

MACHINE DESIGN

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Huge machines lurch around on lopsided wheels, tank treads, legs, and other forms of arcane mechanical locomotion during Survival Research Laboratories' show "The Deliberate Evolution of a Warzone: A Parable of Spontaneous Structural Disintegration." Almost 3,000 people paid \$25 apiece to get into an abandoned toilet paper factory in Graz, Austria, and watch machines battle one another. A large overhead crane moves from skirmish to skirmish trying to break up the fights. The crane hurls down bombs, each the equivalent of two sticks of dynamite, while it picks up and drops combatants. Meanwhile, a V-1 rocket backfires, shaking the building with gas detonations and lighting the factory with fireballs. In the



Spinning Machine, a 454-cu-in. V8 twirls a cable so fast the end of the cable breaks the speed of sound. It spews 150 dB of 200-Hz noise audible five miles away. Also blaring away are air-raid sirens powered by multistage turbocompressors.

CRASHING AND BURNING

Performances put on by Survival Research Laboratories are designed to shock, scare, and startle. But there's some serious engineering behind the choreographed chaos.

SRL headquarters are tucked away in what looks like little more than a corrugated steel shack on a dead-end street in southern San Francisco. The building is deceptively large and serves as both machine shop, warehouse, and head-



Local residents refuse to believe the noise is from an art show, despite explanations from police and local authorities. They insist it's a Serbian attack. The Minister of Defence gets involved, putting the military on alert and

sending in a squad of armed troops to investigate. "It was a bad scene," says SRL director and founder Mark Pauline. "We've done five shows in Europe and three ended up generating political repercussions."

WITH CLASS

STEPHEN J. MRAZ
Senior Editor

quarters for SRL. Its founder and director Mark Pauline, a forty-something self-taught engineer who works hard to satisfy his high-tech muse, also lives there.

Since 1979, he and his SRL crew have staged more than 45 shows, or

performance-art pieces, with titles like "Increasing the Latent Period in a System of Remote Destructibility," "A Million Inconsiderate Experiments," and "A Calculated Forecast of Ultimate Doom: Sickening Episodes of Widespread Devastation

Accompanied by Sensations of Pleasurable Excitement."

The shows routinely include remote-controlled flamethrowers, jet engines and shock wave cannons, huge teleoperated arms and jaws on wheels, and other oversized pieces of powerful



“The Running Machine isn’t quite practical,” says SRL’s Pauline. “But it can walk over any kind of debris on stage and through the mud and dirt where other machines can’t go.”

multi-ton machinery designed to make a lasting impression. “The idea is to make people’s fear of a technological Armageddon come true in a controlled environment,” says Pauline. “So we design machines that look as unsafe as possible, machines that look like they would hurt you if you got too close.”

And the massive machines *do* look dangerous with their exposed gear drives, heavy-duty hydraulics, and menacing Mad Max overtones. Despite the implied danger, however, no audience members or SRL crew have ever been seriously

injured at a show, a track record of which Pauline is rightly proud.

GETTING AN EDUCATION AND FINDING FUNDS

Pauline learned his tools of the trade — pyrotechnics and machinery — from friends, books, and a few semesters at the engineering school of hard knocks. “When I was about 10 years old I discovered how to make high explosives, dynamite, picric acid, and all those unhealthy chemicals, and how to handle them,” he says. “Of course it’s dangerous, but I

WHAT’S THE POINT?

Some people believe SRL shows are all about robots fighting and demolishing other robots. And a little of that may occur. But while props may get destroyed and some machines may take a few hits, there’s actually a message in the madness. In the Austrian show, for example, Pauline and his crew mocked war and diplomacy using technology and machines originally developed for the military.

During the show, a very dumb bomb rigged to a winch repeatedly slammed itself into a target painted on the floor, decimating any machine that strayed into the area. Meanwhile, an overhead crane hoisted machines from one fighting zone to another like some bizarre version of UN peace-keeping forces.

Other shows have poked fun at greed and the consumer culture, crime, religion and technology. There are no sacred cows to SRL. At the Austin show titled “The Unexpected Destruction of Elaborately Engineered Artifacts,” for example, the major prop was a half-scale replica of the University of Texas (Austin) tower from which sniper Charles Whitman killed 16 and wounded 30



“You can’t really call what we do engineering, because there’s no real use for these machines,” says SRL founder and artistic director Mark Pauline of the machines he and his crew build. “But they’re very good design from the point of view that they work, they’re practical in their own way.”

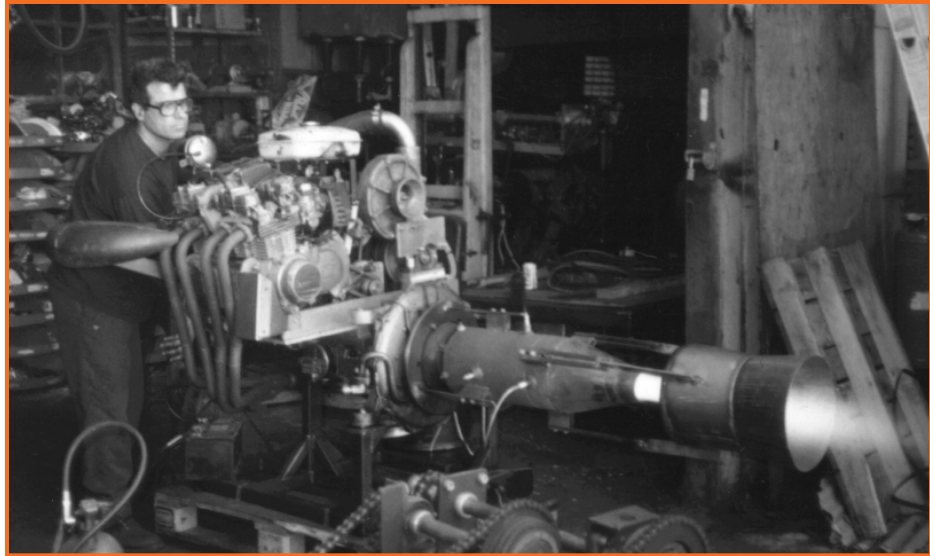
in 1966. A mannequin atop the replica shouldered a rifle.

