
The Ten Talents of the Modelmaker

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Introduction

Alfred North Whitehead said, "Ideas won't keep... something must be done about them." That is why we need model builders to continue the thinking process until the idea becomes a physical reality. A model builder uses his experienced hands to translate a mental image or idea into this physical reality. The model can be a prototype, a scaled model of reality, a view of how something works, etc. Model making is a process of creation where knowledge of prototyping, materials, and manufacturing techniques enable the model builder to effectively and efficiently carve and refine an idea into a physical model. This process often goes through many sequential steps from a sketchy idea... to alternatives... to drawings... to choice of materials... to rough mockups... to high detail... and to finishing work. At every step the model builder's experience and skill, learned from working on custom projects for a wide variety of industries, is critical to the successful creation of a model. Without a model builder, you may just wind up with a pile of chips.

Is the model builder a generalist or a specialist? Someone once said a generalist is someone who knows nothing about everything and that a specialist is someone who knows everything about nothing. A model builder has to be both: a creative thinker and a specialist skilled with tools and materials. The model builder is much more than someone who can just build to a print or is handy with tools. Great model builders have a special combination of "thinking" and "doing" talents.

The list of the ten talents of a model builder was inspired by Michael Gelb's book "How to Think like Leonardo da Vinci" which describes Seven Da Vincian Principles drawn from an intensive study of Leonardo and his methods. Those Principles are:

"Curiosata - An insatiable curious approach to life and the unrelenting quest for continuous learning.

Dimostrazione - A commitment to test knowledge through experience, persistence, and a willingness to learn from mistakes.

Sensazione - The continual refinement of the senses, especially sight, as the means to enliven experience. Sfumato (literally "Going up in Smoke") - A willingness to embrace ambiguity, paradox, and uncertainty.

Arte/Scienza - The development of the balance between science and art, logic and imagination - "whole-brain thinking."

Corporalit - The cultivation of grace, ambidexterity, fitness, and poise.

Connession - A recognition of and appreciation for the interconnectedness of all things and phenomena - systems thinking."

Maybe model building requires more of a liberal arts set of thinking skills where you create a habit of learning and an attitude towards knowing. At its best liberal education, according to Victor E. Ferrall, Jr. (President of Beloit College from 1990 to 2000) integrates thinking and doing. Maybe the craft of model building is best when practiced at the intersection of both thinking and doing.

1: A sense of scale

My father, William H. Chaffee, (an award winning professional model builder for most of the 20th Century) often said that a model builder is someone who can build something in a scale that you can relate to. In life, few people can quickly figure out the best scale for a model. For example, a client had to see two quick cardboard sizing models of a convection oven in 1&1/2 X scale and in 2X scale before he could visualize which of the two scales would be the best scale to show the interior of the oven at a trade show. There are many design tradeoffs in choosing the optimum scale. A 1:12 scale (doll house scale) is great for getting a lot of realistic detail in a house but for most commercial buildings, it is too big a scale to fit through a doorway. Scale also dictates the level of detail that can be shown so choosing the right scale can affect the effect of the model. Scale also has a big impact on the cost of a model.

2: Ability to visualize in three dimensions

People who can think visually in three dimensions thrive as designers, artists, or model builders. Some examples where this talent helps are: (1) In designing trade show exhibits,

scale models are often used to depict tradeshow booths because the clients have difficulty figuring out the sightlines and spatial relationships between the various elements in a booth. (2) In interpreting drawings, a curve on a phone in a drawing may not read right on a product model unless the model builder can visualize and then make the model look as the designer intended. (3) In making topographic models, when there are just a few elevation changes or when there is a large scale (over 1:1000) the vertical elevation may have to be exaggerated 1&1/2 X or more in order to look correct to the human eye.

3: The Pursuit of Art

A model builder can create a model that is a work of art. Gary Kohs of Fine Art Models has done just that with his line of limited edition models of planes, trains, automobiles, and ships. He has Bugatti models fabricated in 1:8 scale with no plastic and has built a 1:48 scale RMS Titanic (eighteen feet long) model with the same number of rivets (over 3 million) as on the original and complete plating on the hull. Here years of research, use of the best materials, the highest standard of great craftsmanship and a passion for detail come together to create art.

4: The ability to sense materials when they "talk" to us.

Wood resists a dull chisel, metal cutting tools chatter with resistance at the wrong cutting speed, etc. Materials talk to us if we listen. With time and experience, the model builder learns from this interaction with materials. In marble, wood, metal, paint, or other materials it is the artist's or model builder's knowledge and experience with the material that enables him to create the final product. This is a symbiotic relationship between the model builder and the material. For example, a recent book, "Bright Earth" by Philip Ball; describes such a relationship in his history of how innovations in color pigment manufacture are associated with and enabled major styles of painting from the Venetian Renaissance to French impressionist. James B. McCormick, M.D., an inventor who has over 30 patents, calls this process whittling and the process of using experienced hands. Michaelangelo, when asked, "What do you see in that block of marble?" responded "A beautiful angel that is mine to release" ... through hard work and whittling.

5: A passion for detail and the ability to do finishing work.

