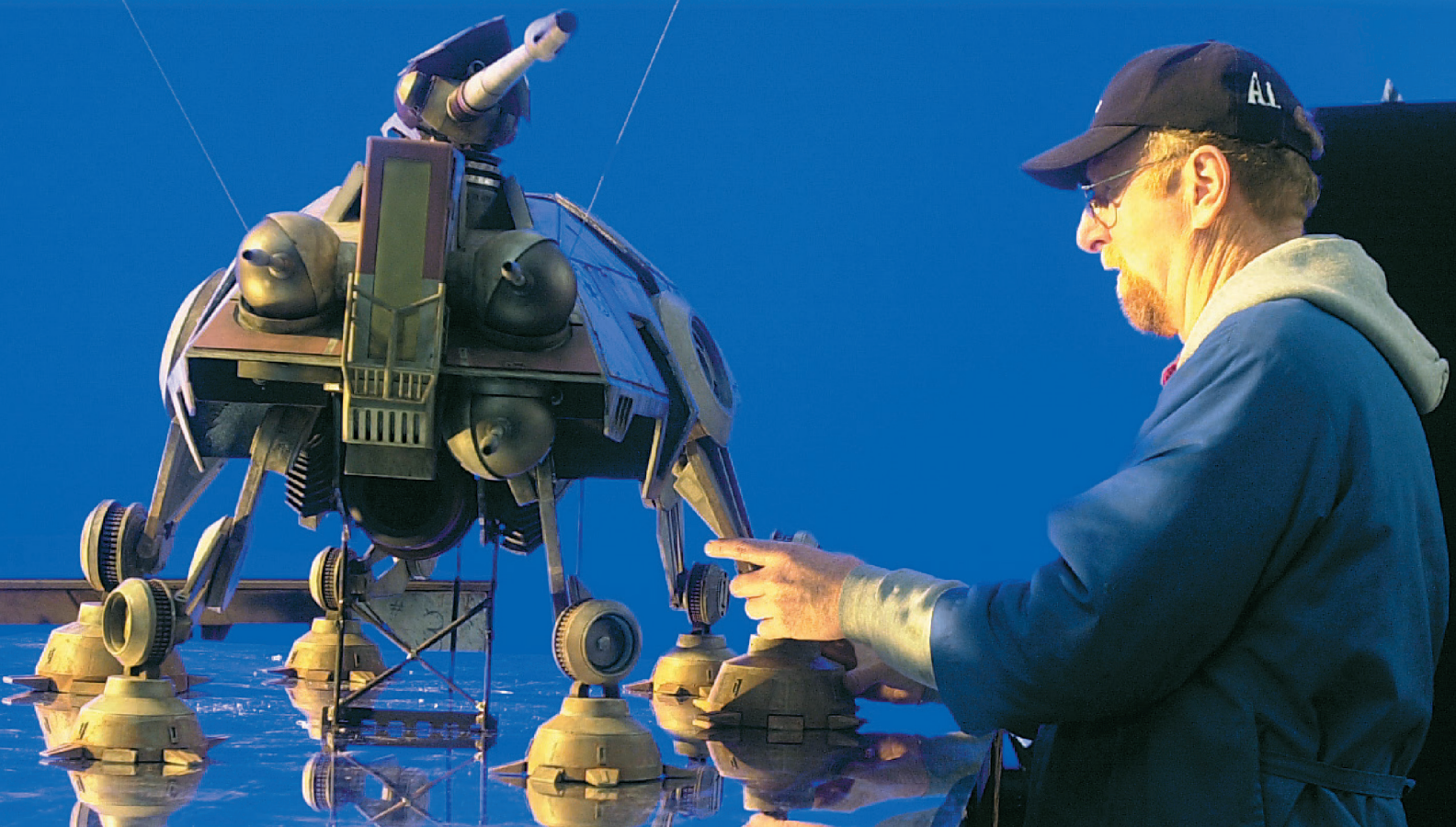
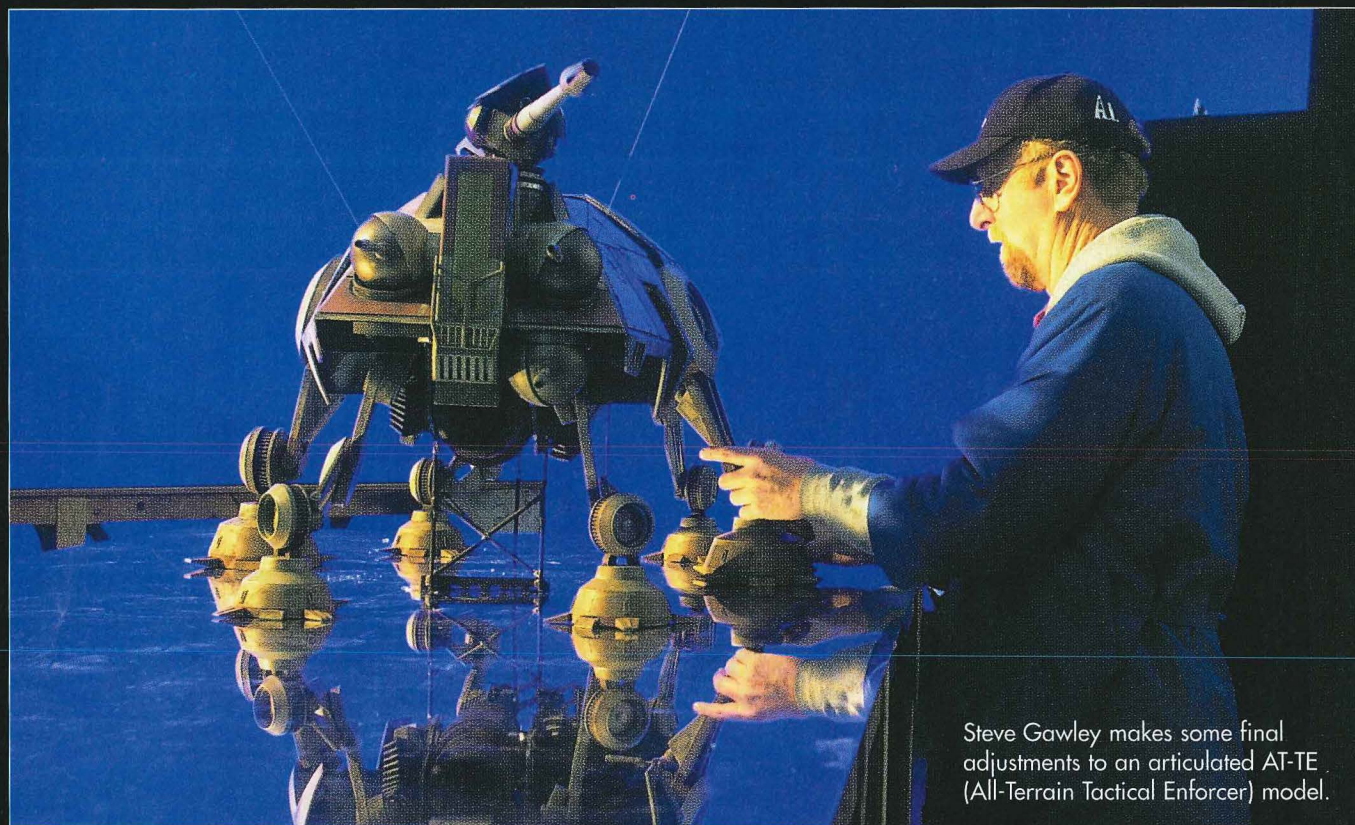


