



▲ Since 1995, Scale Models, Arts, and Technologies has built approximately 100 layouts. Hi-rail railroads filled with superb structures, landscape, and detailing are a specialty, as is quite evident from seeing Don Williams' O and S gauge layout (left). The craftsmen at SMARTT have no trouble shifting gears and designing a toy train display for the public, as seen by the Standard and O gauge layout at the California State Railroad Museum in Sacramento (right).

CTT visits

An innovative custom layout builder

Scale Models, Arts, and Technologies builds state-of-the-art layouts

by Roger Carp
photos by William Zuback

HOW DID YOU DESIGN and build your layout? Most readers of CLASSIC TOY TRAINS would answer that they relied on a pencil and graph paper. They used hand tools and an electric jigsaw to cut the wood for their benchwork. And they made the scenery out of window screen, plaster, and house paint.

All 20th-century techniques that still work today.

But substitute three-dimensional CAD software for a pencil and paper, computer-guided routing tables for handsaws, and 3-D computer software for trial-and-error scenery, and you've entered the 21st-century world of Michael Hart and his staff of professional designers, model makers, and electrical gurus at Scale Models, Arts, and Technologies Inc. (SMARTT).

Phone calls, DVDs, and answered questions

CTT RECENTLY visited SMARTT at its 7,000-square-foot headquarters in North Miami Beach, Fla. There, in the firm's comfortable, brightly lit offices and workshops, we watched as progress was made on several toy train and scale model layouts. We talked with Michael and the 14 men and women on his staff, who design, build, wire, and landscape the layouts under construction.

We watched one craftsman laying track while another installed a bridge on an adjacent layout. Elsewhere, a modeler used her computer to manipulate digital plans for an O scale factory. Wiring preoccupied yet another employee crouched under the benchwork of a third model railroad.

How exciting to see layouts of various sizes and scales being built in such close proximity. But where does the process begin?

"A phone call starts the ball rolling," Michael said, almost reading my mind. "Someone telephones or emails our offices and asks what services we provide."

The answer to that question is, "Everything you can imagine and more."

SMARTT can design layouts and turn over construction to the hobbyist. It can follow to the next stage and build benchwork, lay track, and add wiring in its workshop before delivering a layout to a hobbyist's home. Or it can proceed to the finish line by adding all the scenery, structures, and details before the layout is delivered.

When an experienced model railroader or a newcomer to the hobby calls, Michael spends time learning what he or she wants. Often the person is interested in a layout for home. Sometimes, the voice at the other end of



▲ Designing, constructing, and installing a layout is a team effort at SMARTT. Leading at every step is Michael Hart (second from right), its founder and president. Ably assisting him are (left to right) Alex Vasserman (art director), Raymond Potter (director of creative services), Mel Ivanov (senior project manager), and Tom Kapatelis (general manager).

the line is speaking on behalf of a museum, a shopping mall, or another public institution that wants a layout.

Regardless of who is calling or the size of the layout requested, Michael listens carefully. This is a crucial stage, for he is building a relationship with a client that may last years beyond the time needed to design and build a model railroad.

Michael strives for a solid relationship because he believes in the importance of good communication and keeping his clients informed. "How often," he asked, "do you pay someone and then have to keep after them? Not so with us! You may be the one paying us, but we're usually the ones calling you to discuss your layout."

First, Michael shares the history of SMARTT. He notes how, since 1995, his firm has built dozens of layouts of all sizes and scales.

Then Michael discusses rates and suggests visiting the SMARTT website (smarttinc.com). He also offers to send

a 35-minute DVD that shows trains operating over some of the finest of the model railroads the firm has built. Other segments of the DVD focus on the design, construction, and installation phases.

Michael suggests the prospective client fill out the firm's simple three-page questionnaire so SMARTT can learn more. Some questions are general while others are specific, related to the space available for a layout, track preferences, desired control system, scenic and structure themes, and animation.

Once this questionnaire has been filled out, Michael

studies the answers, discussing what he has read with his chief associates, led by Tom Kapatelis (general manager), Raymond Potter (director of creative services), and Mel Ivanov (senior project manager). Chiming in with thoughts and ideas is Alex Vasserman (art director).

