ON TEST

EXCLUSIVE FIRST UK REVIEW

Twist of Fu

THE EAGERLY ANTICIPATED AND LONG AWAITED NEW 50-SIZE NITRO MODEL FROM AMERICAN MANUFACTURER MINIATURE AIRCRAFT IS ALMOST HERE AND ROTORWORLD HAS BEEN GIVEN THE OPPORTUNITY OF AN EXCLUSIVE FIRST REVIEW. WORDS BY DAVID NOLAN, PICTURES BY LIAM NOLAN

Whilst it may be a fantastic experience to fly helicopters in the 90-size engine market category, it does come with its drawbacks. The additional cost of fuel, the reduced economy and the increased costs of perhaps having to replace everything from 90 sized blades to mufflers in the event of a crash, all mean that the 90-size powerhouse whirly bird isn't to everyone's taste. With this in mind most manufacturers have realised that there is a very lucrative (although competitive) 50-size nitro market out there, which is more achievable to the average flier and in many cases even more fun at the club field than the larger juice hungry machines. Coupled with the reduced running costs the pull of the 50-size market has become irresistible to every manufacturer out there who want in on the game. This review looks at the latest 50 class offering from Miniature Aircraft USA - the long awaited Fury 55.

THE MA50 'SAGA'

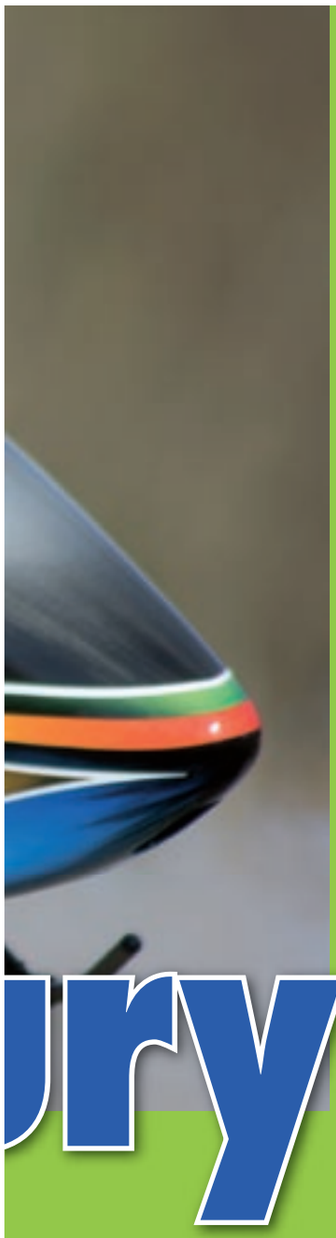
For those who have followed the development of this helicopter from the beginning it must have seemed like that began a lifetime ago. In actual fact Miniature Aircraft USA began development of its 50-size nitro model, then called the 'Razor 50 Nitro', some four years ago following on from the introduction of its 600-size electric model which also carried the name Razor. At the IRCHA Jamboree 2007 I managed to have a flight on one of these 50 nitro kits and indeed a very small number were released, but it was quickly apparent that the model just wasn't up to the usual MA standard and the company, very wisely, decided to pull the model in favour of a complete redesign.

Cut to the summer of 2009. The early part of the year had seen rumours that the now 'nameless' nitro 50 was soon to be released but MA seemed to be stalling for some reason. In June 2009 it became apparent that the company was about to undergo a monumental change and this was the reason for the stalled release. The company was to change hands from being the Schoonard family run business of some 25 years experience to falling within the Flyco group who are parent company to HeliWholesaler, Heliproz, Ron's Heliproz South, Big Sky CNC and Rockie Mountain Hobbiez. Tim Schoonard, former designer and vice president of MA was to stay with the company as chief design architect thus continuing the brand ideals and designs with the company to relocate from the sunshine state of Florida to the colder climes of Billings, Montana, where new general manager, Brian James would take hold of the day to day reigns and take the company forward.

The new 50 nitro was to be the first of the new breed of helicopters from 'new MA' and all attention turned to getting the model out there. So in February 2010 the newly named 'Fury 55' (building on the very successful days of the Fury Expert and Extreme) began rolling off the production line and I was very fortunate to get a new, although somewhat belated, toy for Christmas.

