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—
Mark Rollins

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Ultimate LEGO Worldbuilding and Architecture

**How to Create Anything
with Speedy Techniques at
a Low Price**

Mark Rollins

Apress®

Ultimate LEGO Worldbuilding and Architecture: How to Create Anything with Speedy Techniques at a Low Price

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About the Author



Mark Rollins has been an established writer for two decades, delving into tech and gadget blogging 20 years ago, contributing to various consumer electronics-related websites. Over the last 15 years, he has successfully managed TheGeekChurch.com, boasting a tech website, a YouTube channel (700+ subscribers), and a TikTok channel (20,000+ followers). As a seasoned author, Mark has published six books with Apress, covering Android Marketing, LEGO, Kindle Fire, and UBTECH/Jimu Robots, displaying a diverse and comprehensive writing portfolio.

About the Technical Reviewer



Farzin Asadi received his B.Sc. in Electronics Engineering, his M.Sc. in Control Engineering, and his Ph.D. in Mechatronics Engineering. Currently, he is with the Department of Electrical and Electronics Engineering at the Maltepe University, Istanbul, Turkey. Dr. Asadi has published over 40 international papers and 29 books. He is on the editorial board of seven scientific journals as well. His research interests include switching converters, control theory, robust control of power electronics converters, and robotics.

CHAPTER 1

LEGO: Past, Present, and Future

Introduction

I received my first LEGO set as a Christmas present when I was in first grade, and I remember looking at it with no knowledge of what LEGO even was. This particular set was a Universal Building Set, and there were pictures all over the box to show what you could build with it. Like most kids, I started building by imitating what was on the box, but even with the limitations of imitation, it became very apparent that the potential of building with LEGO was absolutely limitless. The more I grew up, the more I realized that I could achieve greater satisfaction from building something that I created from the ground up or, in many cases, from the LEGO baseplate up.

Now that I am much older (in my 50s), I am grateful to discover that I'm not the only adult who still appreciates the infinite properties of building with LEGO. There are some adults that believe that LEGO should stay left behind in our childhoods, but there are some adults who still consider it important and will still make the time in their busy adult lives to create with it. That is really what building with LEGO is all about: creation.

What I Want You to Get from This Book (the Takeaway)

You who are reading this book, I want to say that I have no idea how old you are, but I want to emphasize how LEGO is a tool for creating worlds. Now you might ask, why should we want to create a world, isn't there already a world there that has been created that we can live in? A world that has its own versions of LEGO pieces in the form of resources so we can build up to be that which we want it to be? To that I say: have you tried living in it?

I'm going to just say it: LEGO is a distraction. Just like the author who writes a book, the painter who makes a portrait, the sculptor who crafts a statue, the end result may not change the world in any way and could be seen as a time waster. However, no one can truthfully say that some pieces of art haven't touched their lives, and I will assure that every creation has changed the creator in some form, usually for the better.

Author Irene Claremont de Catillejo has stated: "Nothing is more satisfying to the human soul than creating something new." After all, most of us spend a lot of time in our own world, working just to provide for ourselves in our jobs in an effort just to survive. Sometimes we need a break from it, and could use an activity that rewards our creativity and not our repetition.

One of the things that makes LEGO so satisfying is that you are taking something that looks broken in its first form and making it whole. Each LEGO set is just a pile of pieces until you start putting it together, and then, it becomes something extraordinary, something that, at the very least, was not there before.

You may have discovered LEGO as a child and discovered there is fun in putting things together. Maybe part of it is to shun chaos and put something into order with the help of a little bit of instruction. If you are the type that purchases LEGO just so you can assemble it and put it on the shelf, like art, I fully support this, provided that you can support yourself.

However, if you are like most LEGO enthusiasts, you don't want to just follow a set of instructions, even if it would make it easier to put some ideas (but not your own) into form. You might not even know exactly what you want to build, only you just have to do it. However, you might not have the right amount of pieces, and these are the problems that I would like to address in this first chapter.

