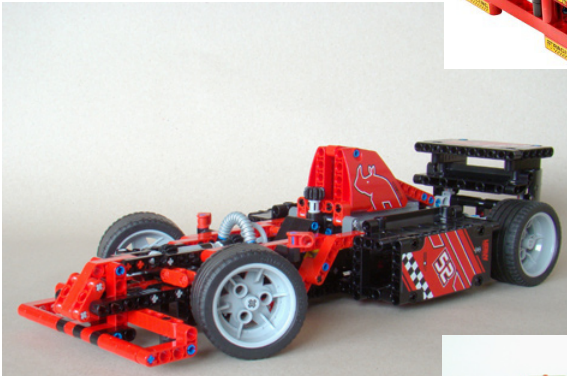




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How to build an Alternative Model out of LEGO® Technic Set

By Tomik (Tomáš Vít)

In a previous issue of HispaBrick Magazine I've shared with you how to build an alternative model out of LEGO Creator set. Now I'm going to advise you on doing the same with LEGO Technic. Since some steps are similar to building with Creator, I'll focus on those they are different. If you look at current studless Technic parts for the first time you may think: "Is this still LEGO?" LEGO Technic differs much from classic LEGO in parts, building techniques and above all in functions. While LEGO Creator is mostly about what the model looks like, LEGO Technic is more about how the model works.

Choosing the Set

The main advantage of building alternative models is the limited assortment and amount of parts – you don't have to think much which parts you're going to use because all of them were already chosen. The main disadvantage of building alternative models is the limited assortment and

amount of parts – you can use parts just out of one set. So choosing the right set makes building easier. At the beginning I recommend you to start with a set containing between 300 and 400 pieces. When you are looking for a suitable set it is wise to check its part list. I especially focus on the amount of gears (you'll use them for creating mechanisms), panels and flexible axles and tubes (you'll use them for adjusting the appearance of the model). If you want to build wheeled vehicles it's better to choose a set containing wheels of the same size. I think currently the best sets to start with are 42035, 42022 and 42004.

Preparation

Preparation is an important part in the process of building your own alternative model. It helps you to reveal possibilities of the set you've chosen. I always start building the main model with the help of the instructions that are included. It is the best way to get an overview of the

parts used in the set, the size of the finished model and sometimes I even find interesting details, techniques or mechanisms that I'll use in my own model. After dismantling the main model I sort the bricks according to their type. The most important categories of bricks are gears, panels, tubes, flexible axles, wheels and special parts (springs, parts of engine, cylinders and so on).

What Do You Want to Build?

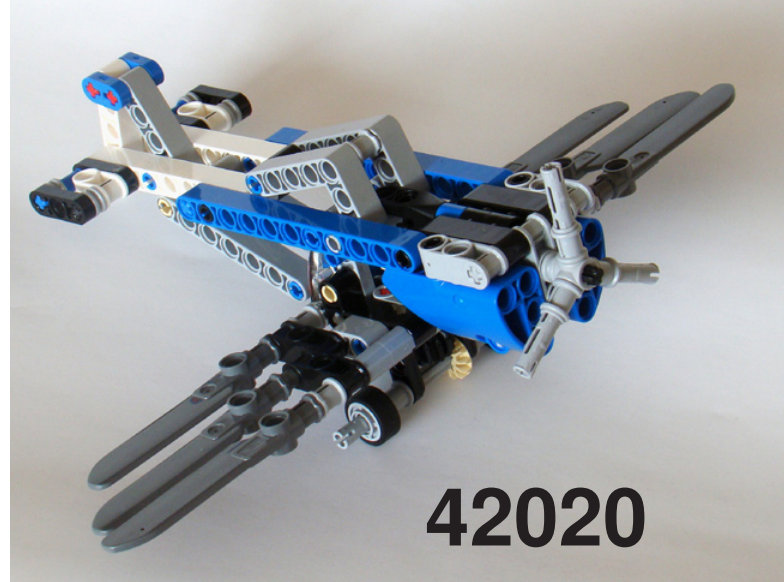
What you want to build is a very important question and you should know the answer before you begin building. It's possible that your "WHAT" will change during building. Sometimes it happens to me too. Anyway a clear idea about results leads to success. What should an alternative model be like?

