



## Aviation Human Factors Industry News

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### [Air Force announces 2006 as safest year in aviation](#)

11/28/2006 - WASHINGTON (AFPN) -- Fiscal year 2006 was the safest year in aviation ever for the Air Force.

The year marked the lowest number of major aircraft accidents and fatalities within the Department of Defense, said the Chief of Air Force Safety Maj. Gen. Stan Gorenc recently.

According to the statistics, the Air Force recorded 19 major aviation mishaps, eight destroyed aircraft and one aviation fatality.

"It's quite an historical accomplishment," General Gorenc said. "In 1947, the Air Force recorded over 1,500 major accidents and over 500 aircraft destroyed at a cost of over 500 service member lives. Obviously, there's been a continuous culture change in which safety has come into the forefront with everything that we do."

He credited great leadership and dedicated Airmen for such a successful year, emphasizing that education has been key to preventing mishaps.

"In safety, there's been a strong leadership approach," he said. "We're continually educating people on where they fit in the bigger picture, and we've been motivating them to be safe and to take care of each other. But at the end of it all, it comes down to personal responsibility. Airmen are going out there each day to be productive and as safe as possible."



General Gorenc said that while it's great to reflect on such a great year, it's important that **Airmen do not let their guard down.**

"The Air Force is a very vibrant organization," he said, "There's a continuous rotation of people coming and going, deploying or moving on. **We have to stay engaged [in a safety mindset] by continually educating, motivating and activating our Airmen to incorporate safety into their everyday activities and routines.**"

## **Paint Chips Cause Troubles For AA's MD-80s**

**Clogged Fuel Filters Lead To Cancelled Flights** American Airlines was forced to ground 22 of its mainstay MD-80-series airliners earlier this month, **after paint chips from recently installed replacement fuel tank covers made their way into the planes' fuel filters.**



The Fort Worth Star-Telegram reports American discovered the problem November 6, after warning lights on two MD-83s alerted pilots to the problem while in flight. Those planes completed their flights without incident, and the planes were then flown to American's maintenance center in Tulsa, OK.

Workers at the maintenance base quickly found the source of the problem: **paint was flaking off fuel tank access covers recently installed on those planes. American began to fabricate its own covers this year, after the original equipment covers wore out... and stock replacements are no longer available.**

Each MD-80 has 30 such covers, American spokesman John Hotard said. Maintenance crews inspected all 32 airliners that received the replacement covers since spring, **and found paint chips flaking off the backs of the covers on 22 planes.**

Crews thoroughly cleaned those covers, and reinstalled them before putting the planes back into service. The groundings led to some cancelled flights, although Hotard did not give exact numbers.

**American has since changed the process for painting the access panels, so paint won't flake off of them.**

McDonnell-Douglas MD-80s (a catch-all term for MD-82- and MD-83-type aircraft) by far comprise the largest portion of American's fleet. More than 300 of the airliners are in service with the Fort Worth-based airline.

## [NTSB calls for new standards for jet engines after '04 crash](#)

The engines on a popular regional jet have a safety flaw that could prevent them from being restarted if they fail during high-altitude flight — and other engine models could have the same problem, federal aviation accident investigators said Monday.



The National Transportation Safety Board (NTSB) is recommending that federal regulators require new standards and tests for the engines on the Bombardier CRJ-model jets to ensure that the failure that contributed to a fatal 2004 crash does not occur again.

Two pilots on an otherwise empty Pinnacle Airlines flight died on Oct. 14, 2004, when both engines on their CRJ-200 stopped and would not restart despite repeated attempts.

The interior of the GE Aviation CF34 engines locked up, preventing them from spinning fast enough to restart, the NTSB said. The jet crashed near homes about 2½ miles from an airport in Jefferson City, Mo.

The NTSB has not ruled what caused the crash. [Evidence released in the case shows that the pilots repeatedly violated airline rules and lost control at 41,000 feet.](#) However, they regained control of the jet and should have been able to restart the engines.

The recommendation affects about 1,300 of the CRJ-100, CRJ-200 and CRJ-440 jets, 50-seat models used by many regional carriers. About 550 similar Bombardier Challenger business jets are powered by the same engines.

The NTSB is seeking a review of other types of jet engines to make sure they can't seize up in the same way.

A spokesman for GE Aviation said the company would cooperate with the Federal Aviation Administration, which regulates the aviation industry. The company maintains there is no problem with the CF34 engines.

“Those engines are completely safe when operated appropriately,” GE Aviation spokesman Rick Kennedy said.

[The NTSB also recommended that pilots be given better information about the steps they need to take to restart engines.](#)

## [FAA misses accident target](#)



The US Federal Aviation Administration says **it has missed its own accident fatality reduction target over the past three years.**

Highlighted by FAA auditor KPMG as part of a wider procedural review, the aviation regulator says it failed to meet the key safety target largely because of the December 2005 crash of Southwest Airlines flight 1248 at Midway airport, Chicago and the August accident of Comair flight 5191 at Blue Grass airport in Lexington, Kentucky.

"We've known for a while we weren't going to make the target for reducing the fatal accident rate in commercial aviation," says FAA administrator Marion Blakey. "With the Midway and Lexington accidents factored in, **the fatal accident rate per 100,000 departures over the last three years is 0.020. The goal was 0.018. That's one in every 5 million take-offs.**

"The accident rate is so low, it's becoming more challenging to improve on it. So we have a new initiative in the flight plan to identify new ways to measure our progress in commercial aviation safety."

