

Model Airfield Construction Materials by Tom Laird and Jim McGlynn

Introduction

We belong to a model aircraft flying club in Scotland and like most clubs both here and in the rest of the UK we operate from a farmer's field, and like most clubs we have an uncomfortable time if it has been raining and the ground has not been dry enough to absorb the rain quickly enough.

In a previous existence we and a few others were heavily involved in the building of a new model flying site from scratch, and at that time we held the traditional view that runway and pits area construction had to be grass, concrete or tarmac. We were new to all this and little thought had been given to the use of other man-made materials such as rubber matting, astro-turf and other alternatives. This report is intended to promote discussion about these alternative materials and gives examples of where they have been used.

The usual counter to any discussion about improving a site is that "we might get kicked off tomorrow". Yes, possibly, and although I'm sure it does happen, I'm also sure it is pretty rare. Having looked at many flying sites in the UK, my feeling is that most clubs operate from farmer's fields and therefore the



General construction sequence for tarmac runway.

Dig big hole

Fill with rubble

Top off with smaller rubble

Cover with sub-surface

Top with tarmac

amount of rent probably reflects what the club is allowed to do. There has to be a point where the rent income from the flying club out weights the income from the crops or grazing and once you find that level, you should be able to upgrade from a wet boggy field to one which is reasonable dry and comfortable.

General construction sequence for new grass runway.

- Scrape off top surface and discard
- Install field drains
- Cover with good quality top-soil
- Level-off
- Sow new slow-growing grass mix
- Wait 12 months before first cut



General Construction sequence for repairing a grass runway

- Use a turf stripper (or sharp spade) to remove and roll up existing grass
- Add field drain if required
- Fill in hollows with sand or topsoil
Remove bumps
- Replace turf
- Water and wait

The Dumbarton club in Scotland did just that with the help of two "Awards for All"

Pits Area

For the pits area I would think rubber mats approx. 2 metres x 3metres would be good enough. This would allow for a modular approach which could be extended as appropriate. If puddles form on the surface keep a brush would be on-hand to sweep water off if the holes are not practical. Rubber sheet with slots or holes would allow for drainage.

Pathways

The Dunfermline club in Scotland is currently carrying out an experiment using old changing room mats from the swimming pool at the local high school. They are being used on the access path to the pits area to see if they will help on soggy ground. These mats are non-slip and therefore ideal for wet climate





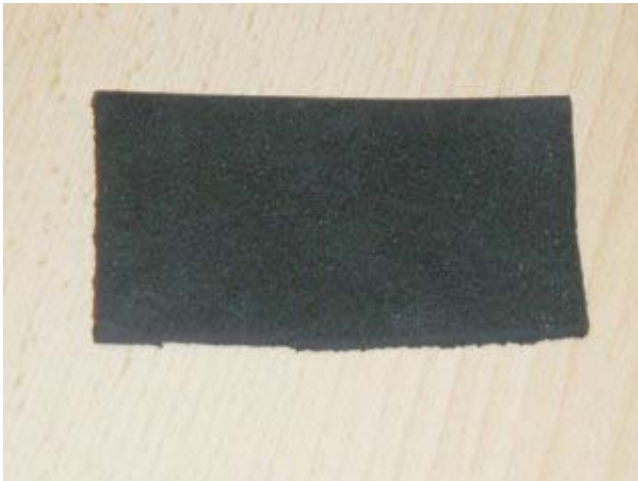
flying sites and could be staked into the ground to prevent movement. The material comes in a roll 20 metres x 1 metre and costs approximately £250 new. Used or second hand ones are obviously a lot cheaper.

Their pits area is about 40 yards from the car park, and the pits area is about 20 metres x 2 metres.

One alternative for the discerning model club would be the type of pathways used on golf courses. However the prices are not for the faint-hearted. Try Huxley Golf for more information.

Runways

Traditionally, runways tend to be grass, concrete or tarmac. Astro-turf could be used but I'm not aware of any club in the UK who is using it.



