Review 8110: Unimog U400

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Pictures by Fernando Correia and LEGO® Systems A/S

Set: Unimog U400
Set number: 8110
Number of parts: 2048 (plus spares)
Estiamted Retail Price: 180-185€

The Unimog U400 is the most anticipated LEGO® Technic set for 2011. Probably also the most successful at hiding its details, from the leak of the first images to the limited availability of this set.

The package and content

The box guarantees the first contact for itself, of course. It has the usual size and nice look, charasteristic to all the LEGO Technic flagship sets.
Opening the huge lift-up cover we can see all sort of details about the model's electric and pneumatic functions, as well as the different attachments combinations available.

With 2048 parts, this is the biggest official LEGO Technic set ever released. The box despite being big, comes reasonably full of LEGO parts and of course the huge new tires take their part in the available space...

The bags with the parts are numbered from 1 to 4, which will help the building process for those willing to take advantage of this aid.

- Bags "1" - For the chassis
- Bags "2" - For the cabin
- Bags "3" - For the cargo bed
- Bags "4" - For the front and rear attachments

The building instructions and stickers come according to the new packaging standard for large LEGO sets, in order to avoid frequent damages during transportation as often occurred in the past. This is definitely a great measure and a sign that TLG is willing to listen to the concerns of the fans.

We get included 5 booklets with instructions that follow the numbered bags, but which do not split according to those. So it does not seem made to facilitate shared building this huge set among several family members. This always makes me

wonder how the instruction booklets are divided and why so many books as is the current tendency.

Together with the booklets there are also two small sticker sheets (again I wonder - Why not all in one sticker sheet?). Among operation instructions and some warning signs, there are also several references to the Unimog and to the licence with Mercedes-Benz.

As usual, the huge part assortment of the U400 and their respective part numbers is shown on the last pages of the instruction manual. There are plenty of new moulds and existing parts in new colours, as we will see further on.

The new parts

Since this is the 2011 LEGO® Technic flagship and from what we already knew, you may expect to find several new parts within this set.

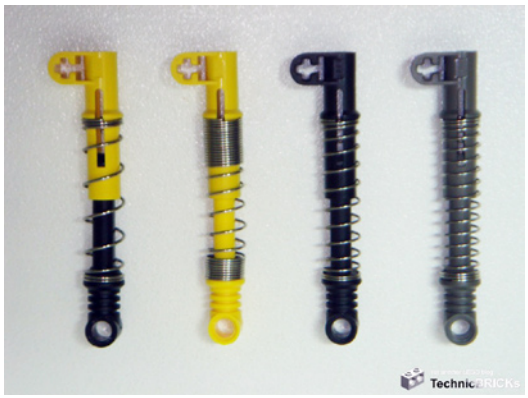
Let's take a quick look at them.

Probably one of the things you will first notice when looking at this new model is the new and large tires. These fit onto the existing 56 x 34mm wheel (44772) but are definitely larger from any previous existing "standard" tires (non balloon format) for the same wheel. The new tire size is 94,3 x 38R, while the previous largest tires existing for the same wheel were 94,8x44R (Balloon) and 81,6x36R.

Also, a new tire tread was used, more suitable for such heavy duty machines like the Unimog and Off-Road or TrTr vehicles.

From left to right: the Power Puller tire, the new U400 tire, the Large Technic Racing tire and the 81,6x36R tire

Because of the Unimog's large part count, the suspension had to be reinforced to sustain all the extra weight. Thus we got a new "extra hard" version from the existing 9.5L Shock Absorber (2909). You can see all the different versions that currently exist, in the picture below.

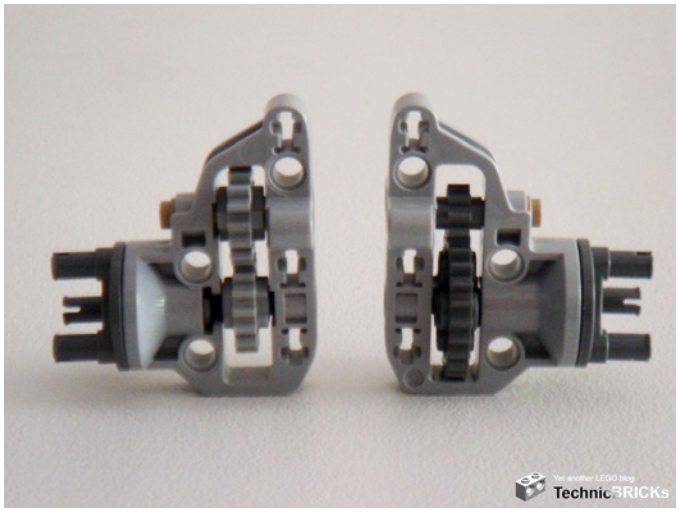


From left to the right: Extra hard, Hard and two variants from the Soft version of the 9.5L shock absorber.