BEHIND THE SCENES OF STAR WARS MODELS

Star Wars: Episode II - Attack of the Clones
Han Solo's Millennium Falcon • R2-D2
And more!



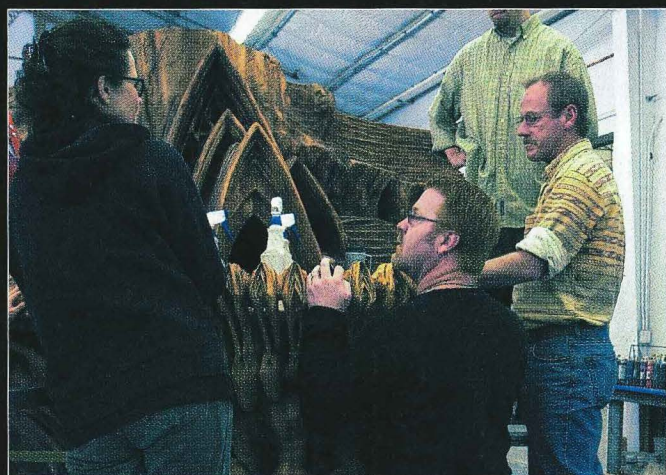


Steve Gawley makes some final adjustments to an articulated AT-TE (All-Terrain Tactical Enforcer) model.

