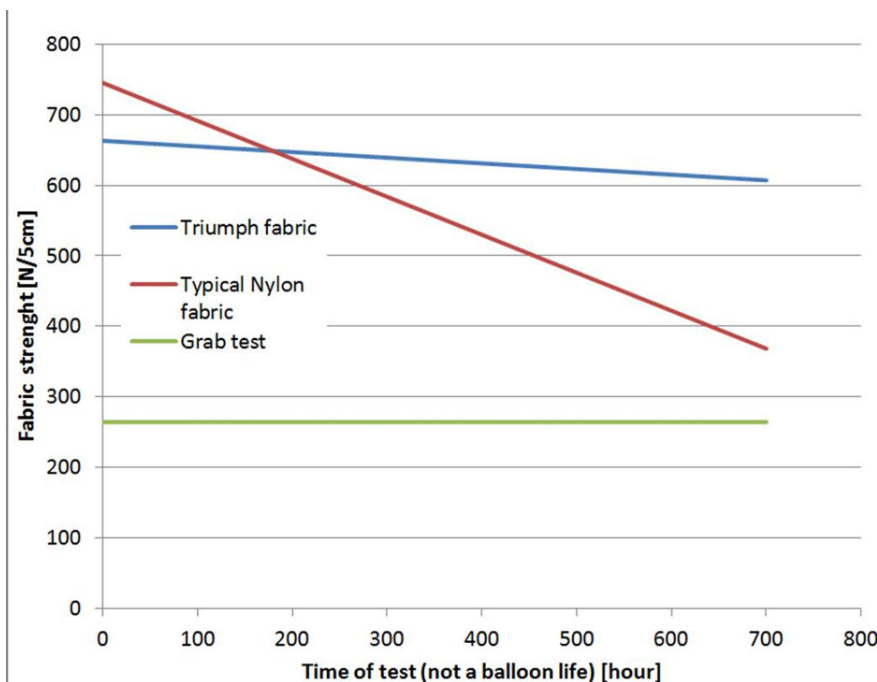


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depends on many factors appeared during balloon operation. For example it strongly depends on area of operation due to UV. We would need very extend statistical data to get this question answered. The best comparison always will be experience form real operation. To our experience, the maintenance station reports longer life of polyester balloon. Triumph average life exceeds 600 hours in European condition. Some of them have more than 1000 hours. We have developed long-term laboratory testing methods which unfortunately do not copy real life of balloon (many operational factors have to be considered) so we are unable to predict balloon life in absolute manners. However we can easily compare different fabrics behavior under laboratory conditions. See the picture below based on our internal testing (2010).



The fourth claim was that **Nylon6.6 has better Abrasion and tear properties.**



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**PK** says I cannot answer the abrasion as we do not have any data here. But how important is this characteristic in conditions of Europe, where majority of launches/landings are from/to grass fields? Tear strength - to our experience the tear strength is affected much more by amount and type of silicon in the coating than by fibers material itself. Try to tear a PES/Nylon fabric without coating, the result will be similar and very low. My conclusion – you can reach the similar parameters by proper manufacturing, no matter on base material.

**IB** comments that, this is a clear cut and true statement.

Fifth claim. **Nylon absorbs more water than Polyester** but Cameron's claim **Urethane coatings stop hydrolysis and thus reduce porosity**

**IB** says, Nylon is more hydrophilic than polyester, although this is Relative Humidity dependent.

**PK** states, this is one of the key elements. Water (H<sub>2</sub>O) itself does not affect Nylon or PES fiber. What makes difference is that Nylon fiber is less resistant to influence by a micro-organism existing in condition of humidity in combination with warm temperatures. In addition some coatings are affected by hydrolysis no matter what basic material of the fabric. Nylon fiber **MUST** be covered by coating to protect it from mildew products. Once the coating on nylon fabric is damaged (and porosity increased), those micro-organism disrupts the nylon fiber polymer structure and fabric is losing its strength. The side effect is the characteristic bad smell of packed nylon balloon which does not appear on PES balloon at all. The smell has origin in rotting of dead micro-organism. Another aspect is increased dampness of packed envelope as Nylon absorbs more water than PES. If you pack wet Nylon balloon with increased porosity the strength can be lowered rapidly over time. Thus strength of nylon fabric strongly depends on porosity while PES not. PES fabric can fly with porosity of 0 sec (of course with increased fuel consumption) but without effect on strength / safety. This is one of reason why we are using polyester at Kubicek.