If you don't have this talent, you may not last long at a model building company. This talent for detail often requires the twin model building virtues of patience and persistence. Model builder Louis Casinelli compares the finishing work on a model to putting a fine suit of clothes on a person. This talent can make or break the success of a model. The right shade of paint, a gloss, semi-gloss or flat finish, the right primer, the grit of the sandpaper, etc. are all very important.

6: Ability to link abstract or unrelated ideas.

Aristotle said the highest form of thinking is the metaphor where you see the similarity in dissimilar things. Model builders mostly get custom jobs. Everyday they have to scratch their brains for ways to build a model. For example, how do you show heat flow in a scale model convection oven that will be in a trade show? Heat is invisible. Successful model builders link unrelated ideas from their diverse experience in a wide variety of industries, fabrication techniques, and materials. Actually, more help is on the way through software. A group of Russian scientists studied tens of thousands of patents and established that the best inventive ideas were developed from about a thousand objective principles and rules of physical, geometric and chemical effects. Invention Machine Corporation (<https://invention-machine.com>) software matches examples of these principles and rules to the problem.

7: Ingenuity

Prototyping is often indistinguishable from design. Model builders are often involved in the development of new products and processes. Because of their practical and extensive knowledge of materials, tools, manufacturing techniques, etc. and the redefining of the limitations of these factors model builders should be equal partners in the design process

with industrial designers, inventors, etc. Model builders have an advantage over many designers because they know from experience what does and doesn't work. Quick and dirty prototypes often point the way to the right path. One model builder developed the world's first continuous guitar string winder for his client that now winds more guitar strings than any other machinery. In just about every job, ingenuity helps. Our model building company colored Bondo orange or gray in order to simulate a toxic battery paste. Then we got a new job that required black paste but we had to put in so much black paint that the Bondo wouldn't harden. That is when we experimented and discovered that water putty and black paint worked.

8: Search and dig like an archeologist

In 1989, The National Museum of Bahrain provided an artist's sketch of what the 5,000-year-old ruins of The Temple of Barbar may have looked like and requested a quote for a scale model. We said "Why build a model of an artist's rough concept when for practically the same price we could build an accurate model if we could get accurate drawings from the Danish archeologist who excavated the site." Eight weeks later, we received drawings from that archeologist. We also did research at the University of Chicago's Oriental Institute's library where we found out the temple had gone through 3 phases of construction. A decision was made to have the drawings made for temple phase II. Finding out the facts necessary to build a model is rarely simple. A model builder can have a great impact by ferreting out the requirements and details that he needs at the start of a job. This is where your company can stand out for your value added. Challenge the client with requests and questions. The model will be better for it. Searching and digging for the materials, techniques and specialized people to build parts of the job is another skill, like that of an archeologist, where you have to have the twin virtues of patience and persistence. The web has certainly helped, but Google and Ebay are not the source of everything. Libraries are hot these days according to a June 1, 2003 article in the Chicago Tribune. They are marketing themselves as a place to get assistance in navigating the Internet. Over the past 10 years or so many new specialized annual industry sourcebooks have been published. The annual Exhibit Builder Source Directory is available in print and on the web at <http://www.exhibitbuilder.net>. The APMM Members' Internet List Exchange (MILE) e-mail discussion list is a place where you can ask for the expertise of other model builders to solve a problem or source a material (you must be an APMM Member to use the list. Go to <http://www.modelmakers.org> for more information). The

problem, though, remains the same. Model builders work with custom jobs in a wide variety of industries so we have to search far, wide and deep to find answers. We never know where or if there is an answer. Maybe our ingenuity and experience will save us. Probably patience and persistence will in the end lead us to the answer. However, if you are looking for a clear hollow polyurethane male leg at a reasonable price, just call us. We found it last week after 6 weeks of searching and a lot of phone calls.

9: Interpreter of information

Sometimes there is too little information available to build a model and the model builder has to read between the lines. Sometimes there is too much information and the model builder has to distill the information in order to build a model. Sometimes the information is ambiguous. Sometimes the information is inconsistent. Sometimes the information is contradictory. Sometimes the client doesn't know what he wants. Why does "sometimes" happen all the time in model building? The best model builders are skilled at ferreting out and distilling what is required.

10: Ability to balance all factors

One of my favorite anonymous sayings is "We have done so much with so little for so long, we are now equipped to do anything with nothing." Balancing a budget, the deadline, the level of detail, the quality, the profit, etc. is the bottom line test of a model builder. As Frank Wielgus said in his e-mail to the MILE on May 7, 2003, "Do you want it done fast, cheap, or right? Pick two." I have often said that in order to solve tomorrow's problems yesterday, think backwards. It helps to find out early when the absolute deadline is. Ultimately, you have to find out early what is important to the customer in order to figure out the right balance of factors. Maybe the best model builder needs to be a Renaissance person modeled after Leonardo da Vinci where the talents of thinking and doing are combined in one problem solving person.

For information on the drawings and models of Leonardo da Vinci go first to this web address <http://www.museoleonardiano.it/eng/museum/collection-of-models>. The bicycle model is based on a drawing that was lost for 360 years until found in 1966. Then go to the traveling models at this web address <http://www.museoleonardiano.it/eng/>

travelling-exhibition/models to see more models as well as download a list of models and a list of videos. For the main museum in Vinci, Italy go to go to <http://www.museoleonardiano.it/eng> which has more information on the museum and Leonardo DaVinci attractions in that area.