THE FURY 55 KIT

When the kit landed at my doorstep the initial reaction was shock at just how compact and well laid out the box is. The box itself being heavily printed and glossy is immediately very different to the older style MA kits which would arrive in a plain box with a model photograph on the front. These new boxes have



Parts and hardware for the Fury 55 kit are supplied in numbered bags that correspond to each building step

The bearing blocks have been cut out and the edges rounded to reduce their overall weight

The main chassis for the helicopter is a typical two carbon frame assembly held together with aluminium spacers

Note the detail on the undercarriage mounts

Headblock with feathering spindle fitted, note the circlip is fitted with sharp side facing the end of the spindle

Swashplate balls showing the similar inner balls

information and photographs printed on every face of the box with the kit details and full specification clear to see. When you open the box you are met with another box which takes up over half the space which is the pre-painted CanoMod Fury 55 canopy, carbon main frames, Miniature Aircraft building towel, full building manual and the rest of the kit in individually numbered bags.

THE MANUAL

The manual is a detailed 50-page booklet outlining the full build with step-by-step instructions accompanied by computerised design drawings showing where each and every part and bolt are supposed to go. The manual detail is overall very good giving part numbers on each drawing, in each description and also gives the complete part number list for the whole kit, both by parts included in each numbered bag but also separately as a full kit list which is very useful when referencing for spares in the future. Also before each step there are actual size diagrams of each piece of hardware allowing you to double check the size of each bolt before using them.

Each building step in the manual also corresponds to the relevant parts bag and hardware bag of the same number, so for example, at manual step one you are required to use parts bag one and hardware bag one. This has the advantage of allowing you to only open the bags you need at that particular moment to reduce the risk of losing parts during the build. Another very useful addition to each step is the inclusion of exploded diagrams for all the factory pre-assembled parts with individual part numbers which is very useful for referencing up the line should any sub-assembly part such as a bearing need to be replaced. The manual also includes a brief set-up guide detailing for example how to set the CCPM servos for the swashplate and setting throttle and pitch curves.

THE MAIN FRAME ASSEMBLY

The main chassis for the helicopter is a typical two carbon frame assembly held together with machined aluminium spacers and bearing blocks which have been cut out and edges rounded to reduce their overall weight. As per other MA machines the frames come with pre-installed PEM nuts to make certain parts of the build simpler as they require no additional nut. The quality of these parts is clear to see and is certainly helped by the dark titanium coloured anodising applied to all the aluminium parts which gives them a very rich look.

The initial two main shaft bearing blocks and spacers are all installed

The standard CanoMod epoxy glass fibre canopy is lightweight and supplied nicely pre-painted


Tail belt drive pulley


Substantial tail assembly


Machined tail belt tension pulley assembly


Fury 55 vertical carbon tail fin


Clutch and clutch bell, fan and fan hub parts


Clutch bell and start cone fitted


Completed engine fan and clutch assembly


Completed engine assembly


The engine and pipe ready for assembly

to the right side frame along with the two machined tail boom clamps and the belt tension pulleys. The hardware bag including all the relevant socket cap bolts and screws for this stage is easily located in the box however the individual hardware parts will benefit from being lightly cleaned of any oil before the application of loctite to ensure a good hold. Of note in these parts are the two tail belt tension pulleys which are again machined aluminium ballraced wheels attached to a machined mount. When assembled these ballraced pulleys have no slop in their movement whatsoever and are also super free running which can only be good for maintaining a constant and smooth belt tension.

Next is the radio tray installation which is essentially a carbon plate mounted to the front of the frames with two nicely finished half rounded aluminium blocks. This is the same tray installation as on the MA Furion 450 and it is clear to see the influence. The left frame is then fitted with canopy and skid mounts and with these parts installed the next step is to mirror the bolt installation with left frame to bring the chassis into some kind of shape. Take care to read the instructions carefully at this point and leave the bearing block screws a little loose so you can use the new design hollow mainshaft to ensure the bearing blocks are perfectly in line. Immediately of note is how this 'carbon box' assembly has become very rigid but yet remained amazingly light. The two front CCPM servo mounts are then installed which do look peculiar as they are right at the top of the frames right next to the swashplate, negating the need for intermediate bellcranks and supporting the servo in such a way as to give it maximum support under the loading received directly from the swashplate.