In the meantime, Michael and the client place their signatures on a letter of intent. This authorizes SMARTT to move ahead with the design. A SMARTT employee travels to the delivery site to obtain exact measurements of the room or building in which the layout will be housed.



◀ Prospective clients are given a 35-minute DVD that shows model railroads built by SMARTT and outlines how the firm designs its layouts, builds the benchwork, lays track, and handles the electronics and scenery. Individuals who want to proceed further fill out a questionnaire to help Michael Hart and his crew design a unique layout.

Design and options



▲ Here's where things get exciting. The three-dimensional design shown on Raymond's computer screen represents a few months of work based on a client's wishes as well as the imagination and experience of SMARTT's managers. It promises to be, in Michael's words, "a very exciting design that delivers both a challenging and a fun-to-operate track plan that will never get boring."

THEN THE FUN really starts! Maybe the client wants an O gauge layout that captures coal mining in the Appalachian Mountains in 400 square feet. Or the museum wants a display that shows how the Santa Fe and Southern Pacific dominated railroading in southern California.

Whatever the person or organization desires, Michael begins creating a unique and imaginative layout. "We thrive on design challenges," he says. "A unique design, coupled with uncompromising construction quality, is the key to producing a great layout."

Thanks to the computer programs that are vital elements of SMARTT's design, engineering, and planning process, there is soon a complete set of engineering drawings and a series of scale renderings executed in three dimensions.

Even better is a video animation that shows the imagined layout from every conceivable angle. Watching this DVD is like walking around the railroad, although it exists only in a virtual world.

The scale plans, 3-D renderings, and DVD virtual animation are sent to the client for approval. Accompanying them is a detailed price quotation.

Michael, aided by Tom and other notable members of the team, sets forth estimates of how much labor it will take to build and install each aspect of the layout. Also included are the costs of materials, shipping, and travel.

However, not every layout is built to the ultimate degree when it leaves SMARTT's workshop.

"We will do only as much as a client requests," Michael says. That means

some people want only the benchmark built, the track laid, and the electrical work completed, but insist on doing their own scenery work. So we take care of those early steps and install the layout.

"For another," Michael continued, "we give clients choices about the depth of detail and extent of work that can be done with track, scenery, structures, and electrical.

"Take the structures. With the 'basic' option, you get commercial buildings to which we do some painting and minor detailing. With the second option, we do some kitbashing, plus more painting and detailing. The third option can have many scratchbuilt buildings that are completely custom painted and weathered, often with interior lighting and highly detailed interiors."

"A gigantic jigsaw puzzle"

SEEING THE COST figures is a sobering experience for most clients, Michael said. Still, their memories of the animated DVD showing what their future layout can look like almost always overcome any doubts.

"Once they've seen the design," Michael pointed out, "more than 90 percent of our clients write the checks and have us move forward. They realize that the quality they're seeking requires the best-skilled people, and there is a cost to that.

"Besides, most folks consider their dream layout to be an investment that will last beyond their lifetime. It can be passed on to their children and grandchildren."

Because SMARTT's layouts are built in modules, they can be dismantled in just a few days and then reassembled at another site.

The process begins on the computer, where designers engineer the entire layout as





▲ The plywood “puzzle pieces” for the modules on this O gauge layout are cut out by a computer-controlled router before being assembled to form the benchwork and subroadbed. The finished pieces fit together precisely. Now GarGraves flex-track and Ross Custom Switches turnouts, plus a few Lionel accessories, are being installed. In the foreground you can also see where custom-made catenary poles will be erected along the main lines.

self-contained sections. Each section, or module, consists of numerous components that await assembly. Later, finished modules are joined together to form the layout.

No wonder Michael referred to each model railroad as “a gigantic jigsaw puzzle.”

The components that make up each module include the framing parts of the benchwork, subroadbed, elevation risers, bridge and tunnel locations, electrical planning, and more. All grades, clearances, and tolerances are precisely determined to ensure smooth running of even the largest locomotives and rolling stock.