Probably the most anticipated were the new parts used to build the portal axles. These include two new elements, the portal axle gear hub and the 3-pin wheel hub.

Once put together these are joined for life, or almost... At least you should put little faith in ever seeing them apart again! But the design of these parts is so single use specific... that there's probably no need to ever take them apart.

The gear hub design also allows for the usage of different gearing combinations. Double 16t for 1:1 gearing or 8t + 24t for 3:1 gearing which will become very useful for TrTr builders.



The double bevel gears 12t + 20t will also work, delivering an intermediate 5:3 gear ratio.

We got also two new elements that allow us to simulate a torque tube with LEGO parts, and basically consist of a large ball-joint. Unfortunately and against the expectations, one of these parts comes permanently attached to a C-beam frame, whereas a separate design with two different elements connected through a couple of pins or 2L axles would have been preferred, for a more generic use of these. It remains to be seen if this proposed solution would be stiff enough.

Then we have also a new version of the pneumatic mini-pump, with an increased 1/2L length. This was produced in LBG

instead of the traditional yellow and blue, likely to ease the distinction from its previous counterparts.

Pneumatic pumps used in official LEGO® Technic sets, like 8868 (Air Tech Claw Rig) and 8049 (Tractor with Log Loader), used the Small Pump (x191c01) in combination with a Technic Engine Crankshaft (2853) in order to achieve a 1L displacement. Although the old pump cylinder is capable of a 2L displacement, it doesn't fit within a linear setup over a Technic beam.

In order to achieve a 2L displacement (double stroke) and optimal pump efficiency, some other arrangements might be used, like a bent liftarm (6-4) or even some old school studmore designs. However such arrangements wouldn't fit properly in the Unimog and would also require more space. This was likely the reason for this re-design as the 2L displacement would be very important to achieve maximum power and enough air supply, for smooth operation of the grabber arm.

Finally there is also a pneumatic hose connector, which allows for Pneumatic Power Take-off (PPTO) terminations at the front and rear side of the chassis.
As seen from the first preliminary images, this was initially achieved with already existing parts. However these would not guaranty the required robustness when attaching and removing the hoses from the several pneumatic tools to attach in the Unimog PPTOs. Hence another new part (the blue connector above) was developed for this set, which was already full of new parts.

The parts assortment

Despite an impressive eight new parts developed for one single set, there are also some other parts released in colours never produced before.
The praise goes for all the new set of Technic panels and beams produced in Orange. This was probably the most demanded colour by the AFOLs, to be re-introduced in the Technic assortment. And finally we got eight new orange Technic elements, at once! I think you all agree that probably the most eye catching factor on the new Unimog, it is its distinctive colour scheme, where the huge orange cabin captures the first attention. It is also a great move from TLG to change from the traditional colours used for the Technic sets. Specially the ubiquitous yellow, in almost every official LEGO Technic building machine...

Another example is the large Technic turntable which is now introduced in the LBG/Black colour combination, instead of the usual DBG/Black and the 11x5 Technic panel released in LBG for the first time.

As for the remaining parts I'd say 8110 presents a very good assortment, with a very good balance in terms of diversity of parts and colours. Also the fact that it is a vehicle using both electrical and pneumatic functions, makes it a very interesting purchase, as you can get into one single set, all the parts for building suspensions, electric functions with gears and parts specific to build gearboxes, but also many parts specific for pneumatic functions (including the new ones) and a good amount of panels in one single colour. Many connectors, gears, U-joints, CV-joints, etc...

A fact that's worth to mention is also the presence of two types of differentials in one single set. Two from the newest 3L version (62821) and one older 4L version (6573), which was not used into a LEGO Technic official set, since 2009. The 4L version was recalled because of its 16t gear crown and how it facilitates the transmission design towards the engine.

Of course, in a set with over 2K parts you may also expect to get hundreds of pins and the like...