I'm going to be talking about how to build whatever you want to build, using the bricks that LEGO can provide, and I also want to give some advice on how you can affordably get more pieces for the creations that you want to make.

I'm also going to show you the best ways for building, and part of it is the maintenance of sorting. Yes, I also enjoy the whole aspect of sorting through much LEGO, but when you are building, you don't want to be spending all your time looking for one particular piece.

So yes, I will teach you about sorting, but this series will also bring you lessons about what you really want to do: building. I'll start you off on how to make a solid foundation for your creation (whatever it might be) and then how to populate it with realistic buildings and vehicles. Then, I want to talk about things that require more imagination, like spaceships, robots, and other mythical beasts. Not only will you learn to create it, but you will make it stand strong and not fall apart so easily.

I'll give you a brief introduction of myself. My name is Mark Rollins, and I have been building with LEGO since I was young and continued to do it long after others told me that I shouldn't. I have written two books about LEGO Technic and one about another type of programmable LEGO, LEGO MINDSTORMS EV3.

In addition to this book about LEGO Worldbuilding, I am also writing a book about how to build with LEGO Technic, which should be released at the same time as this book. For those who are not in the know, LEGO Technic is a type of construction that emphasizes more mechanized forms and larger scale models. So if you are also interested in building with LEGO

Technic, which I only slightly mention in this book, check that one out! But enough of my self-promotion. I want to help you with your LEGO building experience, no matter where you are at. Let's just get started building!

The History of LEGO

I thought it would be fun to discuss the history of LEGO and all of its iterations before getting into it. I know I had a lot of fun just looking at old LEGO catalogs, some of them that I still had with me since my childhood.

When it comes to who founded LEGO, it gets attributed to Ole Kirk Kristiansen in 1932 (Figure 1-1), and this family-owned business has been passed down from father to son. I believe that his name was actually "Ole," and this is not a reference to his age, even though he looks pretty old from this photo of him that I found online.



Figure 1-1. Ole Kirk Kristiansen, the creator of LEGO as we know it

You will notice that LEGO is often used in all capitals, but it is not an acronym. It stems from two Danish words meaning “play well,” and it also means “I put together” in Latin. The LEGO name was officially used in 1936, but only on their highly crafted wooden toys, and it wasn’t until ten years later when the Kristiansen family invests in plastic.

In about 1949, the LEGO bricks begin to look like what they are now, somewhat. Think of the basic 2×4 brick, but empty on the bottom, and you have it.

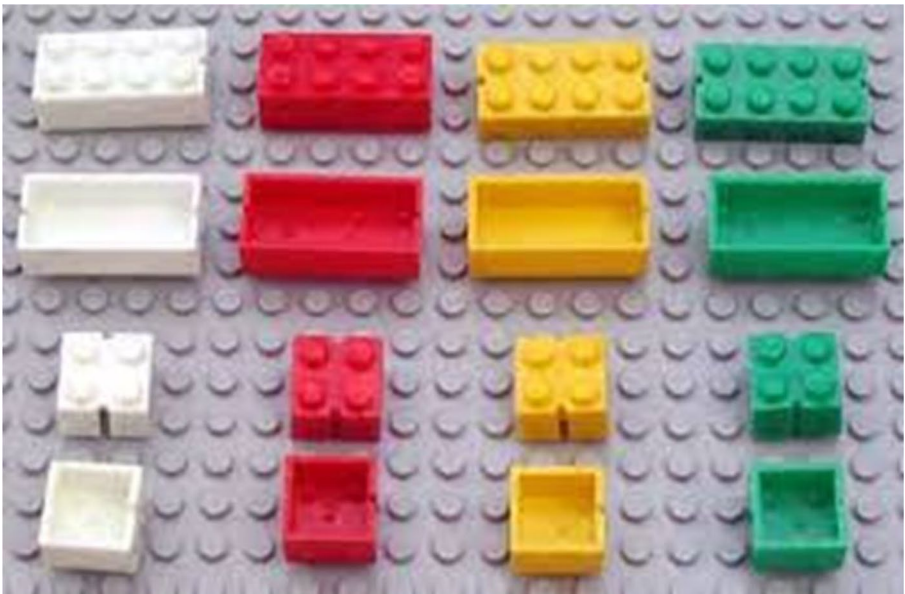


Figure 1-2. *The first LEGO bricks, which look only slightly different from the LEGO bricks of today*

These pieces were called the Automatic Binding Brick, and the original catalog from that year has some of the early sets, which were small houses that looked very blocky, sort of like Minecraft. These houses had roofs that did not slope, but there were already window-like pieces that appeared to show off what type of detail these early LEGO construction sets were capable of.