Behind the scenes of *Star Wars: Episode II*

ILM's Brian Gernand talks about *Attack of the Clones*

By Matthew Usher Photos courtesy Industrial Light + Magic

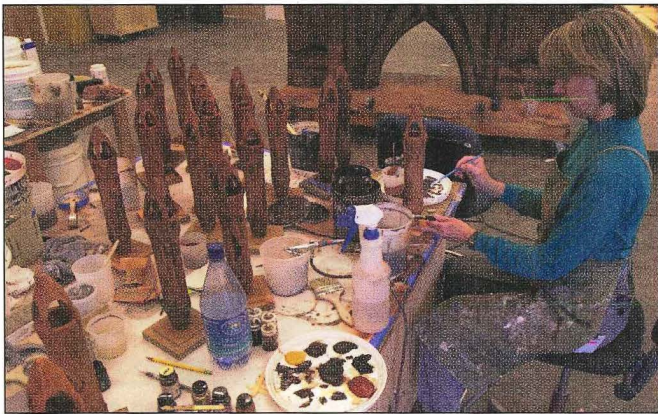


Brian Gernand (center) reviews a "miniature environment" from *Star Wars: Episode II* with other ILM model makers.

Brian Gernand was the Model Project Supervisor for *Star Wars: Episode II, Attack of the Clones*. He describes his work on *Episode II* as his greatest achievement.

Brian joined Industrial Light + Magic as a model maker in 1987 to work on *Caddyshack II* — a film far from the *Star Wars* universe. Brian's work was impressive enough to get him invited back, and soon he found himself working full time on some of ILM's most memorable films, including *Backdraft*, *Star Trek: Generations*, *Starship Troopers*, *Galaxy Quest*, and *Pearl Harbor*. In 1999 Brian worked as Chief Modelmaker on *Star Wars: Episode I, The Phantom Menace*.

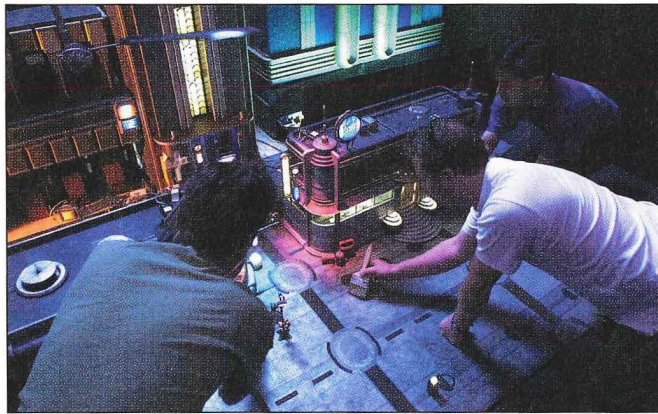
From his home in California, Brian took some time to discuss working for ILM on *Attack of the Clones*.



Peggy Hrastar details miniature towers for the Geonosian arena sequence. The desolate planet Geonosian is the setting for some spectacular sequences, including the sweeping first battle of the movie's clone war.



Steve Belleci details a model of a Kamino building. In *Attack of the Clones*, Obi-Wan Kenobi visits the rain-swept world of Kamino and discovers its secret clone-production facilities.



From left: Aaron Haye, Tom Ehline, and Grant Imahara work on a Dexter's Diner model.



Charlie Bailey details a section of the Geonosian android factory miniature.

A big challenge. "I am proud of my accomplishments on *Episode II*," Brian says. "The scale, scope, timing, level of detail, and speed that this project was done on was unsurpassed.

"We cranked out a massive amount of work in a very short period of time. At our peak we had about 80 model makers. We did somewhere in the neighborhood of 150 to 200 miniatures and models."

According to Brian, it took about 18 months to build the models for *Episode II*. "I was the overall project supervisor, so every single aspect of the model build went through me," he says. "I really enjoy the conceptual work – a lot of us sitting around at a table, looking at a shot over and over again and trying to figure out 'How are we going to do this?'"

"That challenge is one of the very best parts of this job. If in the conceptual process we nail it, everything goes very smoothly from there."

Shrink to fit. Many of the miniatures were actually "miniature environments" – reduced-size sets into which the film's actors could be added via digital technology. Some of the film's most memorable locations – Coruscant's dizzying skyline, the Kamino clone factory, the Jedi temple library, and the Geonosian arena – were produced in miniature by Brian's team.

Modeling everything from spacecraft to androids to landscapes tested the team's model-building skill and resourcefulness. The modelers' abilities are backed by ILM's

state-of-the-art workshops, which are stocked with a seemingly endless variety of tools and raw materials.

"When ILM was getting started, everything was done by hand, or kitbashed," he says. "All the foam and wood patterns were hand-carved or hand-sculpted. We had people there who made wooden propellers by hand, without a template.

"Now we use CNC [computer numerically controlled] mills for a lot of the work, and we're really focusing on laser cutting and AutoCAD [a computerized drafting and design system]. We now can take a piece of artwork and absolutely replicate it down to the finest detail."