Regarding the new parts, the main complaint goes for the fact that most of them seem to have a too specific or single-use design (too specialized IMO). It is the case of the gearbox hubs for the portal axles, that AFOLs have been building very successfully and in compact designs for a long time, with already existing parts, delivering the same type of functionality. The C-frame with the attached ball joint is just another example, as already mentioned before.

Even so, it is still a great set to buy, whether you want to initiate into Technic and want to get a huge and diverse amount of parts at once, or you are an experienced builder willing to enlarge your collection.

The building experience

This year's flagship is definitively not the easiest LEGO Technic set to build. The huge part count leads to a long building time, which may turn into a demotivating factor for those not so experienced with LEGO Technic or the youngest, who may lack the required determination to make it to the end. Also some building steps, namely on the axles suspension/articulation, are sometimes prone to mistakes and require a lot of attention to the details when following the building instructions. There are many places where one can easily make an error along the building process and it also happened with me, more than once... Fortunately I've always detected it in the following steps and did not have to revert many of them, to proceed.

The connection of both frontal and rear pendular axles to the central structure and driveshaft, uses the new large ball-joint parts which are the LEGO implementation of the so called torque tube.

A ball and socket type of joint called a "torque ball" is used at one end of the torque tube to allow relative motion between the axle and transmission due to suspension travel. The torque tube is hollow and contains the rotating driveshaft. Inside the hollow torque ball is the universal joint of the driveshaft that allows relative motion between the two ends of the driveshaft. In most applications the drive shaft uses a single universal joint, which is also the case here, but has the disadvantage that it causes speed fluctuations in the driveshaft when the shaft is not straight.
Since the torque tube does not constrain the axle in the lateral (side-to-side) direction, a Panhard rod is often used for this

purpose. The combination of the Panhard rod and the torque tube allows the easy implementation of soft coil springs in the suspension for ride quality.

Related with the usage of the Panhard rod in this model, there were discussions regarding a potential flaw or a mistake in the building instructions. It happens that the front and rear axles are built slightly different, leading to a small misalignment on the chassis.

The difference occurs because the lower end of the Panhard rod, is connected to the axles in different ways or using two different parts. A perpendicular axle hole and pin connector (6536) on the Unimog rear axle and a perpendicular double axle hole and pin connector (32291) on the front axle. While the correct way seems to be the one used for the rear axle, the front method causes an half stud offset to the live axle making it not straight.

At first sight this may seems to be a mistake, but it is completely intentional and there is a geometrical reason for this. When the suspension is fully compressed, the front axle needs to be centered right underneath the vehicle in order to prevent the wheels from hitting the chassis or the wheel arches, while steered.
When the suspension is fully extended the Panhard rod will make a “circular” movement that pushes the front axle slightly to the right of the vehicle. In the real world the length of the Panhard rod should be the largest possible to minimize this effect.
The advantage of the Panhard rod design is its simplicity and light weight. Its major disadvantage is that the axle movement must necessarily describe the above mentioned arc relative to the body, with the radius equal to the rod length. If it is too short, there will be excessive sideways movement between the axle and the body at the ends of the suspension.
A suspension design that is similar but dramatically reduces the sideways component of the axle’s vertical travel is the Watt’s linkage. Like other large vehicles with live axle suspensions, the real Unimog uses the Panhard rod as a component of the front suspension where Watt’s linkage is not an option. And so also the Technic designers did!

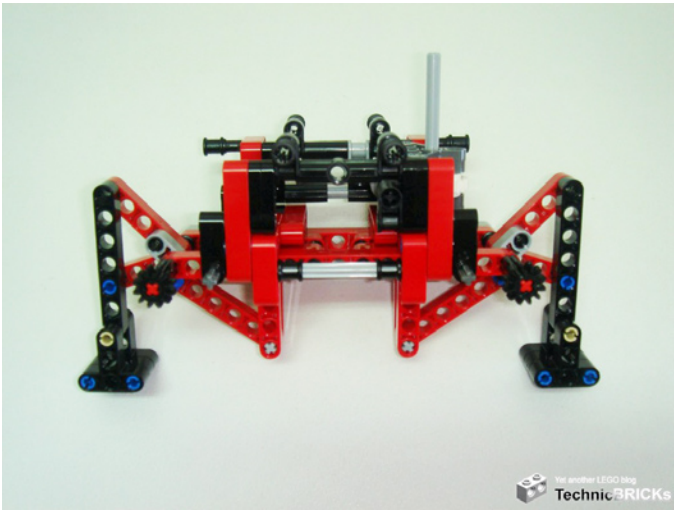
One small detail that I’ve enjoyed a lot, was the sticker in the bottom of the chassis, with a reference to the “LEGO® System A/S”. A clear reference to the company who designed the model, if there was any doubt about this... But after several stickers applied with references to Mercedes-Benz, it makes perfect sense for TLG, to stand their rights...