Quattro Products sell a material known as Economat which comes in 1.5 metre wide rolls at various thickness from 1m to 12mm. The 3mm thick material costs approx £8.50 per linear metre. This material can take the weight of a horse or cow when properly supported. This is a zero-bounce material so would make an interesting experimental runway.



How about some cricket matting from Niels Larsen

Used successfully in thousands of schools, leisure centres and cricket clubs throughout the world for the last 30 years, cricket matting is well known to, and respected by, the cricketing establishment. A new green shrink resistant hard wearing polyester cotton playing surface is bonded to a tough durable base of honeycomb rubber. The matting can be used on any hard and level surface, indoors or out - concrete, wood and asphalt are recommended, but turf can be satisfactory when correctly cut and rolled. After play, the mat should be rolled up (rubber side innermost) and stored away from heat or frost. The cricket mat trolley facilitates easy handling and transportation. The matting is 6' wide and although it can be supplied in any length from 1-30 yards. The approximate weight per running yard is 5kgs.



Team Products do a nice range of anti-fatigue flooring that, while more at home in the garage, could be equally suited to outside.

Astro-turf

The basic overview of Astro turf is that a sand filled artificial grass would be ideal. The surface that the grass is to be installed onto should be firstly prepped, i.e. grass killed off and leveled, geotex laid and grass installed filling the pile heavily (10-15 kgs per sqmtr) with kiln dry sand. This makes the surface highly durable, extremely heavy and gives good drainage. When installed the grass would be too heavy to be stolen, the sand tends to compact and should slow and help against bouncing on landing the models. Alternatively it would be worth asking about second hand grass. This might only be supplied as a full roll approx 20 - 25m x 4m roll but cost is only approx £2.95sqm + VAT and carriage at cost.



Right:- Astroturf pits area with model retainers.



Wine Country Flyers, Sonoma County, CA, USA
<http://www.wcflyers.com> 60' x 425' Astro-Turf
runway taken from Tom Haddorff's RC Airplane.

Geotex / Petromat

Used in the USA with success in various areas:

Walt from Beaumont, Texas, says:

This stuff is called a lot of different names. From the two or three brands I've seen it's seems to be mostly the same stuff. The difference in appearance is mainly the thickness. I would go with the thickness you can get.



Ours is Marafi, by the TC Marafi co and our rolls were 18X308 and went for \$315 a roll. I can tell you that we used Amoco on the first field and the Marafi on this field and there's virtually no difference.

It's tuff, durable, water resistant and the weather doesn't seem to mess with it at all. In fact it likes hot weather. The hotter the better. I say this because once installed the sun will take any remaining wrinkles completely out. It shrinks big time and that makes for a pretty smooth surface.

A prop from a plane will cut it and that will happen over time or maybe the first day. For minor cuts we just left it like it was as the cut will not get any larger over time. For any major cuts and

slices all you have to do is cut a patch slightly larger than the cut and staple it down over the cut. Good as new. When patching a cut or bad blemish I'd recommend the smaller staples. For all else the larger staples will do a better job and grab more substrate than the smaller ones.

I'm sure if you put this mat down over a sharp rough surface it will eventually grind thru the mat. Walking on the mat has no consequences what so ever.

I think one lesson we learned was that if your using a substrate that will not washout from under the mat, it would be safe to crown the middle up as you like, but if you using any type of sand or dirt or anything that might wash out from under it, I'd crown it very little. The higher the crown the more washout you'll have from under.

If you are using any type of rock, gravel or crushed stuff, just remember that what's under the mat will make a big difference in how smooth the finished product will be.