Faster and better. "Instead of digging through traditional kits and kitbashing – like needing 100 Tiger tank kits when we need 100 copies of one little part – we make them now. Things that used to take days we can now do in hours, and the detail level has gone up."

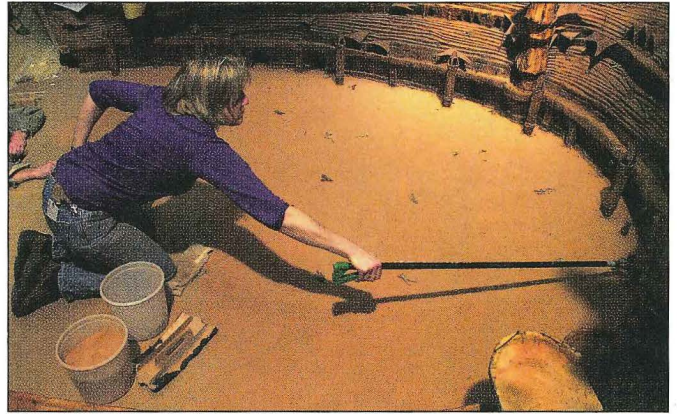
Despite the presence of high-tech equipment, the staff still utilizes plenty of tools and supplies familiar to most modelers.

"We use every traditional model-making tool there is," Brian says. "We use tons and tons of flat styrene and a variety of paints. We use a lot of Floquil paints, and a lot of urethane automotive paints – the kind you could buy at an automotive supply store. We use a lot of latex paints, too; the Geonosian arena was painted with latex paints."

"We used every material known to man on all of our projects,



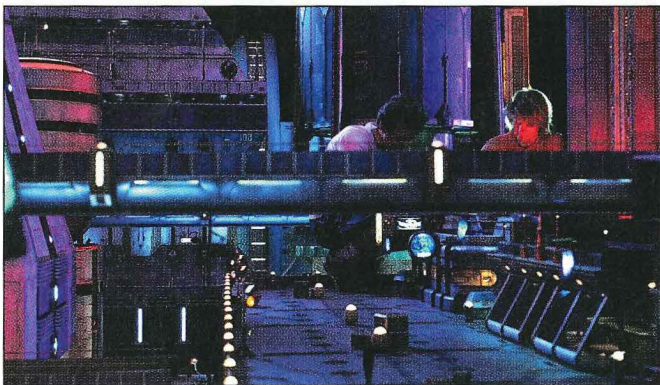
Model makers Dave Fogler and Jon-Paul Kelly work together on the miniature clone command center.



Kim Smith works in the miniature set of the Geonosis arena.



ILM's Pat Sweeney and a model maker work on a model of the Jedi temple library visited in the film by Obi-Wan Kenobi.



Model makers Aaron Haye and Peggy Hrastar make final adjustments to the massive Coruscant city model.

from urethane foam to acrylics to every kind of wood you could imagine," Brian says. "We used dirt, we used sand, we used all kinds of different metals."

One man's vision. Driving ILM's creative process on the film was the series' creator, George Lucas. Despite the movie's scope, Lucas still made time to oversee the work Brian and his team were producing.

"He would come on stage and take a look at the miniatures and give them a thumbs-up or a thumbs-down," Brian says. "George knows exactly what he wants, and he has an incredible eye. His ability to visualize is amazing."

The enduring appeal of George Lucas' vision was evident as fans lined up for tickets weeks in advance of the May 16 pre-

Belief in Magic

When it hit theaters in the summer of 1977, *Star Wars* not only set records for box-office sales, it also redefined the state of the art of visual effects in movies.

Working out of a converted warehouse in Van Nuys, California, with a modest budget, a small, dedicated visual-effects crew developed new ways of filming visual effects to bring George Lucas' fantasy epic to the big screen as he had envisioned it. Lucas dubbed the new facility Industrial Light + Magic.

The team not only hand-crafted ultrarealistic spacecraft miniatures for the visual-effects sequences, it also developed new ways of filming them, using computerized motion-control cameras to film the movie's dogfights and spaceflight sequences.

The team's hard work was rewarded later that year at the Academy Awards, where *Star Wars* was nominated for Best Picture and won six Oscars, including one for Best Visual Effects.

Following the unprecedented success of *Star Wars*, Industrial Light + Magic geared up for *The Empire Strikes Back* and moved into a larger facility in San Rafael, California. The new ILM facility could not only handle the extensive requirements of the *Star Wars* sequel, but could also manage the visual effects of other films as demand for ILM's expertise grew outside the world of fantasy.