◀ The framework for a mountain is cut out from foam board by a computer-guided router. Then tunnel portals are put into position, a scratchbuilt wood trestle is added, and clearances for large articulated steam locomotives are tested before this O gauge layout is wired for command control, specifically, the Digital Command System from MTH.

Once the design work has been completed, the parts are cut on a CNC (computer numerical control) router from 3/4-inch cabinet-grade plywood. SMARTT’s computer software guides each cut of the router’s bit as the wood moves across the router table.

When everything has been cut, workers fit the benchwork and subroadbed together and mate the modules using precision-built fixtures. “The result,” Michael said, “is a modular frame that assembles with the accuracy and strength of an aircraft frame.”

Tom pointed out that SMARTT relies on “a system of custom jigs and fixtures in all trackwork assembly to ensure perfectly smooth transitions on curves, grades, and turnouts and to eliminate faulty performance.” Depending on which track

option a client chooses, the curves may be superelevated and even include easements, the rails and ties painted to look weathered, and the track ballasted.

SMARTT has even come up with its own system to scratchbuild the realistic catenary that some layout owners want.

Other decisions that are faced by clients at this early stage of work on their layout include what kinds of tunnel portals and bridges they want. SMARTT generally uses modified commercial tunnel portals or scratchbuilds them.

Custom viaducts and bridges of all sizes and styles are computer-designed with parts cut by lasers or CNC routers. These impressive bridges have become company specialties, and they show up on many of SMARTT’s layouts.



Electrical and scenery



▲ What a great scene! The low bluffs in the foreground, the rugged mountains behind, and the backdrop in the distance complement one another in creating a truly realistic setting for this S scale layout. Note how the landscape extends down into the fascia in front.

WITH COMPUTERS playing key roles in designing the model railroads SMARTT builds, it came as no surprise to learn the firm often promotes command control. SMARTT personnel are experts on the Digital Command System from MTH, though they are just as familiar with Lionel's TrainMaster Command Control, two-rail DCC, and conventional wiring.

Just about every one of the O gauge layouts that leaves its shop, even the most basic, is wired so several trains can be operated simultaneously regardless of which control system is used.

"Our electrical work is designed and built to provide trouble-free operation to last a lifetime," Michael said. SMARTT uses only the best wire, connectors, and components. It devises a logical wiring plan that's carefully explained in a user's manual written for the owner of a particular layout.

On each railroad, Michael explained, "the command-control system or the conventional system is

divided into relevant electrical zones. That way, each main line can be electrically isolated from the other ones and controlled with separate power supplies to obtain better signal strength performance and even power distribution."

SMARTT offers several electrical options, such as occupancy detection, signaling, control panels, and building lights. There's more to think about on the subject of block detection and occupancy in areas where the track is hidden and on/off switches control power to sidings and yard tracks.

Operating signals from Custom Signals, MTH, or other manufacturers can be installed if clients want more animation. They can be integrated as part of a fully functioning automatic signal or block system.

A full-featured control panel is another electrical option that's available from SMARTT to show track occupancy, turnout-position, and uncoupler activation.

While the electrical wizards on the staff deal with



▲ Details transform a modeled scene into a moody vignette. This one isn't finished, but already there are figures, fire hydrants, parking meters, manhole covers, dogs and birds, seams on the sidewalk, signs, and cones in the road. Plus, the structures have been weathered.

the wiring, artists handle the scenery. They are familiar with every technique in the book, and their knowledge of diverse methods and materials contributes to layouts that never have a uniform look or feel.

A decade of success has taught SMARTT's artists that scenery needs the right foundation. Scenic contours for mountain ranges, canyons, and valleys are usually drawn out on the computer as separate scenic modules.

These modules are designed to precisely follow the subroadbeds they mate to, regardless of the nature of the terrain and the dictates of adjacent bridge abutments, and tunnel portals.

The components that make up these modules are cut from hard foam on the CNC routers and assembled to form the ribs of all the scenic areas. These frames are fitted with a "skin" and covered with plaster, urethane foam, or Sculptamold. The shell gets "a realistic color texture with paints, washes, dry-brush highlights, and ground foam."