At our first field we had bout 12/15 people to help put it down. This tuff HAS to be stretched as good as humans can stretch it. No, it does not have to be stretched perfectly smooth. That would be almost impossible. Just remember that minor wrinkles and stuff will shrink out in the hot sun. It's pretty amazing how this stuff will shrink tight. At the first field we had guys on both sides of the mat stretching it length wise. I'm talking about like stretching a couple of hundred foot at a time and stapling it down the then stretching another couple of hundred feet. Then we had to stretch it from side to side. This is most important to get the crosswise wrinkles out.....This took DAYS. And a lot of raw knuckles.

The second field went very quickly. Why? As you'll see in the pix we used the tractor to do the lengthwise stretching and that allowed us to stretch a 300 foot roll completely out and very tight. We just got one end straight, stapled it down well and went to stretching with the tractor. Then it was just tacking the edges down.

You cannot use too many staples, in fact the more the better. If you can completely seal the outsides with staples you'll be better off in the long run.

More runway construction pix here. Just notice in the pix the job the tractor is doing. This saved us a ton of work and we had two runways both 36X400 done in eight hours. That's not bad at all.

David Osterloh, Elk City Flying Aces says:



Ours is Petromatt. It's a woven material like a trampoline. It's been down for 4 years. It has a few prop cuts but they were easily repaired. We have a 45'x500' runway and a 12'x200' ramp. They are connected with three 12' x50' ramps. The whole job cost \$3800. We did all the labor. It took eight of us a week of evenings. It is soft like grass and smooth like asphalt.

In our area the same job in asphalt was over \$12,000. If you want some more info look at our web site or e-mail me. www.mbcsl.com/flyingaces

Ours was rolled and packed just like it was going to have asphalt put down. This worked great for us. The club in Amarillo had theirs down before us. They put it right down on the grass. They also

have no problems. Ours has a few low spots under it. It washed out a little before our grass filled in. When you walk on it you feel them. However it stretches so tight the first time it gets sun on it, the planes don't feel it. We have had 40% birds at our fly-in with no problems.

The Size of a roll depends on which grade of material you buy. The Taxiway material we used is on a 12'x500' roll. The runway material is on a 15'x500' roll. At this point there is no difference in wear on the two surfaces. We chose the heavier material for the runway based mostly on the UV rating. We thought the sun was our biggest enemy. Installation was a snap. We already had the dirt work done and used a transit to flag the runway.

It takes four guys to unload a roll. We started by folding the edge under about 4". Then we rolled out about 100'. We had a string pulled tight to mark the edge. We squared it up and spiked about every 12". Then while half the guys rolled out another 100'. The other half started driving staples. They are 6" long and about 1&1/2" across the top. They drive best with a rubber hammer. We drove one about every 2". When we got to the end of a roll. We rolled it under, stapled it and overlapped the next piece. We also rolled it under. I can't stress enough the importance of the overlap. This stuff pulls tight. If you don't overlap enough it will gap. The spikes we used are 12" long about 5/16" around with a washer under the head. We used these only around the edge. I think they were overkill. The staples will do the job without them.

The \$3,800 was a total. We bought 8,000 staples and 250 of the spikes and washers.

Mike, It gets cold here to. I am actually in Oklahoma. I grew up in Chicago. It stays colder longer there but gets just as cold here. I wish I could tell you more about the life span of this product. After four years ours is the same. Except for the color that is. The shine is gone from it and it's more dark gray than black.

We put aside \$500. a year for replacement. Our thought was by the time we needed to replace it we would have the money. We make about that much a year from our fly in. I don't think the cold really affect its much. It seems to be the same hot or cold. The only thing is you can't plow the snow from it. It will tear. I hit ours with the deck on the mower. I got it to low and put a tear in it. It's easy to fix but a plow would be a mess. The nice thing is the snow melts from it before it melts from the ground. Don't ask me why but it does.

If you guys decide to use this stuff the overlap is the most important thing. We have 6" and that's about right. The guys in Amarillo TX have some grass in between their seams. It's amazing how much this stuff will stretch. On our first day of laying we were concerned about getting all the ripples out. After the sun was on it a day it shrunk like monocoat. The next rolls went down with some 2-3" ripples in it. Two days later they were gone.

