

Interview: LEGO® Technic

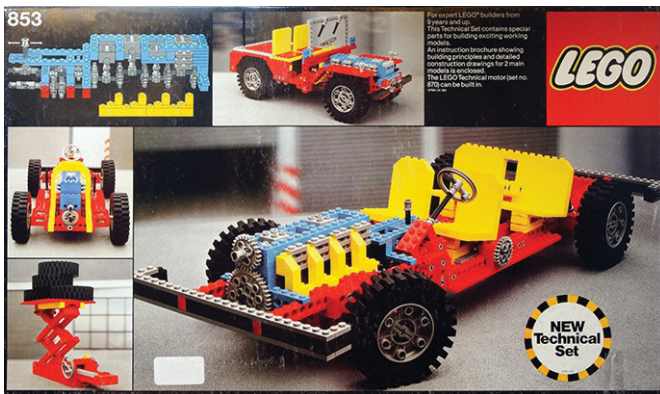
By HispaBrick Magazine®

Pictures by HispaBrick Magazine® and LEGO® System A/S

HispaBrick Magazine® has always been very engaged with the LEGO® Technic and LEGO Mindstorms themes, and from the very beginning we have published articles about these themes. It seems that this passion for Technic is not only appreciated by the fans, but also by the LEGO Technic team. That's why we were very excited when Andy Woodman, Senior Design Manager of LEGO Technic, asked HispaBrick Magazine for an interview. We had a great time with him and we got very interesting answers to our questions.

HBM: The first Technic models were built with Technic bricks. Several years later the beams appeared in the LEGO catalog. What benefits does building with beams have compared to building with technic bricks?

Andy Woodman: The beauty of this system is that we can build closer, we can build more structures and we can build more interesting and structural functionality. It gives us a real smooth effect for our models as well, but that's not a deliberate thing, it's just the result of that. The main reason for starting this beams system was to be able to get these structural connections and be able to build more interesting structures. And by creating these beams we were able to take it a step further than the brick based Technic system.



HBM: Why are beams based on an odd number of holes?

AW: It's to do with the geometry of how things are created. Odd numbers give us the ability to create triangular systems and solutions and also means that the way the system has been mapped out works so you can create structure and building possibilities. And that's why it is different from LEGO System, but as you can see, the cool thing is that there is always a way to make LEGO System work with LEGO Technic and vice versa.

HBM: Is it also because of symmetry?

AW: Yes, because for example you would want to have a shaft run down the middle of something, normally, so if you have 4 holes rather than 3 holes you will always be one off. By having an odd based system you always have the ability to run gear wheels etc. where you want them to be. So there are a lot of system reasons why it is odd.



HBM: When designing new technic parts, Do these new elements need to follow the same rules as any other LEGO brick?

AW: Yes. LEGO systems in general, whether System or Technic, have a set of criteria for each element that follows a grid and there is a grid for LEGO Technic just as there is for LEGO System. But there is a crossover: the holes in the beams match up with the way you can place studs so when you place studded snaps into an element and then use a System piece you can connect them together. The system has been designed to be compatible. That means that when our element designers create new LEGO Technic elements they have to work with all the other LEGO Technic elements; they have to fit within the geometry of our system and they will also work with the relevant System elements. So there are a lot of layers for designing new elements.

HBM: To what degree is the appearance of new Technic elements motivated by the needs of the Technic team?

AW: We are the drivers of this platform. We share this platform a little bit with MINDSTORMS. We also share it with construction, with the figures they create and they have their unique needs and we have ours as well, but the cool thing is we also share our platform with LEGO System so a lot of the play theme based models are using a lot of technic in terms of being able to make functions and being able to make stable models. They use a lot of Technic and that means that when we are creating elements then sometimes there might be an element that is created by a System based project which interacts with a Technic beam and that might be something that we can use later in our models, but most of the time most of the elements we create as LEGO Technic are created by our team and driven by our needs. But there's always a lot of sharing of pieces.

HBM: Is it more difficult to design models with pneumatic or with electric functions?

AW: They both bring their own complexities. They are obviously more complex to design than a model that doesn't have either of those. The pneumatics means you have to run the tubing through the model and you have to be aware of how the tubing will go and how they run through the model so someone else can build it. When you are using the electronic components then there is of course a lot of testing with that

for the lifetime testing of the model. Do the gears run freely, do the gears have enough energy from the motors, how do the clutches work in the model and making certain that the kids can't hurt themselves by driving these models. Each one of those has its own complexities and they are more complex than using just a normal System model. But the designers are well versed in these matters now and they have the extra time they need to be able to do those things.

HBM: How do you do structural studies of the models designed?