- 1) Original – build something different from what the designers at the LEGO® Company have built out of those bricks.
- 2) Recognizable – build model in such way that others recognize what you've built easily.
- 3) Using as many parts as possible – if you use at least half the parts in the set you'll get an alternative model that is comparable with the main model.
- 4) Solid and stable enough – each model should be solid enough for demonstration of functions without breaking and stable enough for standing in its natural position without any support structure.

And where do I get inspiration for alternative models? The easiest way is to build something thematically close to the main model. For example you can build a car or formula out of a truck. Another way is to choose the subject of the model according to the number of gears and special parts that limit the number of mechanisms and functions. For example you can build a dump truck or crane with one linear actuator. If you have two actuators you can try to build an excavator or loader. You can also use type of panels or other big parts as hint. For example if there are flat panels in the set you can use them for building wings. And finally you can find inspiration in models that were built by other builders. You may find some interesting mechanism or another detail which you can try to imitate in your own model. For example my red shark arose this way. I saw a mechanism imitating flapping wings and later I've used it for the shark tail. When you know what you're going to build your next step is to find out what your model looks like and how it works.

Functions

Technic is mainly about functions and Technic without functions is not true Technic. So how can you add functions and mechanisms to your model? There are two ways to create them. You can take specifications of real machine and translate their mechanisms into "LEGO bricks" or you can design your own mechanism in order to get the required function (for example to connect undercarriage and propeller by gears to make propeller whirl when plane is going). You can also check the internet to see if somebody has already built a mechanism you need for your



model. If you find it you can just copy it and adjust it. Great resources of inspiration are books "The Unofficial LEGO Technic Builder's Guide" by Sarel and manual "LEGO Technic Tora no Maki" by Yoshihito Isogawa.

In a simplified way we can divide mechanisms into two groups: with continuous motion and with limited motion. The most familiar function with continuous motion is "fake engine" with moving pistons. It is based on a crankshaft that converts the rotary motion of an axle into the linear motion of a piston. The whirling propeller mentioned above is another example of a continuous function. These functions can be elegantly driven by wheels or an undercarriage. Mostly just ordinary gears are required for building them and sometimes you can build them even without gears. Mechanisms with limited motion are often more complex. It's not possible to connect them with wheels due to their limits so you need some knob (gear, crank or motor) to operate them. The most ordinary limited function is steering. Other limited functions are lifting, opening, tilting, extending etc. If you want to build them you'll need a worm gear, linear actuator or pneumatic cylinder. So by counting them you can easily determine the highest number of these mechanisms and choose A proper subject for model.

To Draw or Not to Draw?

Now it's time to choose which mechanisms provide the functions you would like and you're able to embody into your model according to parts in set. When I'm building complex mechanism with bigger amounts of gears I usually sketch transmissions in order to find out how many gears I need and how much space they require. Sketching is a very fast and effective way of recording thoughts and ideas.

If you decide to build an actual machine I recommend you to find technical specifications of this machine, especially drawings. Then you can draw a grid on these drawings where distance between lines represents length of one stud. Now you're able to determine how big each part of the model is supposed to be in order to keep the original proportions. I often use the size of wheels to adjust scale of grid.

Beginning Building

I always begin building mechanisms first to be sure that the model will work as I want. If you start with building mechanisms you'll be able to use any bricks out of the



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set for them. The size of mechanisms determines the size of whole model. So you'll quickly verify if you are able to include the planned functions in your model and you have enough parts to finish it. If you can't build mechanisms out of the available bricks I recommend you to simplify your model (lower the number of functions) or to build something else.