The sixth and last claim was that **Nylon 6.6 outperforms Polyester in terms of retained strength over a period of time by a factor of five.**





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**IB** stated, this is true data in head to head comparisons.

**PK** answered I have no test data which could support this and only have the experience of our customers with hundreds of balloons in operation with accumulated 600 hours and more without any problem.

To Sum up what can be deduced from the answers as given. Firstly fabric designs are always improving so you can take claims that are years old and question their validity.

Secondly yes Nylon is stronger than Polyester at the start of its life but with all balloons stress tested, it seems a pointless claim to me since the salient point is how long will the fabric retain its properties and you don't want to have to buy another replacement after 250-300 hours when the material properties drop off.

It's as important to fly dry, store dry and keep your balloon used regularly if you want to make it last. The coatings are now as important as the fibers when you think about UV degradation and the Relative Humidity of where you are flying.

And finally as a community, it's about time we removed our blinkers and studied all the options based on their merits and with favorable prices and relatively good weight comparisons, perhaps the manufacturers from Brno need to be taken more seriously.

Many Thanks to Iain Bradley, Petr Kubicek and Alan Noble for their help with this article and to Eric Jan Dooneward for pointing out the Schroeder views.

Steve Roake

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## **4. My interesting first Hops-** by nobody

Again an empty section, despite no end of requests ....so it's left empty!

So that's the format, what happened on your first ever hop or interesting flight and how it felt compared to your expectations? Submissions to me please at [steve.roake@ntlworld.com](mailto:steve.roake@ntlworld.com)

## **Three Favourite Jpegs and why-by Kasey Schwemmer**



G-CEHX Lindstrand 9A

Kasey's first choice is Pauline Baker's AX1. He says, "This is a really cool little balloon built by Lindstrand if my memory serves me correctly. Saw some photos of it when it was being built and



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developed a fascination with it. Would love to see it in person some day (Ed- I have and its lovely).



Whatever

Kasey's second photo is called "Whatever". I had my very first (and so far only) duo flight in this experimental balloon built and owned by Mark and Kay West. Its 45,000 cubic feet in capacity built of lightweight fabric and uses a modified Aurora basket with two seats on a horizontal 20 gallon tank with seatbelts. I flew with the then Aerostar sales manager Allen Schlenker and got some good burner time on it.



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In Kasey's last photo is Paulo Bonnano's Duo bottom end.



I got to check this out in person at the Albuquerque International Balloon Fiesta and was very impressed. A very compact package when packed away and really cool dual-action blast valve. All the coolness of a standard hopper in a Duo.

Thanks very much to kasey for these fine choices. Contributions for future editions of my three favourites and why to [steve.roake@ntlworld.com](mailto:steve.roake@ntlworld.com) please. Do it today folks and share those memories.





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## **4. Updates to the Website / Newsletter/ Topics of Interest**

All is quiet on the topics of interest front. The forum seems to be hibernating at the moment, unless everyone is busy with their projects and hasn't had enough time to communicate their project work.

Website wise, this seems to have stalled out. Is there anyone out there who could assist me with building a new site as the current project has loads of content but needs a technical person to create the template, so with a website in mind to copy as a template, if you can help please contact me directly at [steve.roake@ntlworld.com](mailto:steve.roake@ntlworld.com). Many thanks in advance. The goal is to be in a position where I can add updates myself using a template to replace one page with another without reliance on the builder.

## **5. Homebuilt section- an update by David Westlake on his 31 hopper.**

### **Homebuilt 31- more (slow) progress .....**

Following on from last time.

The first main construction hurdle has long been finished - the 12 horizontal panel templates which make up the half gores - 12 full gores in total. The dimensions were generated from the Excel spreadsheet, the one I used was the John Deering version which has been converted to Metric as the imperial measurements were a headache to work out.

To check that each panel fitted with the next, last November I took the templates to a sports hall to lay out. Together, the templates measure approx 55 feet long (this does not include an extra 5 feet or so at the crown for the parachute panel template).

As I was unable to view the complete template from an elevated position, due to perspective it is difficult to fully appreciate the shape. As shown in the pictures, one shot is from the equator line looking down towards the mouth. The curve generated by the slices of measurement can be seen clearly. The other picture is looking up the complete length from the mouth end.