AW: A lot of it is based on the designer's knowledge. Our designers have a tremendous amount of knowledge of engineering principles. Most of our designers have been building with Technic for quite a long time so they have built up knowledge over the years of building models. When it's a model like the Claas Xerion they are trying to catch the authenticity of the real model so maybe some of the hints about how the chassis is created on the real tractor will influence the way that they lay out the model of the tractor.



And then of course when we get to sketch models we do a lot of testing with them. We do lifetime testing of models and there will be a lot of robot tests in terms of the structural stability. We also do the same as with the System models: we have a mechanical stress test to ensure the models are stable if you want to pick them up and move them around and play with them, and general play testing – kids playing with models, driving them around, using them as they would in their own rooms, watching them play and understanding how they play with the model so as to identify the need of our model. So if we take a model to a kids test and the kids want to do a particular thing with it, and it's not something we thought about, then we'll go back and we will try to work out how to accommodate that. So there's a lot of testing.

HBM: Do you apply changes on the designs, based on these studies?

AW: Yes, every time we take a model for a test we hope that it will pass, but it might not, and that means that the designer needs to have the space to loop that model. Whether it fails the lifetime test or whether it fails the kids test, it's the same outcome: it means the designer will go back, think about it, find a solution and go back to test it again.

HBM: The 4958 Monster Dino is an example of a Creator set that is very much a Technic set. Who designed that set (the Technic or the Creator team)?

AW: That model is a Creator model and it would be a Creator designer who takes it and makes it, but – and this is the same whenever you see a model that has a lot of Technic in it (like the flying fortress in LEGO® Chima, which was a phoenix and that model is very Technic heavy) – they also come and talk to the Technic designers and say: "I've got this idea, can you come and help me with this", because our designers really

know our system and they know how to make mechanisms and it can save the other designers a lot of time.



So for all new designers who come into LEGO, we have 2 Technic designers that will go and give some basic training as to what our system is about and how to use it, but the preliminary message is basically: if you get stuck or want to try something, come and talk to us. So we often get System designers coming by saying "I've got this idea for a mechanism, how do I do this?". Or "I've built this, is this the best way?" We encourage that and Marcus, the designer of the Bucket Wheel excavator, is well known in our team and he has always got a line of young designers next to him asking for help. It's nice for our senior designers to be seen as experts who can be approached for advice.

HBM: According to the information posted on the webpage for the new 42056 LEGO Technic Porsche, this set is part of a "new LEGO Technic concept". Could you define what this concept is about?

AW: We've got the traditional second half year LEGO Technic line-up and we have really pushed the boundaries for these models as much as possible, so this year's lineup has a tremendous amount of authenticity in the Volvo and the Claas tractor and then we add this massive Bucket Wheel Excavator, the biggest model we have ever made and definitely the biggest box we have ever produced. And then on top of that we have this Porsche GT3 RS.



This model gave us the opportunity to do something different from the other models. So we still have the great models which are absolutely packed with functionality, lots and lots of building, but we wanted to do something that maybe appealed to a different type of person. It is still very much a LEGO Technic model, and there will be a lot of LEGO Technic fans who will want to get hold of it and build it, but it also appeals to maybe the collectors of real Porsches, or somebody who owns the real car, or somebody who has always wanted a Porsche, but maybe can't afford it, but now they can get hold of this model and they can build their own, which is even cooler.

So to do this concept we wanted to have a partner who would lean into us and who would really contribute to this, and with Porsche we've been able to work with their design team while they were designing the real car, get a lot of input about what they wanted to see in the model, and then we've been able to capture that input and put it into a book as well. So when you are reading through it and building the model car you have the ability to understand the relationship between what you are building now and the real thing and you get a bit of a design story between the real product and the car. To do that we created this concept which sits above our existing portfolio. It's not that it's better or more difficult to build or anything like that. It's just different from what we have done previously and it's a new niche, a new concept, and we wanted to make sure that we tried to make it as inline with the real product as possible, so we have very special packaging, you have the feeling that you are opening something really special. The graphics on the box are very different from our traditional packaging. So from the moment you see the box, take the lid off and start to build it you get the feeling that it is something different. It's not that it has more elements or is more difficult, it's different. Something a little bit special.

HBM: This year the size of the sets breaks all previous records. Are we getting to the upper limit of what is possible with LEGO Technic as far as structural integrity is concerned or is there still room to grow?