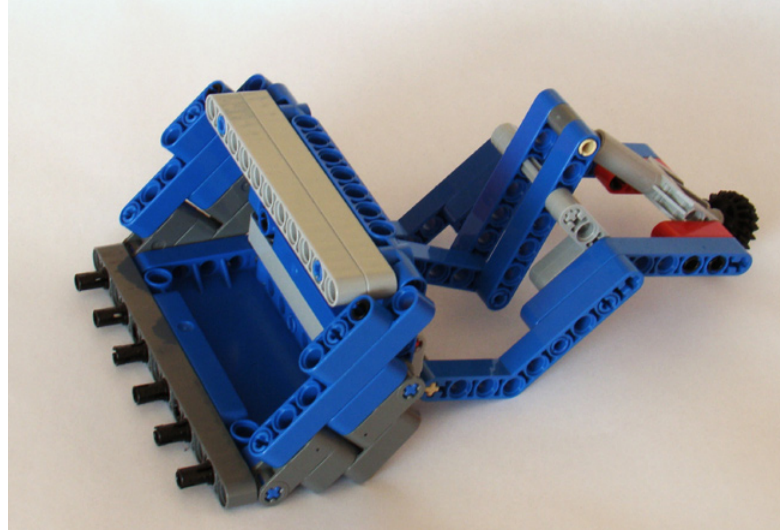
First of all prototypes of main mechanisms must be working. Continual functions should work smoothly within whole cycle. Extreme positions are crucial for limited functions – if there is no problem in them probably there will not be any problem between them either. Now when we've built the mechanisms it's time put them together to get an idea of the size and proportions of the model.

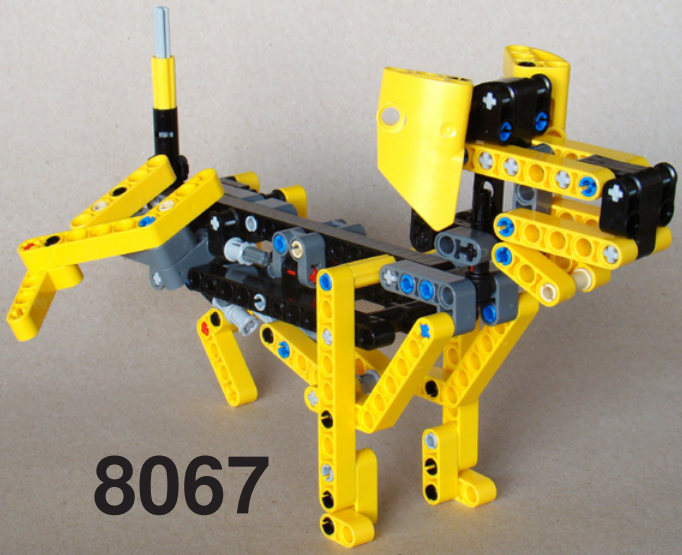
Sometimes it happens you've built all mechanisms but they are too big and you don't have enough parts for finishing (covering) the model. In this case I recommend you to scale them down or change the model. The final size of the model depends above all on the size of the mechanisms (mostly you can scale them down or up) and on the size of the available wheels when you are building wheeled vehicles. I've found out smaller wheels are worse than bigger – bigger wheels mostly don't hurt your model but wheels that are too small can look weird. Choosing a suitable size of your model helps you to use an optimal amount of bricks from the set.

Now when you've built all mechanisms we can begin working on the appearance of model. If the set contains panels I start looking for the most suitable places for them. I lay them on the model without connecting. At this moment my goal is not to find the way of attaching panels to the model but to find the best set-up for them. I'll look for ways of attaching them the in next step – improving.