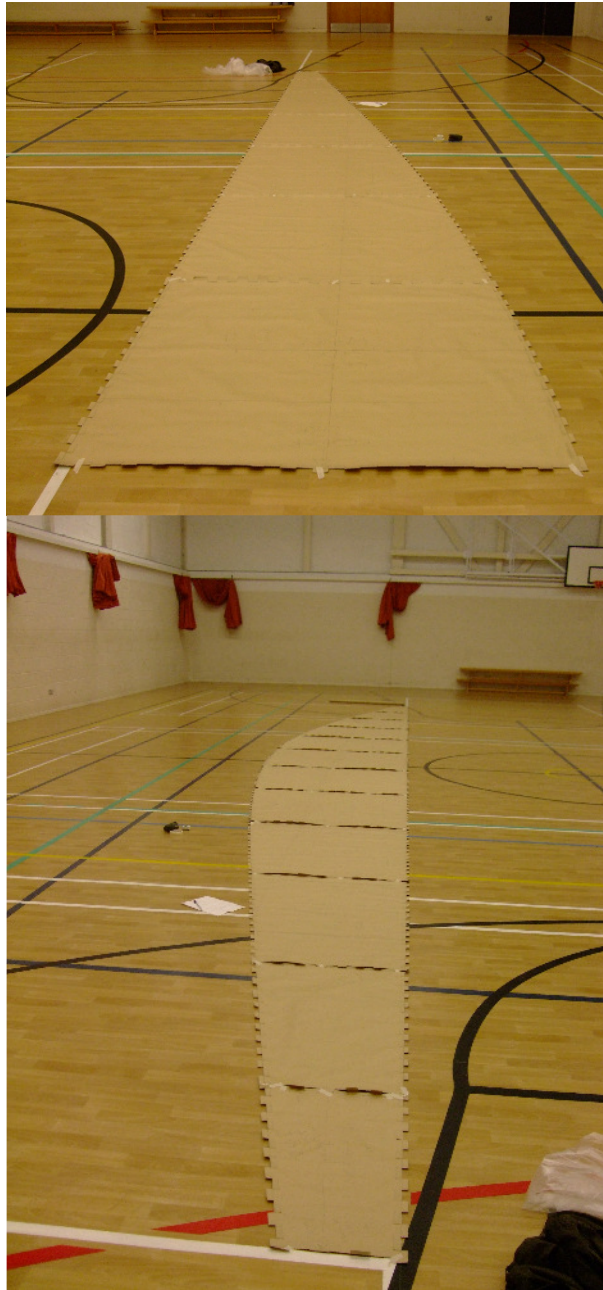




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This method of using lots of small templates will mean a lot more sewing which I'm sure I'll regret. However, in doing it this way I have been able to limit the cutting table to 5' x 7'.



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Cutting of the panels has recommenced again since Christmas. The below jpeg of the colour grid for the envelope is shown below – ideas were quite fluid up to a point, but I'm committed now....

[illegible]





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But the appearance aspect is the least important to me – if I had got hold of 300m of mud brown fabric I would have been just as happy! As it happens it's turned out to be quite an attractive scheme but incorporates far more colour than I had originally planned or wanted. The reasoning behind it is to maximise the use of the shorter lengths of fabric I have acquired. I figured the best way to do this is to in disperse them with the fabrics I have the most of (i.e. white and burgundy red). The dotted lines show where the seams will be, the thick black lines show the potential placement of load tapes (still undecided).

Simple pull test on fabric (or "grab test").

The next picture shows a fully functional spring balance grab tester I've cobbled together (minus the pull strap attaches to the ring on the part to the bottom right of the picture). I'm certainly no engineer, but this only took a couple of hours work and £20 parts of eBay which is pleasing. It is based on drawings shown in the Cameron and Kubicek maintenance manuals - basically it comprises of two aluminium clamps with rubber faced jaws which will hold a piece of fabric whilst being pulled. The force of the pull is measured by the spring balance.





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I have done a simple pull test on each colour of fabric to be used upwards of approximately the bottom third. This has been done following the instructions in manufacturers manuals.

I do not claim to know what I am doing, but the guidelines on how this should be done seem to be universal and involve lining up the threads in the ripstop between the two jaws of the tester in such a way that the same threads are being pulled in the same direction. Lining up the fabric in this fashion has been a real pain!