Figure 1-3. *An early catalog of LEGO, with the name of “Automatic Binding Bricks”*

By 1953, the LEGO name appears on every brick, just like it appears on every stud (the round section of the brick), with construction kits of LEGO Mursten (LEGO bricks) to encourage creative play. LEGO drops the name of Automatic Binding Bricks and began to produce brochures that showed models that could be produced from extra sets. In 1955, there was a town plan that had bricks of all kinds of interesting shapes, even with curves. There are vehicles on these catalogs, but it doesn't look like the user could assemble these like the buildings. The vehicles looked more like Matchbox or Hot Wheels cars.

It wasn't until 1958 that the coupling principle is patented, which really highlights the “clicking together” that LEGO is truly known for. It was very apparent that the family realized its potential and encouraged building up of LEGO bricks in order to stimulate children's creativity.

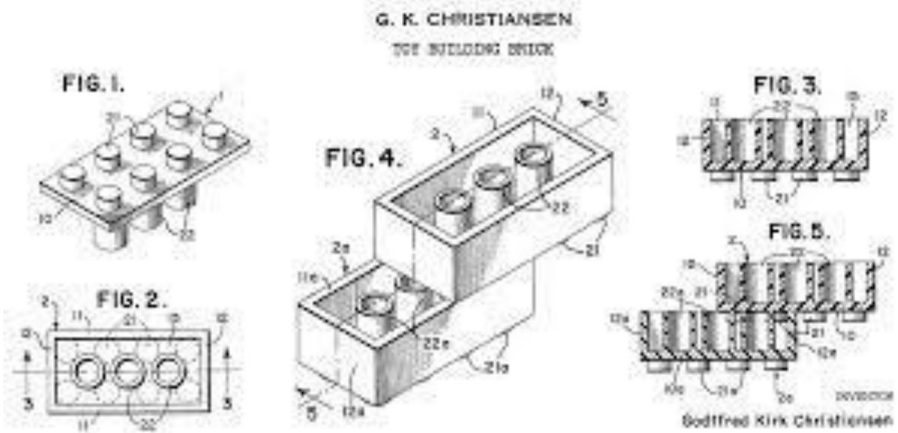


Figure 1-4. The patent for LEGO’s “click together” technology

Then in 1960, a fire destroys the company’s wooden toy warehouse, which marks the time when LEGO begins to stop production of their wooden toys. The LEGO toys begin to flourish, with wheeled creations in 1962, and by 1965, new catalogs begin to come out each year that highlight the growth of the company. In fact, if you want to see how much LEGO has grown in the past 60 years, I highly recommend going through their old catalogs. Much of the information that I could find came from the ones that I found online or the ones that I had in my own collection. I recommend looking at this website at BrickSet: <https://brickset.com/library/catalogues>.



Figure 1-5. Samples of LEGO trucks in 1968. These models look very archaic compared to what LEGO has now, but it shows a progression

An early catalog from 1966 shows that the company was heavily marketing basic sets with Playpacks such as basic set 070 (LEGO set numbers are now in the tens of thousands). Sets started to have a little more detail with the introduction of sloped or “bevelled” bricks. Even in the mid- to late 1960s, LEGO had motorized parts, particularly with trains. Granted, the trains and cars were very rudimentary in their designs.

By 1968, the vehicles became a little bit more detailed, as a possible prototype to the Technic/modeling team. There are tipper trucks with hinge pieces and a truck with a crane. This begins bricks with functions, even if they were not mechanical. It’s interesting to see the scale that differs from the buildings to the vehicles.