Likely because this is a licensed model from Mercedes-Benz, for the celebration of the Unimog 60th anniversary, there is no reference at any other sticker, about the LEGO Designer who developed the model. Unlike what has been done in other LEGO Technic sets from the recent years, specially the flagships. But if you don’t know I can tell you, this was another model designed by Markus Kossman, who has also designed other large and complex models like the Mobile Crane (8421), Motorized Bulldozer (8275), Front Loader (8265) or yet another more recent Mobile Crane (8053).

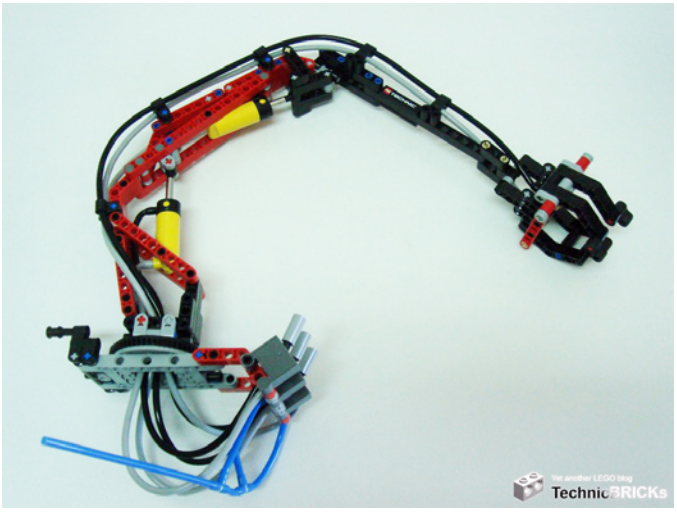
The pneumatic functions are driven by an electrical air pump system. Once running it for a short time without operating any of the pneumatic cylinders (thus not consuming any air flow) the generated pressure increases and easily reaches the maximum allowed. Suddenly we start to hear a kind of rattling noise coming from the pump or nearby and I guess the air should start to leak somewhere. Likely from the pump seals, as the generated resistance is not enough to stop or even slow down the PF M-motor.
In previous sets and MOCs where a pneumatic pump was used, we have seen such kind of pumps driven via a rubber belt or a clutch gear, as it is the case of the motorized version from the recent 8049 (Tractor with Log Loader). I’m not sure whether it should have been the case also here, but I’m confident on the Designers choice and let’s hope this won’t become a source of problems for this amazing set...

Another solution that may have helped to control the over pressure condition and consequent noise, could have been the use of one air tank (67c01), despite the extra cost this would represent for a set with already a premium price tag...
The Unimog air supply system does not use one to accumulate pressure. The pump is driven by the PF motor and attaches directly to the pneumatic hoses. Let’s say the Unimog uses an electric pump instead of a compressor to feed the air circuit. However this should be very easy to MOD if you like to do so, as there is some free space on the right side of the chassis, next to the PF motor. Although an air tank doesn’t fit totally in, it should not protrude too much.

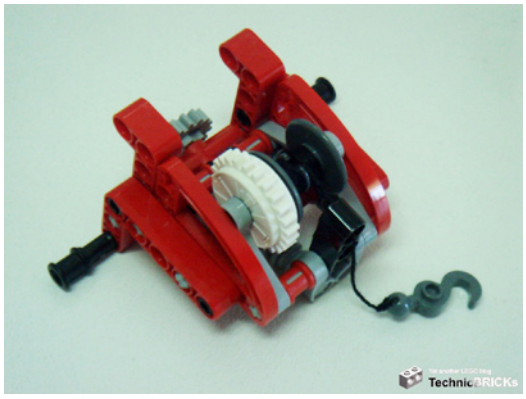
After building the cabin and flatbed, the first attachment we build is a grabber that fits either as a front or rear attachment. It is powered from both a PTO (to drive the grabber arm turntable) and a PPTO which supplies air to the several pneumatic cylinders used in the arm (in the boom, dipper and claw).



We start building the lower part first, which consists of the manual outriggers or stabilizers and the structure where the grabber itself gets attached.