— Matthew Usher

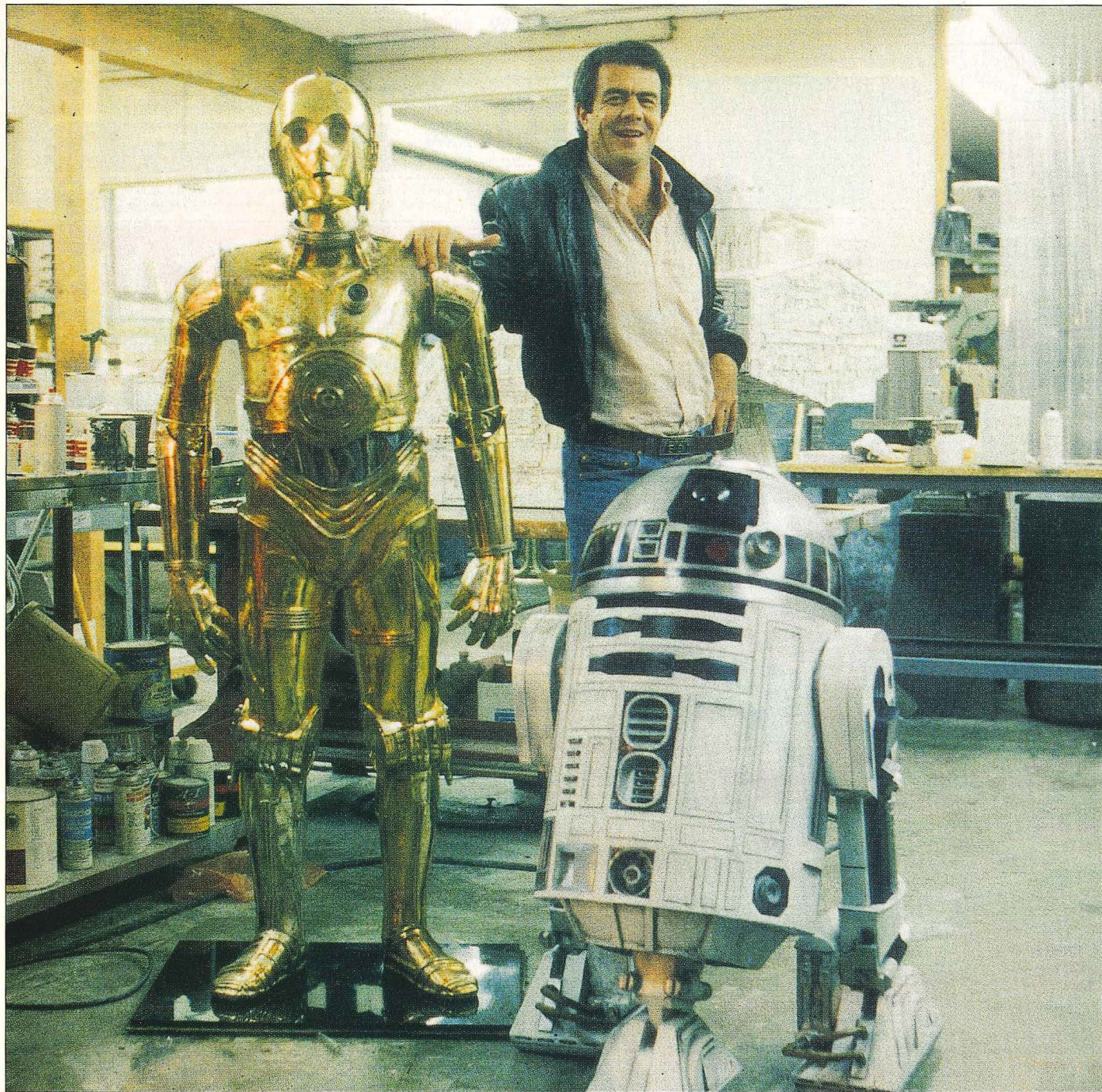
miere of *Attack of the Clones* — 25 years after the series' premiere. *Episode II* grossed \$30.1 million on its Thursday opening and an additional \$86.2 million during the weekend — making it one of 2002's top draws at the time of this writing.

Personal interest. Regardless of its power at the box office, Brian Gernand is proudest of the modelers who worked as a team to make *Attack of the Clones* such a visually stunning film and a worthy continuation of the *Star Wars* saga.

"The finished effects are amazing," he says. "Those 80 model makers who worked for us are the best in the business. They worked so hard, and really put their heart and soul into this. They were creating beautiful pieces of art, and they took it very personally." **FSM**

Mike Fulmer, special-effects modeler

By Matthew Usher Photos from the Mike Fulmer collection



Mike Fulmer with familiar companions inside ILM's headquarters in San Rafael, California.