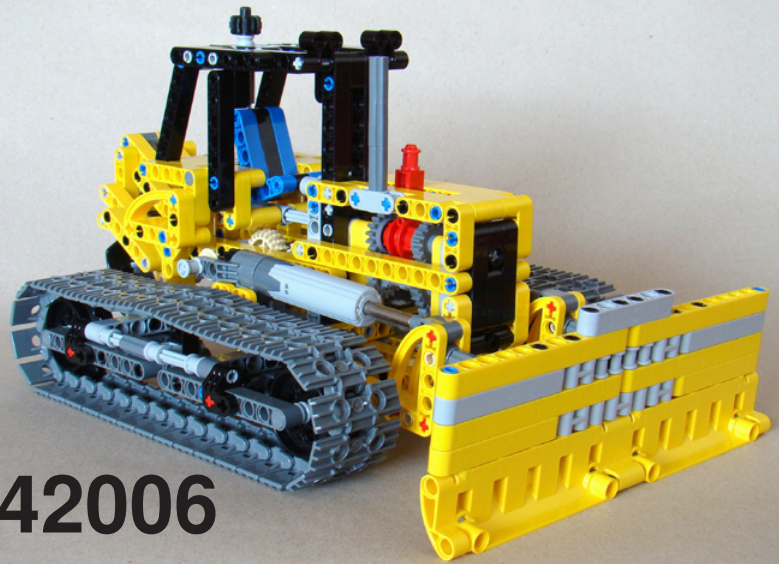
Improving the Prototype

Improving the prototype in order to get a finished alternative model is usually the longest phase. In this phase I focus on covering mechanisms by body or framework to make model look like the original object while all mechanisms must stay operative. I also focus on making the model stronger, adjusting its size and proportions and tuning its color scheme.





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Probably each of you will struggle with a lack of bricks during building model. If you miss just one part or several parts you can try to replace them with other similar parts. You can also check if you used needed parts somewhere else in the prototype and replace it there to be able to use it where you can't replace it. If you miss a large amount of parts you probably chose too big a scale and you have to make the model smaller. Sometimes it is sufficient to adjust just the proportions (make it slimmer or shorter) and at other times you'll have to rebuild the whole model or even change its subject. Limited assortment and number of bricks force you to use each part as efficiently as possible. It's crucial to work with a parts list (you can find it at the end of building instructions). It helps you to keep an overview over available parts in a set.

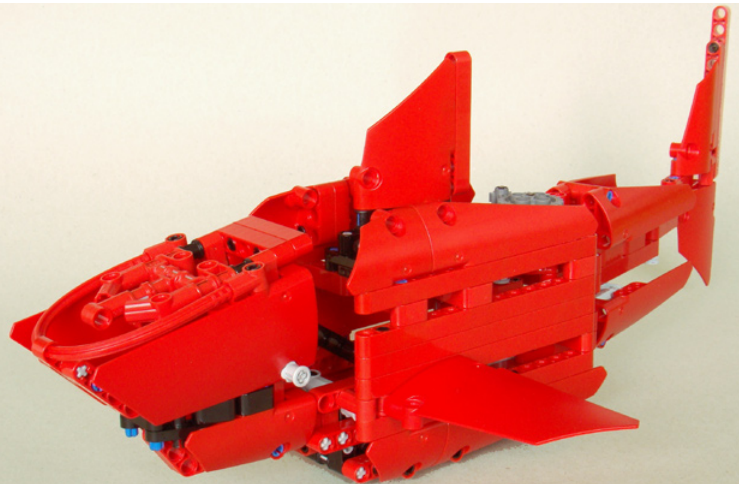
Sometimes the opposite situation happens. You've almost finished your model and there are still many left over parts around. You can solve this problem in two ways. You either expand the whole model or part of it or add something to present the model. You can add for example some accessories, new details that will become part of model or a separate model relating to the main one. For example when I was building a compact wheel loader I used left over parts for building forks that can be attached instead of the bucket.

Finally we shouldn't forget to make the model solid enough. Solidity determines overall playability of your model and is key quality for showing functions – I expect you don't want your model to fall apart during demonstrations. Models that lay on a shelf don't attract as many people as a model which you take into your with hands and try its functions. So

I focus on preventing deformations of model or its parts.

