



DASSAULT FALCON JET COCKPIT

OLD DESIGN Control panel is full of analog dials, switches, knobs, and levers. A change in a flight plan takes up to five minutes. In an emergency, the pilot runs through a paper checklist to troubleshoot. Flight-management system is described in a 450-page binder.

◀ **NEW DESIGN** Four flat panels replace the dials and most of the switches and knobs. A mouselike device selects pull-down menus to adjust settings. Flight plan changes take one minute. Pilot runs through an electronic checklist in an emergency. Flight-management system is 30 onscreen pages.

INNOVATION

BUILDING 'EASY' INTO TECHNOLOGY

The user interface comes to the fore in product design

Ted Selker is ready to tear out some of his thinning hair. An associate professor at Massachusetts Institute of Technology's Media Lab, Selker is in a dither about MIT's new e-mail system that takes five times as many clicks to send a message as his old software did.

There's not much that bugs him more than clunky, baffling user interfaces—the screen or control panel that connects a human to a device. As the creator of the breakthrough red pointer that sits in the middle of the IBM notebook keyboard, Selker has built a career out of making computers easier to use. He wishes more equipment makers would do the same. But since no one is measuring the time consumers waste because of awkward design, "we put up with a lot of crap," Selker says.

OUT OF THE MIRE. Companies outside the computer realm are taking heed. For outfits such as Dassault, Whirlpool,

and 3M, it hasn't taken complex statistical analysis to realize that users who must make life-and-death decisions, such as pilots and surgeons, want fewer buttons to run more functions on the equipment they use. The goal for all these manufacturers, of course, is to boost sales. But along the way, they're hoping to strengthen brands, save customers time, and even improve product safety by keeping users from bogging down in a mire of buttons and screen commands. "The design of a user interface can really make or break a product," says Robert J. Beaton, director of the Displays & Controls Laboratory at Virginia Polytechnic Institute.

Simplification is one of the best ways to improve usability. In the cockpit of its new Falcon Jet 7x, Dassault Corp. is taking just such a tack. Its new EASY cockpit scheme replaces a panel of

knobs, switches, and levers with four flat screens arranged in a T pattern. All the information pilots need—from altitude to speed to where the plane sits relative to the horizon—is displayed on those screens, reducing a 450-page paper-based flight-management manual to 30 online pages. "We're trying to move to the paperless cockpit so the pilot doesn't have to carry 100 pounds of navigation books," says Jerry Tritt, Dassault Falcon Jet's chief pilot.

A pilot navigates through the data using a cursor control device mounted on the middle console, where his hand naturally falls. If the pilot wants to change the flight plan, he points, clicks, and follows the choices on the screen—all while looking ahead rather than down at the console. The controller has even been designed to hold steady during turbulence.

The intent behind this innovation is to increase what's called situational awareness—knowing where you are relative to the terrain and other planes. With

the new system, changing a flight plan now takes seconds, down from as much as five minutes the old way. "Instead of flipping multiple switches and trying to remember how it's done, it's in front of him on screen," says John Uzcakaj, a vice-president for business, regional, and general aviation avionics at Honeywell International Inc., whose Digital Engine Operating System is behind the high-tech panels. The new design still

SPECIAL REPORT INDUSTRIAL DESIGN

must pass muster with regulatory bodies before it can take wing. Dassault expects U.S. and European regulators to certify the new cockpit by early 2003 and to have EASY in the air soon after.

Home appliances aren't so high-tech, but they can still leave consumers in a spin with a nonsensical array of dials and buttons. Whirlpool Corp. is trying to help its customers make sense of it all by creating control panels that are consistent across appliances within a price category. Charles Jones, vice-president for consumer design, calls it "leveraged learning." In other words, once you learn how to program your dishwasher, it's a cinch to drive the microwave because the systems are similar.

Whirlpool and its partner, Ziba Design Inc. in Portland, Ore., are trying to think like consumers. Within its appliances, Whirlpool has placed a layered interface resembling that of an automated teller machine, so the user isn't overwhelmed with cooking options when all she wants is some popcorn. The number of functions has jumped to 250, from 75, and they are grouped in three levels to accommodate all users—from children with basic skills to adults who may want to set up their own programs for the perfect tuna casserole. The appliances have a combination of so-called soft keys that control the liquid-crystal display, along with traditional buttons and dials, or hard keys. These are arranged in a hierarchy on the control panel to highlight major functions—the on-off switch is a large button—and downplay others.

Medical-equipment makers also are focusing on simplifying user interfaces—knowing that such changes can save lives. Take 3M Health Care's cardiovascular systems division, which is now owned by Japan's Terumo Corp.

WHIRLPOOL APPLIANCES

OLD DESIGN Different control panels for every appliance. Shape and color of buttons or dials do not relate to function. One microwave offers 75 functions—many of them too complex to use.



▲ NEW DESIGN Control panels now have a common look, feel, and function. Graphical user interface allows layering of functions so all buttons are not on the surface. A microwave user can now access 250 functions in less time, with 30% fewer errors.

3M wanted to double the number of functions of its blood monitors (gizmos used to track blood properties during open-heart surgery) while reducing the number of button pushes necessary to access them. The operator, faced with a range of displays that included pressure gauges, timers, and alarms—along with a spaghetti-like array of tubing carrying blood from the heart-lung machine—doesn't have the time to

fiddle with a fancy user interface.

Lacking its own internal design experts, 3M hired IDEO, a San Mateo (Calif.) design-and-engineering outfit, to help. The result was a modal approach, again like an ATM. The operator can choose among setup, calibration, or operation modes—and each level restricts the number of available functions, reducing errors and saving the user from having to memorize all the idiosyncrasies of the machine.

FASTER RECOVERY. And the results? A recalibration during an operation takes one touch of a button, getting rid of awkward paper printouts and reducing possible errors. And with more accurate readings of levels of potassium—a chemical used to stop the heart during the operation—users are more certain of when to start lowering the potassium to restart the heart. The advance takes 5 to 10 minutes off a 50-minute bypass procedure. Together, the improvements in form and function mean that "the new design helps the patient get off [the heart-lung machine] and recover quicker," says Gary Paul, who was the system's program manager for 3M.

The importance of the user interface is even becoming apparent with products that never had one. Companies such as Coleman Co. and First Alert Inc. have now made their smoke alarms interactive. The plastic boxes that used to hang, inert, from the ceiling can now be shushed without having to climb on a chair. The Coleman model has a button that chefs can push with a broomstick if cooking smoke sets it off. With First Alert's product, the touch of any button on a TV or other household remote control device will activate an infrared sensor to silence the alarm.

Now if only the VCR and DVD makers would be as sympathetic. Even after 20 years on the market, VCRs remain too complicated for many ordinary folks to program. So most people use them only to record shows in progress or play movies. The DVD is almost as troublesome to set up. That's probably because design engineers focus on adding the next cool function rather than simplifying its use. "They're paying more attention to the inner works than the outside," says Virginia Tech's Beaton. When they finally do think about how these gadgets work, maybe we'll be able to relax in front of the TV without worrying about which button to push—or not.

By Faith Keenan in Boston, with Adam Aston in New York

TERUMO BLOOD MONITOR

OLD DESIGN

Systems often produce bad data, requiring a complex recalibration process. The monochrome display is tough to read at an angle. Users must pore through reference manuals to memorize the buttons to use.



▲ NEW DESIGN

Recalibration takes one push of a button. Fewer buttons are required to monitor 12 blood values vs. the old design's six. The readings are color-coded—red for blood coming from arteries, blue for veins. Training time is reduced.