With the gyro mount quickly installed the tail belt and tail belt pulley system can be fitted. The tail belt pulley is again a machined aluminium wheel and sits remarkably close to the belt tensioners which is intentional as the tail belt simply cannot slip or jump off the drive gear even if the tension runs loose over time. The last part of this assembly is the main gear and auto hub. The main gear is a 111 tooth main gear and is bigger than most used in other 50-size models. Coupled with a bigger 13 tooth drive pinion to keep the main gear ratio at 8.538:1 the idea is to keep the gear train large to add strength and to keep it smooth running. This sees the end of the first building stage.

ENGINE INSTALLATION

This stage begins with the installation of the clutch bell and pinion. The start system is very similar to most of the popular brands of 50 out there at the moment, as it utilises a start shaft with one end sitting into a Torrington one-way bearing in the actual clutch. This method is simple to work with as it does not require alignment but will self align. The clutch bell stack and pinion builds quite easily and when finished is quite short in length and also a beefy assembly with no free play present at all.

Next comes the fan, clutch and engine installation. Both the fan and the hub are made from aluminium and are the only two non-anodized aluminium parts in the kit, retaining their shiny metal colour. The fan comes predrilled for a governor magnet and also has a smaller hole drilled out to let the magnet glue ooze out on installation. Both the fan and the hub are remarkably light and have to be screwed together to make the completed fan assembly. The fan hub installation is a curious one and requires a gentle hand. The hub itself appears to have been manufactured to an extremely high tolerance to provide no fan run out on installation. It slips nicely over the crankshaft and sits slightly proud of the engine thrust washer by about a millimetre. The instructions then state that the engine nut, with loctite applied, should only be 'snugged' down until the gap


Right side of completed frame assembly


Left side of completed frame assembly


Radio gear installed


Completed Fury 55 head

'The performance of this helicopter was truly amazing'


Spektrum H6040 high speed high torque servos as used on all controls - thanks to Horizon Hobby UK


Cyclic servo arrangement


Cyclic servo alignment tool as supplied with the kit


All radio gear installed

disappears leaving no free play in the crankshaft. It is important NOT to crank this nut down, as doing so will distort the fan and cause runout. Two socket head bolts are then fitted to the underside of the fan to clamp it onto the crankshaft and hold it firm. It is hard to resist the cranking down on the fan nut but really this step is essential to keep the fan running true. The clutch complete with the one way Torrington bearing can then be screwed down onto the hub. The machined tolerance on this part is very fine indeed and I did find it a little tight to install. To aid the installation of the clutch keep it sitting flat in relation to the fan hub as you screw it down and it will fit a little easier, but it is a tight fit.

The engine mounting system again uses a machined aluminium base with side mounts that bolt straight on. The engine is then installed as a whole mounted unit with a carbon deflector attached to the top ensuring maximum cooling over the head when the engine is brought close to the fan shroud. The shroud is the same type as used by MA over the last number of years, but with a couple of key alterations. As supplied it needs a little work to trim off excess plastic flashing but beyond this cleaning up there is no further cutting required. There are also now, moulded slots on the inside of the shroud to hold a carbon plate shroud deflector which is designed to force the cool air from the fan directly over the head of the engine and not let it escape between any gaps, thereby preventing wasting air. This will certainly aid cooling on the newer and slightly larger capacity 50 class engines and coupled with the deflector on the engine mount will serve to keep the cooling to a maximum and the wasted air to a minimum. The whole engine mount unit and shroud is located in the frames through a hole on the left side frame which is then braced with a separate carbon plate. This means that to completely remove the engine for any type of maintenance will require the removal of only ten bolts and the engine will simply drop out, with engine reinstallation requiring no additional alignment.

With the addition of the undercarriage and the new moulded X-Cell tank this sees the main chassis complete. A point of note here is the ease by which the tank can be removed. It is suspended between the frames on soft mounts and requires the removal of only two bolts to gain full access to the tank. The kit supplies a sufficient clunk for the tank, however I chose to install a fuel magnet foam clunk as I had no intention of running a header tank.

THE TAIL

Attention can now turn to the tail boom and transmission system. The tail drive is a belt driven system to a tail transmission assembly which consists of a machined aluminium gear and an aluminium tensioner wheel, braced between ball raced carbon mounting plates. All of this mounts to an aluminium tail brace which leaves the tail free from movement. The tail tensioner sits virtually on the tail pulley gear which again gives the belt nowhere to go should it run slack over time and means that there is a much reduced chance of the belt skipping off the pulley. The tail yoke pitch slider and tail grips will be familiar to those who have built Miniature Aircraft however the slider assembly now comes pre-assembled reducing the fiddly bits to have to work at on the tail. The hub and grips are the same as those used on their 90 machines to date and are both ball and thrust raced, for the best performance possible. When assembling the grips just note the orientation of the thrust races which is very important and adequately explained in the manual and make sure to add plenty of good grease to them but be careful this grease does not get onto the hubs threaded studs on assembly. The grips are tightened on with a locknut but loctite is recommended and it might

I ran a little exponential on the cyclic just for the first flight

The helicopter was smooth, save for a little movement on the canopy

be worth investing in a thin walled 7mm hex driver as there is very little room when tightening the nuts. The kit is also provided with graphite reinforced plastic tail blades.