AW: You can build a small model that is unstable. It's all about the way that you create the model. The way you put structure into the model with the elements that you use. By bracing, by cross structures and by locking down you can make a model which is very stable, and at the moment we have got a whole series of new frame elements which we are using and that allows us to experiment and to go a little bit further than we have before. There will always be a limit, but it will always be limited by the way that we think about the structure, so we could make models that were way bigger than these that were very structural if we made them in the right model type and in the right way. The question is, I don't think we can find a box big enough to put all those elements in because this is the biggest box we have and it is literally the biggest LEGO Technic model we have done. It is just short of 4000 elements and it's a tremendous building experience and we are really looking forward to seeing people build it. I'm not sure if we can go any bigger at the moment, because we couldn't sell it, but we could absolutely build a bigger Technic model. If it's the right model and it's built in the right way you could build something as big as you like, really.

HBM: LEGO has been bringing out licensed Technic sets for some years now (Mercedes), and this year there are several from different brands (Claas, Volvo, Porsche). Why are there more licensed products now and is this a trend in LEGO Technic that you consider to be an important direction?



AW: We are always trying to make sure we are as authentic as possible. We want to bring our fans the coolest, best models that we possibly can, that are packed full of the things you guys want - you want the challenging build, the authenticity and that amazing functionality where you have to think

“how the hell did they do that?” and we want to push that all the time. And sometimes that means we build an amazing model which is a version of something like the Bucket Wheel Excavator - this is our interpretation of this kind of machine. We are very much inspired by the real machines, but this is our version, so there is no right or wrong about this one. But with something like the Claas tractor, we chose the coolest tractor with the most functions. Most tractors are very cool, they are very impressive, they are very big, they've got small wheels at the front, big wheels at the back, engine, cab, you can add whatever implement you want, but that's it. That's really cool, but with the Claas Xerion there is even more. You have the 4-wheel steering, you have the different steering possibilities, the rotating cab. And to be able to do that model means we have to talk to Claas and see if they are open for this possibility. For all of the licenses that we use we have a collaborative approach. We don't do a license and say “thank you very much for the pictures, we'll go our way and make the model”. We are very much involved with the design teams and the people who are creating the real machines, because we want to try and capture as much of that as possible and bring it to our fans. So the designers of the Claas and the Volvo have been to the production line, they have seen the people who have designed the real thing and have talked to them, and the same goes for the Porsche - they've been to the production line, they have seen inside these machines and they have been able to capture as much of that as possible and bring it out to you guys.

That is not to say they are an exact replica of the real thing, because these are LEGO Technic versions of the real machines, and I think sometimes that is overlooked by a lot of people. We are not there to make an exact replica. We are there to make a LEGO Technic version of these real machines, so it is about capturing the essence of the design and functionality, but remembering that it is still built with LEGO Technic. We really want to make the very best LEGO Technic versions of these things. It's a challenge. We don't do licenses for the sake of it and we don't do licenses if people approach us. We very much look at what that opportunity is and what it means to us. So you will see more licenses, but they will be used in a sparing way, because LEGO Technic is about authenticity and functionality so it's very much about matching those two real world partners.



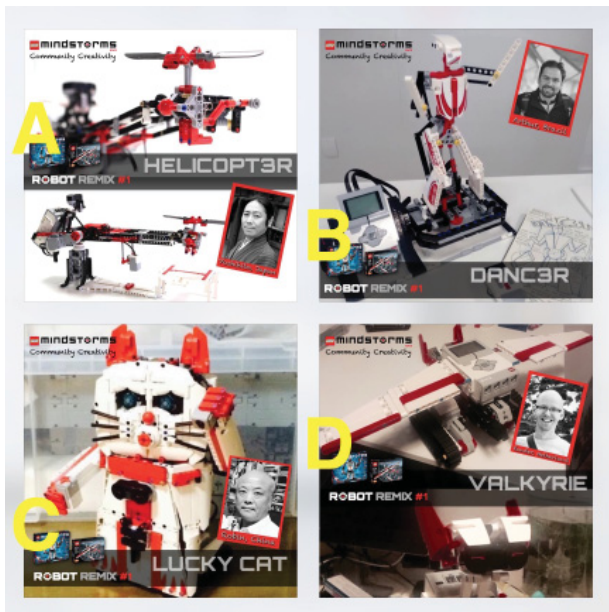
HBM: This year (as has happened on other occasions as well) there has been a set that was announced in traders catalogues and toy fairs, but that was finally not marketed (42051 - Airport Rescue Vehicle - there are some images available online so the set was definitely developed). Why does something like this happen? What happens to such a set?

AW: The fire truck has been developed and for various reasons its launch has been delayed, but it's a very cool model, so who knows where it will turn up next...

HBM: Over the last couple of months several combination models of an EV3 set + Technic set have been published under the name RobotRemix (and more are to follow). What is your opinion about this initiative? Are there synergies between Technic and MINDSTORMS beyond the efforts of fans?