You may not recognize his name, but you'll almost certainly recognize his models. Mike Fulmer is responsible for some of the most famous special-effects models in movie history. Through more than 10 years at Lucasfilm's Industrial Light & Magic (ILM) production house, Mike created models featured in some of the highest-grossing films of all time, including "The Empire Strikes Back," "Raiders of the Lost Ark," "Return of the Jedi," "Back to the Future," "E.T.," and "Star Trek II: The Wrath of Khan."

Ironically, Mike didn't set out to be a professional model builder. After serving with the Marines in Vietnam, Mike returned to the states and worked at a variety of jobs, including work as an ironworker and pipe fitter. The son of an Air Force pilot, Mike had always been interested in model building, particularly scratchbuilt aircraft, and sometimes he sold the models he built to collectors.

While working as a welder in Oregon in the late 1970s, Mike built an air racer model for a collector in San Francisco. When he delivered the model, the collector, who had retired from television work



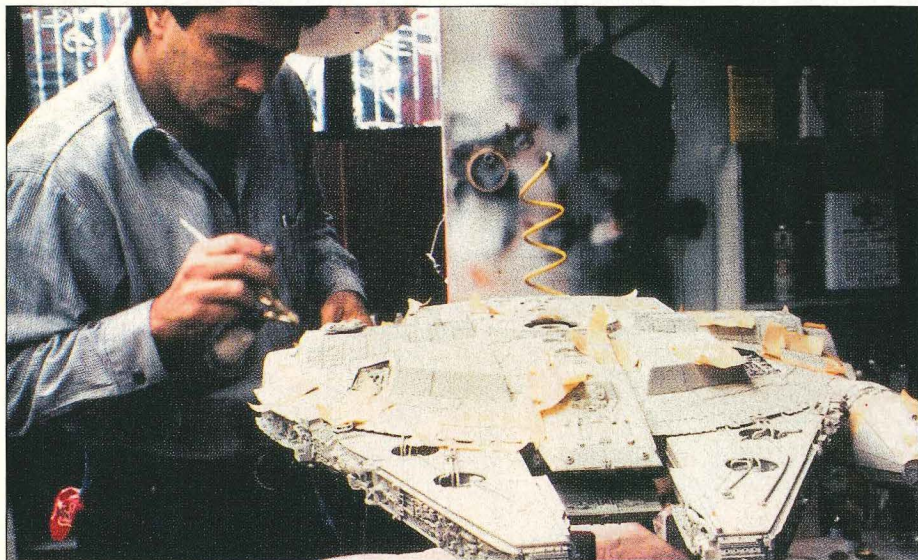
During the filming of "Indiana Jones and the Temple of Doom," Mike makes adjustments to a 3'-wingspan Ford Trimotor model. Suspended by barely visible wires, the unfinished model worked as a "stand-in" during camera adjustments, and was replaced with the fully detailed model just before shooting. To take advantage of natural lighting, the miniature set (complete with scale mountaintop) was constructed on the roof of ILM's main stage.

The complex aerial fire-fighting effect sequences for Steven Spielberg's 1989 film "Always" were filmed indoors against a backdrop of real fire. As Model Supervisor, Mike helped construct the film's aircraft, some of which had 20' wingspans. A few were radio-controlled, but most of the aircraft were suspended from wires and "flown" from an overhead track.





With Ira Keeler in one of Mike's workshops near San Francisco. "I think we've worked together on more than 300 aircraft alone. Ira's one of the world's finest pattern makers and model builders," Mike says. Under construction on the workbench is a Ford Trimotor, a replica of the models they built for "Indiana Jones and the Temple of Doom."



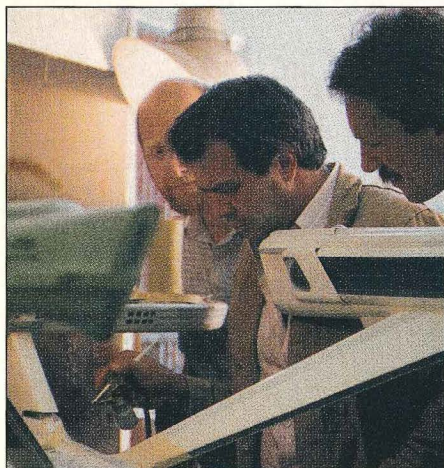
in Hollywood, encouraged Mike to show it to the staff of a film production company that was just moving into new facilities in San Rafael. Reluctantly, Mike agreed and, armed with the finished model, had an informal interview. Afterward he dropped off the model and drove back to Oregon.