In general, SRL adheres closely to its mission statement: “SRL is an organization of creative technicians dedicated to redirecting the techniques, tools, and tenets of industry, science, and the military away from their typical manifestations in practicality, product or warfare. Performances consist of a unique set of ritualized interactions between machines, robots, and special-effect devices, employed in developing themes of sociopolitical satire.”

never really knew just how dangerous until I had an accident.”

That accident occurred in 1982 during the construction of some rocket engines. The engines were supposed to power heavy, wheeled props into each other at several hundred miles per hour during an SRL show. “The rockets were going to use the same kind of fuel as the Shuttle, right down to the ammonia percholate and rubberized epoxy binders,” recalls Pauline. “I was using pretty sophisticated burn-rate-adjustment chemicals, each with different specific gravities, to build a 1,000-lb thrust engine, the kind you would find on an anti-tank missile. They were about 2.5 in. in diameter and 12 in. long.” Unfortunately, he mishandled one and it exploded, removing the four fingers of his right hand.

In high school he found himself hanging out with kids from the more affluent section of Sarasota, Fla. Coming from less than well-to-do parents, he had a hard time keep-



Mark Pauline tests a jet engine outside the SRL workshop

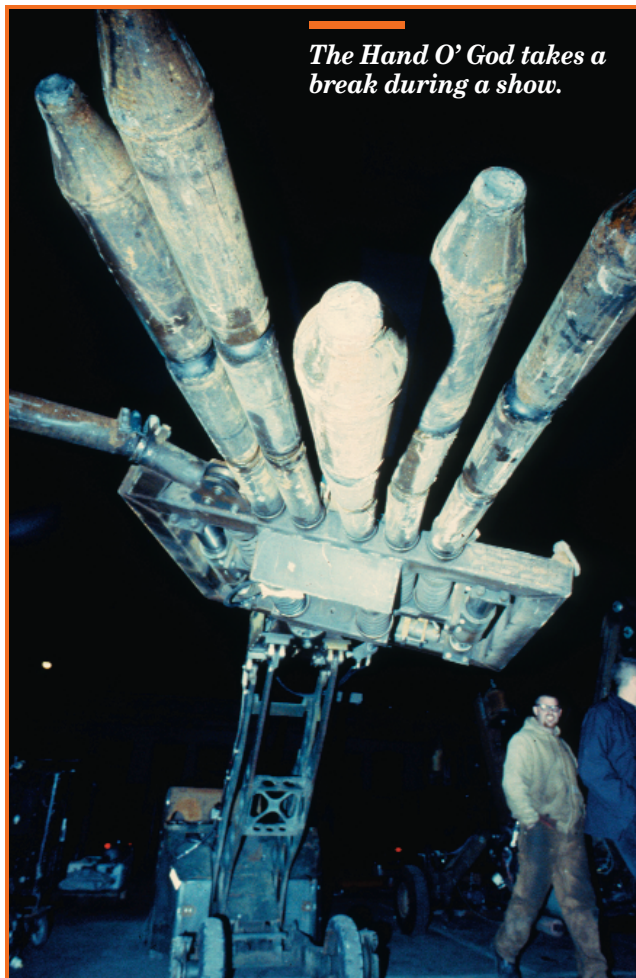
ing up with his friends' fancy cars and motorcycles. “If you were going to run with that crowd, you needed a nice car, the faster the better,” says Pauline. “So as a practical matter, and to elevate my social standing, I bought junked cars and fixed them up. That’s where I first learned how to work on machines and build them.”

Shortly after graduation, Pauline got a job as a civilian contractor for the Air Force on a project to build two robots. He ended up as foreman on the job because he could read complicated blueprints.

With a few years experience working on a variety of military projects, Pauline went to college and earned an art degree. Shortly after graduating, he was faced with a challenge. “I’d been trained for basically two things. I had a degree in visual arts and I had pretty extensive experience in engineering and making machines,” he says. “I wanted something tailored specifically to my interests, needs, and skills. It was very calculated. I sat down for about two weeks and figured out the basic form. I envisioned at the outset that we would do these huge performances that would rival other popular culture events but be extremely different from them.” Thus was SRL born.

To finance his dream, Pauline did fabrication, custom machining, and prototyping for high-tech companies and laboratories in the San Francisco area, including the Stanford Linear Accelerator Center (SLAC). “I could get a steady stream of work through contacts I made at the labs and people who work here at SRL,” says Pauline. “We can make almost anything here at our shop and we work fast.” He also set up a network of connections who could lead him to sources of industrial material and cast off military gear that would find a second life as SRL machines.

However, jumping from job to job began to eat up too much time. So now he funds SRL as a one-man, high-tech salvage operation. “There are several places in this area, each about the size of a city block, that buy stuff from the big, technically advanced companies by the ton, then sell it to licensed dealers and the public,” explains Pauline. “One place gets five to six 40-foot containers each week



The Hand O' God takes a break during a show.