By the way, 1968 is when Legoland opened in Bilund, Denmark, and it had 10 acres of very elaborately constructed LEGO houses. That really must have been a great sight to see, even now. It is 1969 where Duplo is unveiled, but I'm not going to cover that series much in this book. Just to let you know, the Duplo is twice the size of a LEGO brick in all dimensions. The Duplo can also be used in construction for when you need, but I'll talk about that later.

Anyway, in 1970, the Town sets began to look to scale with their miniature LEGO cars. In 1971, the company created "dolls furniture sets specially for girls," which had kitchens and dining room tables that were more than a few bricks high, too big for the towns that they were also marketing.

In 1973, these basic sets are created, presumably with a new numbering system. The Town sets were getting more complex, and there is even a rocket base that predates the space system by several years. The LEGO boats become available, and they can really float.

In 1974, LEGO realized that they needed to add people, so the LEGO family was introduced. These first LEGO people are very large compared to the minifig. The plan was to use them with the doll furniture.

In 1976, the basic sets get a double-digit upgrade with 10, 20, 30, 40, and 50. The sets also become a bit more advanced as well, and I remember having the 402 set. They start doing models based on more real things like the Spirit of St. Louis and a Boeing 727. Also, this is when these figures start to appear. They were just these guys with no faces and cutoff stubs for arms. Their feet did not move, but they had hats.



Figure 1-6. *The minifigs, with the first two in its first iteration and the second two with the design that is still used today*

Sometime in 1978 and 1979, Kjeld Kirk Kristiansen starts this “system within the system,” which is made to offer the right products to the right age. This is when a lot of new things start happening.

This is when the new improved minifigure steps in, and it works with the Town system, phasing out those stiff other armless and fused leg guys. It also opens the door for the Expert sets, which is a subject of another book that I have written about Technic. I’ll focus the rest of this LEGO history lesson on sets that are of the minifig scale, but I do talk a lot about LEGO Technic history in the aforementioned other LEGO Technic book.

In 1979, a very big event happens as LEGO unveils Space. I don’t think it is any coincidence that this set showed up a few years after *Star Wars*. LEGO Space definitely sets its sights on the stars, fitting for the space age and beyond.



Figure 1-7. *The LEGO Space system, one of their most successful programs, ever*

Oh, there was also Fabuland. A series that didn't really take off, which has happened several times throughout the history of LEGO, and I am most certain that there are entire series that I left out of this history. However, the Castle system, which appears as kind of an afterthought in the catalog, really took off.

The minifigs also really made the towns come to life as the buildings now felt liveable, some of them opening up to reveal more on the inside.

These Town, Space, Knights, and other sets were enough for LEGO to advertise as "toys you grow up with" and "the toy children add to, rather than outgrow." Speaking of growing, they really bought the whole train thing back with a set made for the town scale.



Figure 1-8. *An ad campaign for LEGO to show how it was marketed as “toys you grow up with”*

In 1988, LEGO added the Light and Sound, the first time they used light and sound on their bricks. In 1989, another very popular system was introduced with the new Pirates collections, with the very elaborate boats with sails and character faces that were more than just yellow with a smiley.

Like the whole “system with a system,” the LEGO Space was one of those collections that had different series within them and usually only lasting a few years before being discontinued. LEGO attempted the Space Police and with a monorail system. They also have Futuron and Blacktron, different variations of the Space sets. The 1990s saw the addition of the M:TRON, where magnets were used to lock certain bricks into place. There was also the Ice Planet sets, made for a planet with ice.

The Knights system also had its systems within, and the Knights collection grew with Forestmen, which were guys who lived in the forest like Robin Hood. And there were also glow-in-the-dark ghosts. The Knights system had a kind of shift in its modeling as there were a lot of dependence on pre-fab pieces rather than individual bricks. The shift in bigger pieces made it easier to build, but many builders wondered what else could be done with them once the initial set was created.