If wind blows that hard, yes it can pull it up unless there's a solid line of staples all the way down the edges. The edges must be protected by some means to keep the wind from getting under it.

There is no special trick however to laying this stuff and the pictures would not be of much help. We prepared our runway by leveling, crowning and packing as if asphalt were to be put down. Our site was terraced before we got it so a lot of dirt work had to be done. Had it been level to start with we would have put the material down directly on the grass. We went to Amarillo Texas to see a working runway before we put ours down. It was put down directly on the grass. They failed to use enough overlap on their seams and the runway pulled at the center exposing the grass. Except for the seam problems it is still working fine for them 5 years later.

We had some initial problems with rain in our first year. If you notice in our pictures it is uphill about 15' from our flight line going west to our parking area. This caused some runoff that washed some of the dirt out from under our taxi way. Had the grass not been removed to level the site we would not of had this problem. It was however a simple fix.

We peeled back the taxi way a few years later, leveled the dirt and put the Geotex right back down. It was necessary to stretch the material as we went and use new staples. During the initial install it is not important to stretch the material. We put ours down in sections during the evening hours after work.

By the following evening the sun had stretched out all the wrinkle from the previous days work. This stretching is what caused the problems in Amarillo TX. The only overlapped about 2" and used a staple about every 12". We used a full 6" overlap and put a staple in every 2".

We have had a lot of rain this year. There are some places were water stands under our run way. When walked on it does feel spongy. It has not caused any problems. We are careful though not to drive on it when the ground is soft.

As far as the planes are concerned the wet ground will get some dirt and water on the covering from the spinning wheels. This material is very plane friendly. Even when our taxi way had the washout under it the planes would roll right over it. The simply were not heavy enough to notice the depression under the material. We would not have fixed it except we were afraid a newcomer may twist an ankle walking across it.

I hope I have answered most of your questions. I have a lot of information in my head about this and I am sure I have forgot something. I always glad to help so please ask any questions that come to mind.



Dan Deitemeyer, member of The Blue Max flying club, Illinois, comments:

"Weed mat" which is basically heavy plastic sheeting (Teeram in the UK is similar) was laid down and then the astro-turf was put down on top. We sealed the seams of the astro turf like you would if installing wall to wall carpeting. The outside edges were rolled over and inch or so and we

drove large spikes through the astro turf into the ground. The spikes are holding very well. We require use of tail traps in our pit area. This is basically a U shaped rod with a vertical rod at the bottom of the U that sticks in the ground. The fuse of the plane rests in the U shape and the horizontal stab holds the plane in position while the engine is started and



Geotex runway, Amarillo, Texas

<http://www.arksclub.com/>

tuned. What may not be obvious in our pictures is that we installed aluminum pipe with aluminum collars into the astro-turf so the tail trap easily slips in place and we have predefined about 30 pit positions. This prevents people from trying to make their own holes in the astro turf and helps with crowd control.

After installing the astro turf, we introduced a new “field rule”: pilots are asked to catch fuel spills/overflow in a container rather than letting the fuel seep into the astro turf. This helps keep the area clean. There is the beginning of some stains at each plane location (especially the front row that is used more heavily) from guys running rich but that’s to be expected I think.



Grass Protection Meshes

If your site suffers from cars cutting up the grass car park or driveway then a possible solution would be a turf reinforcement or grass protection mesh. These spread the load of the car’s weight. The grass will grow through the mesh but still provides grip when required. Check out the Hy-Tex web site for more details <http://www.hy-tex.co.uk>

Material Sources

Concrete companies are always looking for a place to dispose of leftover concrete at the end of the day so contact your local plant. Maybe they would be willing to give any leftovers they have to you for free! You will just have to have a crew that could be ready at a moments notice to go to your site and finish it.