As stated before the Fury 55 has a belt driven tail system rather than a torque tube. The thinking here is firstly to reduce weight but then also leave the crash spares much cheaper. I have never been a fan of tail belts as often they are very 'draggy' and zap away large proportions of engine power, however the tail system on this helicopter is without question the most free tail belt system I have ever come across. The most important thing of note here is to keep the correct orientation on the tail belt for proper tail rotation and also to not twist the belt too many times during installation.

The boom supports come pre-assembled and have nicely machined aluminium ends attached which leave the supports remarkably stiff when attached to the aluminium boom clamp at the back of the boom.

HEAD AND SWASHPLATE ASSEMBLY

Both the head and the swashplate will look familiar to X-Cell users as they are largely the same as has been used on the previous machines, with a few key changes to make it in keeping with a trimmed down 50-size machine. The swashplate has the same tried and tested high quality bearing assembly as before, which contains grub screws for adjustment to remove any potential slack as the bearing wears throughout its life, but there is a little less meat on the outer ring to once again reduce the weight. The assembly of the swashplate balls is fairly straight forward but with one word of caution. The inner ring uses two slightly different sizes of ball, one of which is longer than the other and is to be used for the pitch arm links and the other is slightly shorter for connection to the washout set. They are quite similar and will require a prior look before using to prevent any confusion. Once again the washout assembly has been slightly simplified by the introduction of a one-way pivot pin which only requires the installation of one retaining clip per pin and not two as on the previous kits. These clips can be fiddly as they are very small so take care to install them in a confined space as they have a habit of shooting off when opened. I always use a small flat head screwdriver to open the clip a little with no special tool required.

The head makes use of the well tested preloaded damping system with a circlip retainer and is capable of running with up to 620mm blades. This allows the head damping to be adjusted to suit personal taste from soft to hard without pressing on the grip bearings which are free to rotate smoothly without any interference from the damping. The damping itself is provided by o-rings which can be loaded with washers, which are supplied, to harden the head or left standard for a softer feel to suit personal preference. The manual suggests using two washers per side to achieve a stiff feel to the head, but in my opinion one per side is more than sufficient and will prove difficult enough to fit without adding more. A small brass tube is provided to help with the installation of the second circlip which can sometimes prove testing to install. The tube should be placed over the feathering spindle end and pressed home by inserting a blade grip retaining screw and screwing it in until the clip falls into its groove. Have patience with this as it can be a bit tricky. A tip here is to look closely at the circlip and you will see that they have a sharp and a slightly rounded side due to the way they are manufactured. Place the clip on the shaft with the sharper side facing towards the end of the feathering spindle (and therefore the rounded side towards the centre of the head) and they will stay in the grooves much better under load.

The grips are the same Graphite Reinforced Plastic (GRP) grips as MA have used for a while now on their 90-size helicopters and they have always proved reliable and cheaper to replace in a crash than an aluminium grip. Newer style bell mixing arms are now being used with the Fury 55 which allows more confidence when pulling large amounts of collective and cyclic that a link won't pop off. They are a very similar design to the much smaller version on the Furion 450. The headblock is aluminium and has a notable slimness when compared to the older MA head blocks which again is more in keeping with a 50-size machine.

A completely new flybar carrier and cage is being used and is easy to build but just make sure to pop on the ball link before closing off the cage. The paddles provided are GRP paddles with two mounting holes available for normal and more aggressive styles of flying and whichever you decide to choose it will be down to personal preference.

In low down ground work the hard stops were sharp and precise

This helicopter certainly allows the power of the latest 50-size engines to be realised

One initial strong point to this helicopter was just how straight and true it tracked

The model seemed quite happy with all I could throw at it

I personally opted for the more aggressive mounting position.