AW: I think it is really cool. LEGO® Technic and MINDSTORMS is the same platform. We use the same elements and you can interchange the whole thing. There is absolutely no reason why you can't make a MINDSTORMS equipped Claas tractor. I'm sure someone will at some point completely automate a version of the Claas tractor and that will be really cool. Because they are completely compatible I look forward to seeing the opportunities. Philippa (ed: the MINDSTORMS Community Manager) was here earlier. We are in the same building and very close to each other. We know what's going on with each other's products and we use the same platform so I think we should encourage that cross use.

HBM: This year there have been axles in different colours. Is this a trend to colour code axles in the same way pins are colour coded or is this an aesthetic change for specific purposes?



AW: It's related to the building system. We are always trying to make the most amazing models with the coolest functions, but at the same time we need to be able to make a challenging build - this is LEGO Technic, it's not an easy-build system - but we try to make it as easy as possible for you to get it right. That means that in the chassis of the Porsche or the tractor there are lots of colourful parts that enable you to make sure you are holding it the right way round and you add things at the right end, or they are there to make sure you choose this axle and not that one. This year we have launched both even axles in red and odd axles in yellow, which is an addition to the black and grey we already have. That means that the designers have more freedom now to make sure you pick the right axle when you build the model. You'd be amazed at the consumer call rate we get because they confuse a 5M axle with a 7M axle. In the past both were only available in grey. The designer had two choices: either not use one or the other, or find a way to use it in a very clear way and even then there was confusion. So to make life better for our consumers we introduced these secondary colours and that means that if the designers use a 5M axle in grey they will use the 7M axle in yellow so there is always a differentiation.

I know this upsets a lot of hard core users because they feel the model becomes multi coloured, but if you look at the models of the second half year you will see that from the outside of the model you can't see that. From the outside of the models the designers always work really hard to make sure that you don't even notice that, but when you are building the functionality on the inside of the model they will make it as clear as possible so you can understand how to build that model.

HBM: What criteria do you look for/follow when considering inviting someone to become part of the Technic team? (i.e. what should I do if my dream job is to become a Technic designer?)

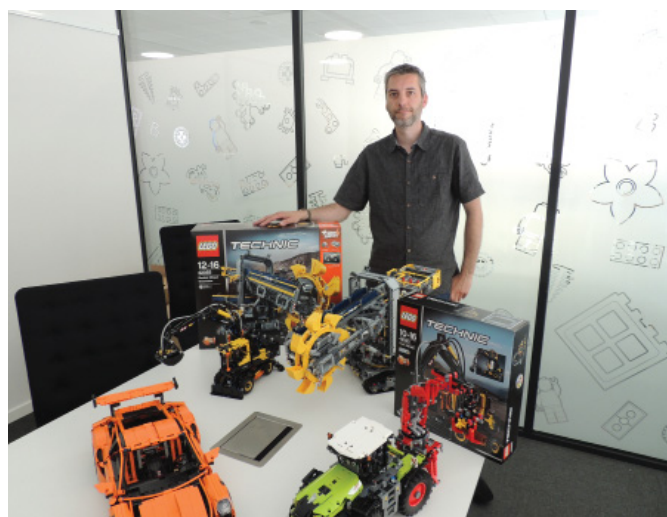
AW: If you want to be a designer in LEGO, the best thing I can recommend is that you train to be a designer. Take on all the courses and possibilities you have. If you are still at school, then follow a career path of art and design. If it is something that you really burn for, if it is really a strong passion for you, then follow that path and become a designer. And then when you graduate and become a designer, you have the opportunity to see if there are any openings at LEGO. If there are not, then you still have the ability to become a designer and maybe later you can look for opportunities at LEGO, but that passion for LEGO, building and creating models, keep that going, because that is going to be a really cool part of your possibility to join LEGO.

HBM: Is engineering also an important factor for the Technic team?

AW: It's not essential because we have different roles within the Technic teams. Some of the guys are heavily into the engineering side of things - e.g. they understand the way gears work, what they need to make different drives, etc. - and then there are designers who really understand the aesthetic of the model, and in that sense our team is very much collaborative. So the designer who is very much into the aesthetic of the model can help the designer who is into the engineering of the model and vice versa. There is always one designer who is responsible, but our models are always very collaborative and designers are always helping each other out. What's driving LEGO Technic forward is that our designers are very open to somebody else giving them an idea, and that's very important from a designing point of view and something we really nurture in our team.

Whenever we look for people we bring them in, we understand how they work. It's not just a case of taking the very best designer, but rather the very best designer that will work in my team. It's not just the very best person sitting in a corner to make a model. They need to be able to interact.

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Andy Woodman
Senior Design Manager of LEGO Technic