The company, George Lucas' Industrial Light & Magic, had just moved north from Van Nuys, fresh from the success of "Star Wars." A few weeks later, Mike received a letter asking him to join the staff, which was gearing up to start production on the second "Star Wars" film, "The Empire Strikes Back." After a little debate, Mike decided to leave his job as a steelworker and take the job. He was uncertain about what exactly he would be doing, though – Mike had never seen "Star Wars."

It was a hectic time at ILM. The company was building a new special-effects facility from scratch and working on "Empire" at the same time, all under Lucas' tight preproduction security. At one point, Mike took a model into a restroom just to get away from the construction noise long enough to do some hand painting.

One of his first assignments turned out to be one of the icons of the "Star Wars" universe – Han Solo's Millennium Falcon. Smaller than the original 4' model used for the first film, the model enabled the crew to film more complex sequences, including a breakneck race through the asteroid field. Mike ended up building the Falcon in several scales to accommodate different shots.

Despite his science-fiction beginnings, Mike's favorite project is Steven Spielberg's "Always," where he was able to get back to his aircraft roots. The film's scratchbuilt A-26 and Catalina fire-bomber models had wingspans up to 20'. All of the ships' systems, from the control surfaces to the engine speed, were controlled remotely during the film's fire-fighting sequences.



One of Mike's first projects at ILM was constructing a smaller version of Han Solo's Millennium Falcon for "The Empire Strikes Back." The original "Star Wars" Falcon was 4' long, too large and heavy for the complex shots that "Empire" required. Mike eventually built several Falcons, from the 2' version shown here to a tiny model less than 2" long.

Armed with an airbrush, Mike touches up the engineering hull of the refitted USS Enterprise that appeared in the first three "Star Trek" movies.

Unlike films where special-effects elements are combined after shooting with an optical printer, all of the effects sequences in "Always" were shot "in camera" as they happened with all of the elements in place. It's a process that leaves little room for error. "Always" was a tough film to do, but it's wonderful to watch," Mike says.

After working on more than 30 films and commercials, Mike left full-time work at ILM. Although he still does special-effects work, he now has more time to concentrate on other interests.

An in-progress 1/15 scale World War II fighter rests on the workbench in his home workshop north of San Francisco, bound for a private collector. All of the model's panels were hand-formed over a wooden buck and assembled over a photoetched airframe. The plane's control surfaces move when the 4"-long control stick in the cockpit is pushed.

Also on the bench are several prototype models for electric-train giant Lionel. Brought into the company by part-owner Neil Young in the mid-'90s, Mike has designed several models for the company's Route 66-themed line of trains and accessories.

Not all of Mike's projects will fit on the workbench, though. A freshly completed full-size '32 Ford street rod rests under a car cover across the workshop — street-rod fabrication is another one of his specialties. Mike has two other larger workshops for projects where more space or security is required.

"Over the years, quite a few modelers, usually talented hobbyists, have asked me how they could enter the film business. That question's always a handful to answer," Mike says. "There's a wide gap between modeling as a hobby and modeling as a professional. Modeling as a hobby is usually a part-time affair, and the subject model is of interest to the builder, kind of a labor of love.