The Towns systems also had their own collections within collections like Flight, Max RPM, Nautica, and RSQ 911. In 1992, Octan came to town, a fictitious big oil company that appears on a lot of LEGO systems.

There was a shift in 1992 to make some more girl-friendly models, something that LEGO had been kind of shifting away from. There was Paradisa in 1993, which had more pastel pinks to make it like Barbie's beach paradise. By 1994, it went to Belville, which had some very larger dolls in it. These types of sets still exist in the form of the LEGO Friends series.

The other types of sets came to be more advanced with new types of pieces being created annually. Boats still kept floating, and trains got pretty advanced. The company continued its growth, with excellent marketing programs such as Zack and Jack the LEGO Maniac.



Figure 1-9. Jack (originally called Zack) the LEGO Maniac, the spokesperson for LEGO in the 1980s and 1990s

There were always advances to each of the sets in some form. For example, the Pirates had these Imperial Guards in 1993. In 1994, there were the Islanders, which might be considered culturally insensitive. The Knights in 1993 had Dragon Masters, Wolfpack, and Black Knights. Then, in 1995, there were the Royal Knights and the Dark Forest. In the Space systems, it turned to Spyrus; then, 1994 brought Unitron. Then, 1995 bought Exporiens. It was 1995 that brought in Aquazone, bringing LEGO underwater as good as it could with the Aquanauts and Aquasharks.

It was in 1997 where things got really shaken up; LEGO brought in RoboForce, UFO, Fright Knights, and Aquazone with Aqua Raiders. These were all new set systems, very different than the ones before. LEGO also tried new types of sets with Outback and Wild West. There was also the very weird one with Time Twisters, kind of a surreal set devoted to time-travelling characters.



Figure 1-10. LEGO had an explosion of new sets in 1997

One year later, 1998 brought in Adventurers, think Indiana Jones, but without the Indiana Jones. There was also Insectoids for Space. Aquazone branched out with Hydronauts and Stingrays. LEGO brought out the Ninjas, which was not the Ninjago sets, as they would come later. There was also the Res Q, a team with black vehicles that did rescues. Since it was the 1990s, there was the Xtreme Team, because it was the 1990s, everything was marketed as extreme back then.

Then, since it was 1999, the year of the long-anticipated *Star Wars: Episode I*, LEGO got *Star Wars*-related toys, which is one of their most successful collections to this day. There was also Rock Raiders, which was not so successful. The Town had more become the City Center, and these sets have been rebranded to just “City” from now on and continues with new models today.

There was also a wide variety of LEGO software. They were for the console games or PC, and I remember the Creator software, but I'll discuss LEGO Creation software in later chapters. In 2000, there was MINDSTORMS. This was an intelligent brick playset that I write about more in my LEGO Technic book as well as my earlier work about *Beginning LEGO MINDSTORMS EV3*.

The 2000s was an interesting time as set systems would come and go. There was this MyBot system which allowed for creativity with different functions. Scala, targeted for younger girls, started showing up as well. There was also a brief stint of Arctic sets, kind of an offshoot of the Ice Planet sets without the space factor. Sports finally got into the action with LEGO soccer fields.

In 2001, there was LEGO Race and the Alpha Team Spy group, a kind of espionage action themed set that was popular for a while. There was also a studio collaboration with Steven Spielberg where LEGO builders could apply their talent to making movies, thanks to a specialized camera (this was before every phone had a camera, and every phone became a smartphone). LEGO was always trying to be ahead of its time, and many times, they succeeded.

The Town and Knights sets continued to grow, and Space had shifted more toward *Star Wars*, but LEGO also had the Life on Mars thing as well. Then, there was the Bionicle, which was first introduced under the Technic umbrella, but these sets really grew in popularity over the years, with some made-to-DVD movies.