Alex Vasserman, SMARTT's art director, acknowledged that the scenery finishing methods used at SMARTT are pretty conventional up to a certain point. He commented on the subtle tones and shading in the colors selected, the assortment of ground textures and materials, and the extensive range of natural vegetation utilized.

"We use purchased and scratchbuilt molds and hand-carved plaster and foam to create realistic rock formations and cliffs." Alex launched into a discussion of the three-step technique SMARTT perfected for making all kinds of roads.

"Realistic depiction of water areas can make or break the scenic believability of a layout," Michael has learned. So his employees have mastered the use of various materials to make the most effective water.

"Nobody does seasons as well as we do," Mel Ivanov asserted. The coloring and effects to create a summer or winter scene are some of what SMARTT does best.

Structures and installation

THIS IS THE point at which a client's eyes tend to grow wider and wider, dreaming of how many structures can be fit onto the layout. Naturally, the prevailing feeling is that more will be better – and they should be scratchbuilt, weathered, illuminated, and loaded with detail.

So Michael must explain that structures can inflate the cost of a railroad. Nice as the scratchbuilt depots and industries may be, prudence often dictates using commercial structures and kitbashing new ones as ways to hold down expenses.

Still, customers generally find ways to keep within their budgets and still have buildings unlike those on other layouts. There isn't anything that SMARTT can't produce: farms, lineside structures, city terminals, mines, warehouses, urban business fronts, mills, courthouses, suburban houses, and the list goes on.

Clients spell out on questionnaires and in conversations whether they want injection-molded kits made out of the box or mingled with parts from others to form unique structures. Craftsman-type kits that use resin castings, laser-cut wood parts, or plaster pieces have appeal, especially because they lend themselves to superdetailing.

The experience that SMARTT has had in designing and fabricating architectural and engineering models and dioramas helps when a client requests scratchbuilt structures.

Raymond elaborates on the techniques used to produce the most unique structures. As he explains, "We often take photos of key locations from the client's life, work them up in the computer, and duplicate them in miniature."

No idea is too exotic for SMARTT's artists. Once the designing is complete, lasers and CNC routers produce



▲ Raymond Potter, director of creative services, offers some tips to modeler Rali Mitzova. Using photographs and plans of actual buildings, SMARTT constructs scale models of contemporary structures as well as stations, factories, houses, and more from the past.

the parts and the firm's artisans finish the job.

Before long, it's time to test the modules that constitute a layout rapidly approaching completion. When every one is operating flawlessly, Michael makes arrangements with the new owner for the layout to be delivered by truck. On average, nine months have elapsed since the order to go ahead was given to SMARTT.

Michael likes to joke that the layout system developed at SMARTT keeps peace in his clients' families. Why? Because SMARTT layout installations happen in a matter of days, not months.

On that special day, when the client flashes a huge smile, the modules are delivered, assembled, and locked together. The final track sections that span each module are secured, wired, and tested. Scenery joints between modules are blended.

A few days later, Michael "hands his client the keys." The most pleasing comment he usually hears from the client is "Wow! This is way more than I expected!"

Ready for more

Once the owner of the new layout is satisfied, Michael, Tom, and the others head back to Florida. Waiting for them will be more layouts to build, questionnaires to read, and telephone calls to answer.

Having a professional builder design and construct a toy train or scale model railroad may not be for everyone. But for those who want a layout that takes full advantage of 21st-century technology, the services offered by SMARTT are right up to date. **CTD**

Scale Models, Arts, and Technologies Inc. can be contacted at PO Box 600505, North Miami Beach, FL 33160; 305-949-1706; smarttinc.com



To see two model railroads that SMARTT built using the process outlined here, go to classictoytrains.com and click on "Train layouts." Then click on "Layout visits" and check out the layouts belonging to Bob Porges and Don Williams.



▲ Scratchbuilt and kitbashed structures line the boulevard of an O gauge layout soon to be completed. Michael and his staff will transport the modules to the client's home, where they will be assembled and tested.