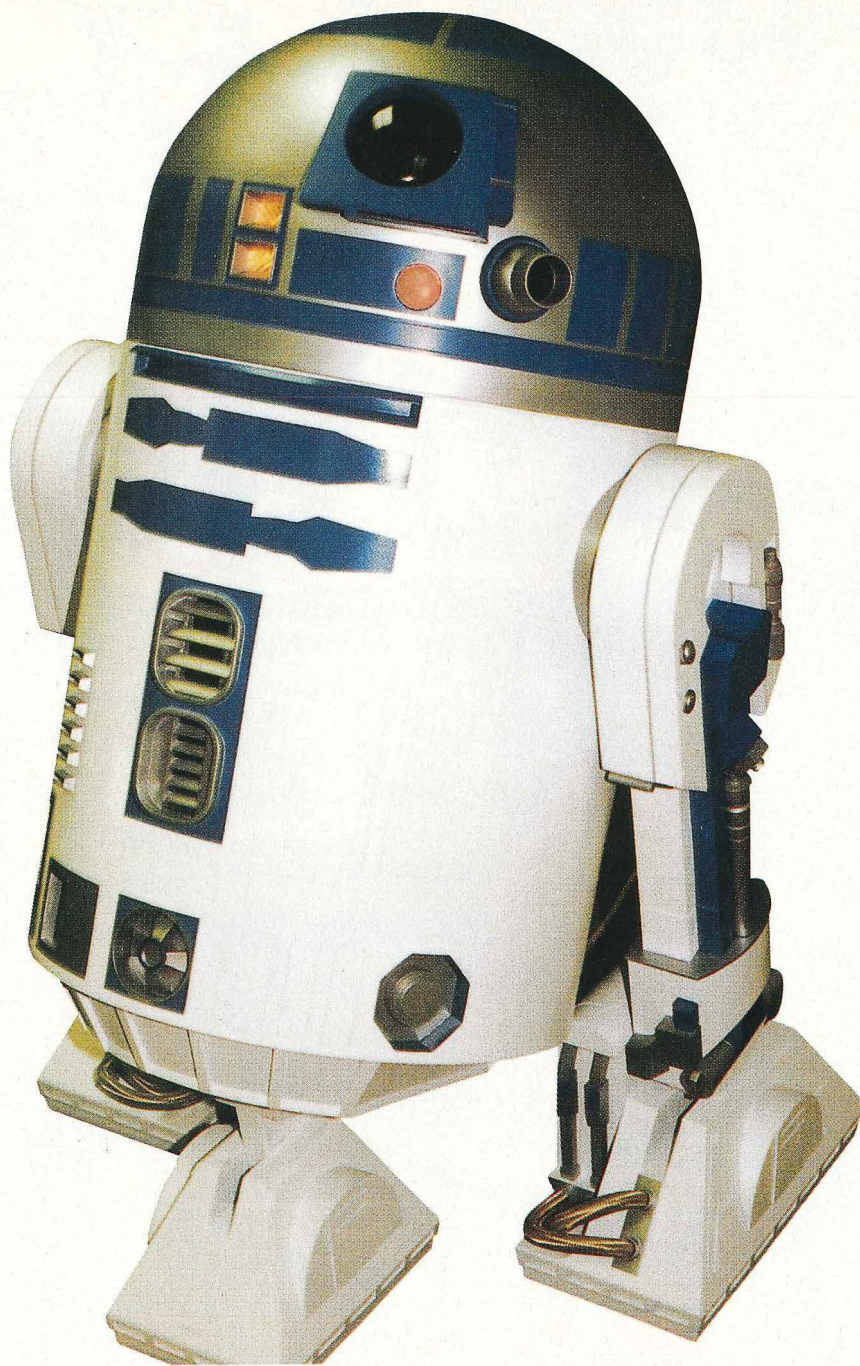
"You have to leave all that behind when you cross into the professional arena," he continues. "I've known a few talented modelers who took the high-level path, and couldn't handle the 12-hour days, seven-day weeks, and the push to produce projects that held no special interest other than a paycheck. I've been lucky and have had a lot of fun, but high-end model work is a serious business."

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SHOWCASE



*This droid
was designed
for a store
display*

A full-size R2-D2

By Peter Lukas

The story of our R2-D2 began in September 1996, when the owner of a hobby store approached my company, Alberta Industrial Models in Calgary, Alberta, and said he was planning to open a store before Christmas dedicated to selling exclusively sci-fi memorabilia. He wanted to have R2-D2 built for his display window.

I am a "Star Wars" fan, as are the other modelmakers who work with me, so we accepted the challenge.

We had most of the material on hand, as well as the tools and equipment to get the job done: 4" and 10" table saws, scroll and band saws, disc sanders, Dremel tools, and a pegboard full of hand tools.

Only one drawing was available; we also consulted photos from several books and spent hours watching "Star Wars" videotapes. After finishing the research, we prepared drawings and templates before beginning construction.

➤ **The builders of R2-D2 were (from left) Andrew Hulbert, Cliff Erasmus, Peter Lukas, and Brendan Whitty.**

➤ **This full-size (43½-tall) R2-D2 was built for a science-fiction-memorabilia shop. The semicircular panels on the feet were molded and cast so only one original had to be made. Four furniture casters on each foot allowed for ease of transport.**

➤ **A spine made from a 4"-diameter ABS tube has Plexiglas and ABS discs as well as spacers attached. Slots were left in the bottom disc to allow access for locating the vents after the outer skin was in place.**

Most of R2 was built using a 4' x 8' sheet of .060" ABS plastic and two sheets of .090" ABS. Brass, aluminum, and steel were used for strength. We knew R2 was going to be moved around quite a bit for conventions and other promotions so he needed to be tough.

About \$400 in super glue and accelerator went into building R2-D2. We decided to paint the model using industrial and furniture lacquers, which had proved in the past to be durable. Lacquers dry quickly and can be sanded and buffed if you scratch the paint.

To finish, we added braided hose to R2's feet, wired the model with lights, signed our names on the inside, and riveted an engraved plaque on the bottom of the torso.

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