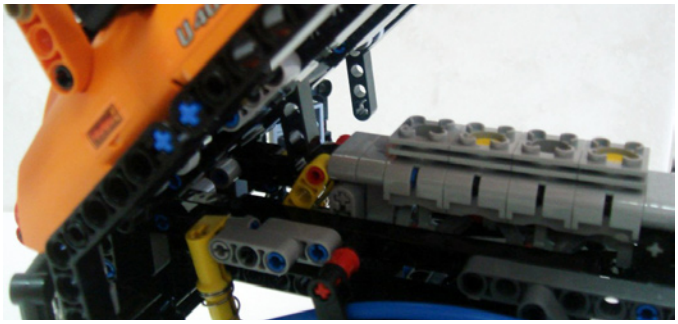


The grabber arm is controlled manually, from three pneumatic valves also located in the upper part of this attachment. By design and to avoid twisting the pneumatic hoses beyond the limits, the grabber rotation is physically limited to a bit less than one complete turn (360º).



The main model includes a second attachment which consists of an electrical winch, that also fits either as a front and rear attachment.

As an electrically operated attachment only, it uses the PTO but the PPTO is left unused.



Functionality and playability

Once the model is built, you get with a plenty of functions to play with. Besides all the winch and the grabber play possibilities with the respective pneumatic and/or electrical functions, there are still some other points of interest in this model. For instance you can tilt the cabin like in real trucks, to uncover and see the L4 engine.

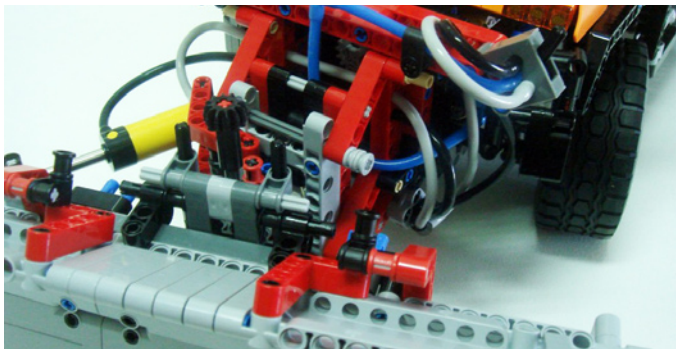
Once laid down, you can fix it by sliding-in the two red long pins with stop bush. These are however of very difficult access.

The suspension is also a source of fun for itself. However you may find it not as hard as it would be advisable. Despite being enough to sustain the model's weight, it is not always hard enough to make the springs instantly to return back in place, when you tilt the model to a side. Hence it is easy to find the whole cabin slightly tilted towards one side. Though the rear outriggers may help to prevent this, when parked!

The B-model

As you might know, the Unimog is a versatile work vehicle, also known for the variety of attachments available to adapt it to different functions and needs.
TLG perceived this as the essence of this vehicle and decided to develop a B-model inline with this characteristic. Hence, the Designers chose to develop another attachment that, along with the Unimog base truck, would constitute the B-model.

In this case it was chosen to design a snow plough that fits to the front. This attachment uses two pneumatic cylinders to raise and tilt the plough, and one additional manually geared function for the fine vertical adjustments. Thus it just uses the front PPTO, leaving the PTO completely unused.



Now it's up to you to create as many as new attachments/tools to the LEGO Technic Unimog, as you like!

The verdict

Although labelled for the 11-16 age range, the Unimog U400 looks definitely targeted for the AFOL segment because of its size, huge part count, complexity and number of functions, to mention just a few.
Things I like: massive introduction of parts in orange; massive reintroduction of pneumatic elements and extended part count; complexity and functionality, at the cost of a higher price than many confirmed to be willing to pay.
In my opinion this set clearly ranks the maximum in most of the categories except regarding in terms of parts innovation. Despite the huge effort and resources probably allocated to design and produce a bunch of new parts, and the adoption of uncommon colours in the LEGO Technic theme up today, it suffers from too much specialized (single use) new parts, as already mentioned earlier in this review.
The gigantic aspect of this set and its huge amount of parts are of course reflected in the final target price. Despite fitting the AFOLs or more simply put, the adult segment, this may turn into a sales disadvantage for mass sales of this product. Only time will tell!
You can find a larger review and videos at: http://technicbricks.blogspot.com/2011/02/tbs-techreview-13-8110-unimog-u400.html
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