The Cameron manual states that fabric which withstands a 13.6kg pull is "fully airworthy"- I have been subjecting mine to in excess of 15kg before stopping the pull. I think it would withstand far more but the rubber jaws of the tester have allowed slippage beyond that and I don't fancy injuring myself with the recoiling bits of aluminium in some sort of unnecessary destructive test.....

So, cutting continues with the tested fabrics, and needless to say it's proving to be a very boring task. I have had some issues with some of the rolls of fabrics, like visible faults with the coating and large holes where faults or samples have been hacked out etc.

However, I can't really complain - I've bought it all as "seconds" and the low prices far outweigh what I've lost so far. It's a bit



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of a "no brainer" really. When I've had a good run with it there has been very little waste which is why I chose this type of construction.

To be continued....

Dave Westlake

## **6. Gallery Pages –**

This section is the Editor's choice of new jpegs, visuals and older balloons of interest or alterations. If you know of a new or interesting hopper or Duo that hasn't featured in this section, then feel free to forward details of it with a suitable photograph to me using my normal email address.



Sent in by Jules Howden and printed with permission from David Head, three hoppers over Kirschberg Austria, featuring Steve Lacey, Steve Burden and Dan Wilson.

What a great environment to fly hoppers –Ed! I've got to get there some time in the future even if just with the hopper.





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OO-BRV has just recently been restored to G-DIPZ. Chris Dobson now owns this Colt 17A that he had been chasing for a while. Registered in February to its previous known identity, Chris now has both of the Dippy Chocolate balloons. Let's hope G-DIPZ is in as good a condition as the shape.



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## Manufacturer News / Events / Updates

### XLTA Dates are out!

XLTA will be held again this year at Whelan Farms Airport CT01 in Bethlehem, CT on **September 6th, 7th, and 8th 2013**. The web site will be updated shortly with the new dates but wanted to let everyone know to start making their plans and letting everyone get the word out to hold the date.

At this time if anyone has any recommendations, changes, or ideas that you would like to see take place at this year's event let me know so we can include when we send out additional information in May!

<http://www.xlta.org/> your host once again will be Mick Murphy so any questions or ideas, contact him via [info@aerblaney.com](mailto:info@aerblaney.com).

### Bedale Yorkshire

Richard Bowater invites all hopper owners to the Bedale Balloon festival over the weekend of 14<sup>th</sup>-16<sup>th</sup> June. This very nice event has already three hopper owners lined up to my knowledge and is a lovely area to fly with nice sociability and camping onsite, and also a great BBQ on the Saturday night. ( I myself am attending as part of another team but am taking the hopper with me-Ed ). For further information and to confirm your interest please contact Richard via [richardbol@yahoo.co.uk](mailto:richardbol@yahoo.co.uk)

## Adverts / For Sale / Wanted section

### G-BVUI is for sale

Lindstrand 25A. 1994. G-BVUI. 96 hrs. Lindstrand colours (no words) in red, yellow & blue. New EASA C of A on delivery. £1700 Zebedee Balloon Service - 01488 681527, 1700 British Pounds= (+ -) depending on Exchange rate: \$2700.00 Photo of balloon is the first one on the Zebedee list under envelopes. web page:

<http://www.zebedeelist.co.uk/list/list.php?section=envelope>

I also have the matching Lindstrand hopper bottom end that I might be willing to part with. If anyone is interested, E-mail



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me at [advanced@gci.net](mailto:advanced@gci.net), or call me in Alaska at 907 242-5860  
Jack advises that £3750 buys the complete kit.



Photo thanks to  
Zebedee list- Peter Bish



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## The Klein FAN Smaller is Better!



Tiny but surprisingly powerful  
inflation fans!

9 kg empty, 10.5 kg full (fuel  
+ oil)

2.5 hp Honda engine

One fan easily inflates  
balloons up to 2000m<sup>3</sup>

Two fans will blow your  
socks off!

Contact Advanced, Inc.

[advanced@gci.net](mailto:advanced@gci.net)

Tel. +1 907 346-3495

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## **And Finally.**

Membership is currently a healthy 444 members and numbers are generally rising. All articles for inclusion in future issues will be gratefully received by your editor. Please forward them to [steve.roake@ntlworld.com](mailto:steve.roake@ntlworld.com) and feedback good bad or indifferent is always welcome. Views aired by contributors may not be those of the Editor Safe and happy hopping! Steve Roake.

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