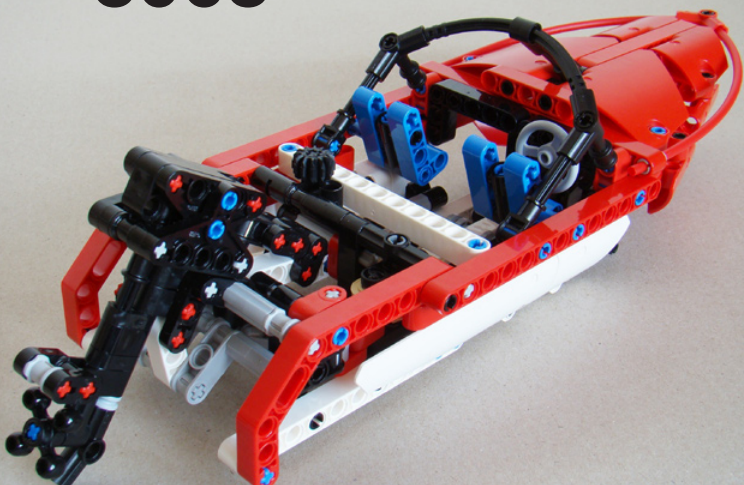
Conclusion

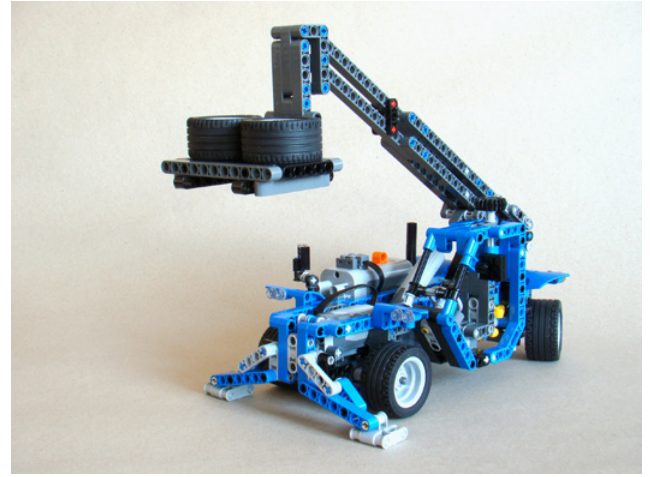
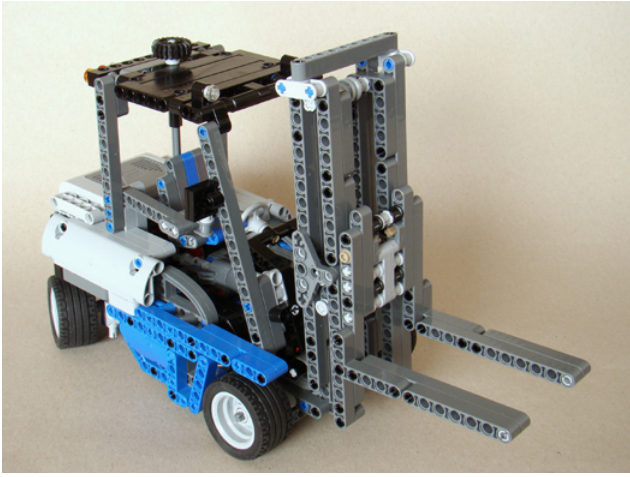
This article has showed you a step by step procedure for building alternative models out of LEGO® Technic sets. I've tried to show you the process more than describing particular building techniques (this is a topic for a book rather than for one article). I hope the hints introduced above will help you with building your own models. If you want to know more about my creations or even build them, visit my web site <http://buildinst.sweb.cz>. You'll find my alternative models and building instructions for them there. #



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