RADIO INSTALLATION

As stated before, the two front cyclic servo mounts are peculiar looking as they sit right at the top of the helicopter just in front of the swashplate but still well within the confines of the canopy. The servo installation stage comes again with all of its own hardware and some purpose made carbon and G10 spacers. The G10 spacers are to be used to help clamp the servos in with the carbon spacers being used optionally to space out the servos to give the correct swashplate to servo geometry. Use of these carbon spacers will depend on the type and size of the chosen servos to be used, with not every servo requiring their inclusion.

My servo choice for this model was the new Spektrum H6040 high speed titanium geared servo. It offers a little over 12kg of torque at a 0.08 speed running at 6 volts. With this kind of specification I made the choice to try this one type of servo on each of the helicopter controls, running them on the cyclic, throttle and even the tail! The speed is certainly there (if a little slow for a tail servo) but the main reason was the torque and the fact that they are titanium geared for improved wear rates which is impressive. These servos required the use of the carbon spacers to keep the geometry right and they slotted in perfectly. The throttle and tail servo installation is straight forward but just read the instructions and study the diagrams carefully as the tail and throttle servos are mounted to the inside of the frames. To help aid the cyclic servo setup a small carbon alignment tool is supplied which clearly shows exactly where the servo arm must sit to offer the perfectly centred alignment. This tool simply clicks on over the two socket head bolts closest to the left and right cyclic servos and is very simple to understand and use. Just remember to remove the tool when you have finished with it.

The front mounted radio tray offers plenty of room for all the regular gear to be installed quite nicely and indeed provides plenty of extra space for additional gadgets such as the SwitchGlo onboard glow driver that I decided to fit. The kit also comes with nice new Velcro strapping with 'Miniature Aircraft' printed on in silver writing, which is a nice touch.

The standard canopy that comes with the kit is a nicely pre-painted CanoMod epoxy glass canopy which is fairly light, but also looks the part too. All that has to be done here is to grommet the canopy up for use and depending on the chosen muffler stick it on and go fly! I chose the new Hatori SAB-55 muffler designed specifically for the O.S. 55 and I must admit to having to trim the canopy a little around the top of muffler to prevent any fowling on the pressure feed. This was completed very simply with a Dremel and sanding drum.

INITIAL FLIGHT

With all servos linkages set up as per the manual, the engine needle settings as per the recommendations of the manual, it was time to try some initial hovering. I ran a little exponential on the cyclic just for the first flight and tamed down the servo travel and set about getting the engine started. Without much effort the engine flicked over and kicked straight away into a steady idle. A few seconds later the Fury was spooling up and pulling into an initial hover. The model rose steadily with no trim required up to eye level at a head speed of about 1,800rpm which was clearly effortless to this obviously slobbering rich engine.

The helicopter was smooth, save for a little movement on the canopy which can be attributed to the engine running way off tune, but other than that the helicopter was spot on and it was clear that even at this rich setting this thing was going to have power. After a few gentle slow circuits I landed and checked over the model for correct operation. Everything was fine save for the thick coating of oil on one side from the over rich engine. I leaned the engine in several clicks on both the high and

Equipment Used

- Fury 55 helicopter
- O.S. 55 engine
- Hatori SAB-55 muffler
- FlightTech 8A voltage regulator with fail safe switch running at 6V
- FlightTech 3,000mAh 2S2P LiPo receiver pack
- Spektrum H6040 servos on all controls including tail
- CSM 720 gyro
- CSM Revlock 30 governor
- SAB 600mm 'Red Devil' main blades
- SAB 92mm 'Red Devil' tail blades
- SwitchGlo onboard glow driver

With thanks to the following companies for kindly supplying their equipment for this review: Miniature Aircraft USA and HeliWholesaler, Horizon Hobby UK, Motors & Rotors, FlightTech/Energon Solutions, CSM, Hatori USA and SAB composite.