One company gets rid of 1-5 cubes (cubic yards) of concrete every night that would go a long way on a runway that is 15 foot wide. 1 cubic yard will cover an area 10foot x 8foot x 4 inches thick!

Roof Tiles

As with concrete companies, those making roof tiles also generate scrap tiles during development and pre-production etc. These tiles are very brittle and break down easily into small fragments which are very good for filling in between the larger rubble. Again, you might be able to negotiate getting them free of charge. They are also sought after by farmers as they make good in-fill at the entrances to their fields etc.

General Rubble / Demolition companies

In the UK demolition companies have to pay to use a commercial dump. Offer a free disposal in exchange for taking (say) 25 loads at 20 tons per load. Also see if they will put in a hi-mac to move and spread the rubble. You will probably need a SEPA (environmental) license but these are not expensive. The license should be for "top soil and inert" i.e. nothing combustible.

Model clubs with Geotex Runways

Amarillo Radio Kontrol Society, USA <http://www.arksclub.com/>
The Blue Max R/C Flying Club of Buffalo Grove, Illinois, USA <http://www.bluemaxrc.com/>
The American Turf Fliers near Tulsa, Oklahoma, USA <http://www.americanturfflyers.com/>
Elk City Flying Aces, Oklahoma, USA <http://www.mbcsl.com/flyingaces/>
Richmond Propbusters, Indiana, USA <http://www.propbusters.net/>

Model clubs with Astro turf Runways

Wine Country Flyers, Sonoma County, CA, USA <http://www.wcflyers.com>
Peninsula Channel Commanders <http://www.flypcc.org/>

Model clubs with Astro turf Pits areas:

The Blue Max R/C Flying Club of Buffalo Grove, Illinois, USA <http://www.bluemaxrc.com/>

Goetex Suppliers (UK)

Hy-Tex (UK) Limited <http://www.hy-tex.co.uk/>
Pro-pex (Worldwide) <http://www.geotextile.com/products/product.htm#woven>

Prices (approx) (USA):

15 foot x 300 foot roll = 525 USD
18 foot x 308 foot roll = 315 USD so shop around

Astro-turf Supplies (UK)

<http://www.evergreensuk.com/> (great site for information)
<http://www.astro-turf.com/>

Swimming Pool non-slip mats

JP Lennard or surplus from the local schools etc <http://www.jplennard.com/>



Rubber Matting:

Quattro Products (Economat). <http://www.quattro.org.uk>

Team Products <http://www.teamproducts.com/>

More information:

Check out the R/C Universe discussion "Clubhouse" forum:

http://www.rcuniverse.com/forum/Building_a_runway/m_1260111/tm.htm

http://www.rcuniverse.com/forum/m_2912065/anchors_2912152/mpage_1/key_/anchor/tm.htm#2912152

http://www.rcuniverse.com/forum/FINALLY%21%21%21%21_Our_new_runway_project/m_2906216/tm.htm

Typical UK relative Prices (excluding VAT & Delivery)

	£/sq metre	50m x 10m
Astro Turf (New)	£5.50	£2750
Astro turf (Used)	£2,95	£1475
Economat	£5.66	£2833
Covertex (Geotextile)	£0.60	£300
Plastic Pegs (150mm barbed peg)	£5.00 / 100 +VAT	
Turf Protection Mesh	£2.75	£165 for a 2m x 30m roll
Tarmac	£15	£7500

Further Information

We would be interested to hear from any clubs who have tried alternative materials and would be pleased to add their experiences to the web version of this report, together with a link to the club web site. The latest version of this document including links and pictures is available at <http://www.tomlaird.com> where you can also find our experiences in turning a peat field into a flying site with solid car park, tarmac runway and pits area.

We can be reached by e-mail to tom.laird@wolfsonmicro.com or jim.mcglynn@blueyonder.co.uk

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Finally we would like to say a big "Thank You" to the aeromodellers from around the world who freely shared their experiences for the benefit of us all.

Tom Laird / Jim McGlynn

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