Figure 1-11. *LEGO Harry Potter, one of their more popular systems, debuting in 2001 with the launch of the first film*

Then in 2002, this was when LEGO Harry Potter came around, which also became a huge hit. There was also the Dinosaurs systems. Does anyone remember Jack Stone? Because that was a thing. Then, Mission Alpha went Deep Sea, so I guess the Aquanauts were out? Yes, there were times where LEGO would focus on a new thing and kind of forget the old thing, like how Knights sort of took a backburner to Harry Potter, and Classic Space got essentially shelved due to the still-continuing popularity of *Star Wars*.

Even though the 1990s were over, 2003 has an Island Extreme sets with skateboarders. Oh, then, there was the Orient Expedition, which had these big domed roofs and other things not really seen in LEGO before. Sports got an expansion with basketball and hockey. Oh, there was also Spybiotics and then the big fail of Galidor, which has been reported as one of LEGO's biggest failures.

By 2004, there was an attempt to appeal to girls again with Clikits. The Knights Kingdom began, with large figures that were kind of similar to Bionicle. Oh, and *Spider-Man 2* had a set, one of LEGO's first forays into super-hero-related IP.

At some point, LEGO had developed a Creator system that still is around. Creator, particularly the sets with the 3-in-1 building products, is a really good jumping-off point for any LEGO enthusiast old and young and is often cheaper than some of the other licensed sets.

Speaking of licensed sets, it is in 2007 where *Batman* shows up. It is 2008 which has a nice Model Town House, and these detailed town houses are still available on LEGO current catalogs and have a lot of great details. Indiana Jones sets also start to come out (since *Indiana Jones and the Kingdom of the Crystal Skull* bought Indy back in theaters), and one set that I thought should have done better than its initial movie release: *Speed Racer*.

Yes, LEGO would often back some franchise, and oftentimes, it might not pay off. For example, 2010 had *Prince of Persia* sets. Does anyone even remember the *Prince of Persia* movie? LEGO would often try other things that were similar to other ones of the past like the 2009 Power Miners that looked a lot like Rock Raiders.

By 2011, LEGO realized it had a hit with Ninjago, and this still exists. They also started producing licensed sets with Disney's *Pirates of the Caribbean*, and this kind of eclipsed the whole Pirates sets that they had been doing for a while.

By 2014, the year that hit *The Lego Movie* was released, there were all kinds of sets related to IP like Ninja Turtles, both Marvel and DC, Minecraft, Lord of the Rings, and even Minecraft, because (let's face it) these two are kind of related. I had almost forgotten about Ultra Agents and Chima.

Since this is getting very long, and you have a good idea of the diversity of LEGO's products throughout the decades, I will quickly summarize the last decade. You can see their current catalog still has a lot of material related to popular sets as City, Ninjago, *Star Wars*, Minecraft, and Harry

Potter, and even Jurassic Park has shown up. There is also newer sets like Sonic the Hedgehog and Mario, video games which have had great success in their big-screen adaptations.

There has also been an increase in Speed, a series devoted to making car models that is separate from Technic, which is also still produced by LEGO. At some point, there was also an emphasis in LEGO Architecture, sets that are very different from the minifig scale sets and Technic sets, but really showcase modern marvels. I'll talk more about LEGO Architecture in the next chapter.

Something that has been very big for LEGO recently has been its flower collection. Since this book focuses more about creating in a minifig scale, I won't be discussing anything about LEGO flowers.

Okay, so that was a cool look back through history! Maybe that brought back memories from when you were a kid, about all the models that you had, and maybe those that you couldn't afford to get back then.

For me, there were a lot that I couldn't afford, and since I wanted them all, I began to realize that I had better make with what I had. Most of us probably had a friend or neighbor who had a lot of sets, and I remember one friend of mine who had built a LEGO Space mothership that was 4 feet long. I thought it was one of the coolest things that I had ever seen, but I'm very certain that with the LEGO pieces that I had at the time, I couldn't make something like that. However, if this is the time to really start making your LEGO dreams come to life, you still might need a few more LEGO bricks to make that happen.

Places to Purchase LEGO Bricks Affordably

Yes, if you wanted to increase the amount of LEGO bricks you have, you could go to the LEGO store or LEGO online and max out your credit cards, but hey, stop trying to do that!