The calm before the storm. The Fury 55 is a good looking helicopter

I get the feeling MA has hit a real winner in the new Fury 55

TECH SPEC

X-Cell Fury 55

PRODUCT TYPE:	50-size nitro 3D helicopter
LENGTH:	1216mm
HEIGHT:	22mm
ROTOR SPAN:	1365-1405mm - 600-620mm blades
TAIL ROTOR SPAN:	260mm - 95mm blades
KIT WEIGHT:	2.45kg (includes painted canopy)
RTF WEIGHT:	3.31-3.4kg (less fuel)
MAIN DRIVE RATIO:	8.538:1
TAIL DRIVE RATIO:	4.61:1
RRP:	TBC (expected to be around £500)

AVAILABLE FROM: Specialist R/C heli stockists

MANUFACTURER: Miniature Aircraft USA

WEB: www.miniatureaircraftusa.com

The Miniature Aircraft Fury 55 is distributed worldwide by HeliWholesaler and is available in the UK from Motors & Rotors (www.motorsandrotors.com), Midland Helicopters (www.modelhelicopters.co.uk) and Fastlad Performance (www.fast-lad.co.uk).

mid-range needles, increased the head speed a few more rpm and went again. With a bit more speed in the circuits this time it was clear that one initial strong point to this helicopter was just how straight and true it tracked across the sky. Very big and fast looping manoeuvres were already possible even with the helicopter still being run in, as it would simply climb vertically as if possessed with little engine bogging. Again landing and checking the engine temperature showed that this motor was still no where near being on the right tune, still being far too rich and so a further needle adjustment was required. I also set an idle up for this flight with much increased cyclic throws, an increased head speed and a little more collective as it was obvious this helicopter had an impressive power to weight ratio.

The little helicopter was really starting to come into its own now with the whole setup making more power and carrying more speed through every manoeuvre with a smoothness that left it a joy to fly. But this type of flying just isn't my thing at all and I was eager to get it singing loudly and making those nice blade slapping noises we all love, so with the running in phase very much over in my opinion it was time to unleash the Fury!

3D SHAKEDOWN

The engine was pulling well at this point but was still spitting out a lot of oil and was running cool so a leaning in was required. I reset the throttle curve and governor to give approximately 2,000rpm on the head and maxed out the cyclic and the collective to give the model that punch and snap that I wanted. The increase in the headspeed certainly pulled the motor into its power band and added a lot of authority to the cyclic which has sharpened up a lot. The model also seemed to take on an increased light feel which was confirmation that I was going just where this model wanted to be. So with the model spooled up and into a hover I flicked my idle up, waited for the headspeed to follow and when settled I punched the collective and watched the model climb like a rocket vertically faster than any 50 I have ever flown. The tail was holding really well with the combination of Spektrum H6040 and CSM 720 and pirouetting manoeuvres proved easy and locked in with no note that this had a belt driven tail. Changes in pirouette direction under manoeuvre loads were sharp and showed no sign of loading up the engine or stressing the tail drive.

In low down ground work the hard stops, which were definitely aided by the torque of the servos holding the swashplate, were sharp and precise and easy to judge because of this. Fast backwards hurricanes and pie dishes with the occasional pirouette thrown in, proved the model could be accurately stopped at any point and would still retain that locked in feel. Fast pirouetting manoeuvres such as piro loops and snakes, which really test the tail, were no problem and the model seemed quite happy with all I could throw at it.

With the increased cyclic rate both aileron and elevator tick tocks could easily be judged even when low to the ground with a jab of collective being enough to stop the helicopter dead. A truly amazing helicopter as when the idle up is disengaged and returned back to normal mode the helicopter would once again return to a tame and docile machine, that was positively easy to fly and all of this on the same mechanical head settings! I have no doubt also that this helicopter, engine and pipe combination will develop even more power as time progresses, as the engine has done very little work and will bed in fully over the next few gallons.

After several flights at this I stopped to check over the helicopter for any faults and could not find any. Everything like gear meshing and tail tension had bedded in well and seemed to be more free if anything with the swashplate, washout set and ball links being free to operate but still locked in place.

THE VERDICT...

The performance of this helicopter was truly amazing and certainly allows the power of the new generation of 50-size engines to be realised. Where it was indeed a joy to both build and fly, I believe the true quality of this kit won't be properly appreciated by the owner until many hours of hard flying are under its belt. Many of the crucial but basic parts on this helicopter such as swashplate, ball links and bearings have been tested and run for many years in the 90-size arena and have proved more than adequate to the job. This can only bode well for the new Fury 55 which is one of the first of a new breed of 50 plus helicopters to enter the market place at a time when running costs are at the forefront of people's minds and when the value for money product is where the sales are going be.

If you want to buy once, not have to upgrade and have a 50 class helicopter with the performance of a much larger machine, then rest assured the new Miniature Aircraft Fury 55 will not disappoint as it oozes quality at every turn from the build to the hard flying capability. I get the feeling MA has hit a real winner in the new Fury 55 and if initial tests are anything to go by it will be around for some time to come.

David Nolan