Failing to remedy all the KPMG's concerns is one of two milestones the FAA has missed in its "organizational excellence" goal under its Flight Plan roadmap for 2007-2010.

## [Aviation seminar opens \(Hong Kong\)](#)

More than 120 delegates from over 40 organizations are attending the two-day **Aviation Language Proficiency Seminar** the Civil Aviation Department is hosting in Hong Kong.

The delegates include civil aviation administrations, the International Civil Aviation Organization, the



International Federation of Air Traffic Controllers' Associations, the International Federation of Air Line Pilots' Associations, airlines, air traffic service providers and linguistic consultants.

Opening the seminar today, Director-General of Civil Aviation Norman Lo said the language requirements set by the International Civil Aviation Organization for **radiotelephony communication serve as one of the most important aviation safety initiatives to be implemented.**

As an initiative to further enhance aviation safety, the organization has formulated **the language proficiency requirements for compliance by aviation personnel,** including pilots and air traffic controllers.

Mr Lo said the air traffic service provider and airline operators in Hong Kong are phasing in the new requirements and would like to share their experience with other organizations.

### **Next-Generation Mechanic**

Introduction of the A380, 787 and A350 XWB will create a demand for a different sort of mechanic.

The image of the traditional airline mechanic is firmly established: Toolbox in hand, he dutifully checks a plane's systems and components, relying on an intimate knowledge of various parts and how they interact to conduct the maintenance necessary to keep the aircraft in protected working order.

He is someone who doesn't mind getting his hands dirty and is **highly skilled at using conventional tools.**

But with high-tech, next-generation planes such as the 787, A380 and A350 XWB set to enter service in coming years, it may be time to reevaluate this image.



**The aircraft mechanic of the (not-too-distant) future likely will trade his toolbox for a laptop computer.** Rather than trudging around to various spots on a 787 or A380, he will plug the computer into one spot and download a comprehensive maintenance picture. Rather than relying on drills and screwdrivers, he will be required to evaluate data and determine what it means. His fingers are as likely to



be typing furiously on a keyboard as they are to be moving among the oily nuts and bolts of an engine component.

Consequently, aircraft manufacturers and maintenance training providers are warning that the current methods of training technicians relying heavily on traditional classroom instruction and on-the-job, task-oriented supervision soon may be outdated.

"Modern planes are rapidly becoming flying computer networks," Alton Director-Maintenance Training Steve Pennington says. "Most of the [maintenance training] regulations we see globally don't reflect the huge advances in technology that we're seeing in new aircraft." Adds SR Technics Head of Technical Training Markus Buergin: "I see more and more [aircraft] engineers that are working with computers instead of toolboxes."

Also changing the nature of maintenance training is the increasing number of airlines that are outsourcing training to independent providers.

"Airlines are more or less business entities and their main purpose is to move people from A to B. They're focusing less on training," explains Snecma Services Senior VP-Customer Operations Pierre-Emmanuel Gires. "The cost [of training maintenance workers] is lower if you use a subcontractor. Increasingly, even smaller and medium-sized airlines are subcontracting out [maintenance] training."

While saving money for carriers and perhaps enhancing training by turning it over to specialists, outsourcing gives maintenance trainers less access to actual aircraft in operation, **throwing a wrench into conventional conceptions of on-the-job training.**

"Independent training schools have limited access to aircraft," Buergin tells ATW by telephone from Shanghai, where he hopes to launch an SR Technics maintenance training center in 2007. "An independent training school has hardly any possibility to bring the students to an [in-operation] aircraft. Airlines want to have the aircraft in the air, not on the ground. And they're very sensitive because of airline and airport security to allow access to the aircraft. If you do not belong to the airline or do not have a close cooperation, you cannot provide the practical training [in the customary manner]."

### **'Virtual' Learning**

The combination of advancing technology and reduced access to aircraft means maintenance training is **becoming more computer-oriented and interactive**, with trainees learning via "virtual" programs that allow them to explore a plane's inner workings electronically. "You'll see more classroom training hours but not the classical classroom training," Buergin says. "There will be much more interactive classroom training. The industry will use interactive software, two or three-



Dimensional computer images, to give students the images of what the aircraft looks like. New software allows students to go into the aircraft on screen.

Practical training or parts location will be 'virtually' provided to the extent legally possible. Actual practical training can be reduced. This is quite an achievement."

Maintenance training programs being set up for the A380 will rely on innovative technology. "It's a computer-based training in a special [high-tech] room," explains Axel Pfeiffer, Lufthansa Technik's project manager for recruiting and developing an A380 maintenance team. **Trainees will use "a laptop and two monitors and the program will utilize 3D animation to display a simulated airplane. You can open doors [on screen], explore the aircraft, see all the different parts."**

Serge Deleurme, who manages an engine maintenance training center for Snecma, says classroom training, which 10 years ago was a rigorous textbook-oriented exercise that emphasized memorization, increasingly is focused on **"need-to-know only"** since modern technology makes so much data readily available to mechanics. "We use computers more and more" as part of the classroom training, he explains, insisting that computers allow trainees to learn better and faster and to concentrate on gaining practical knowledge and experience rather than memorizing information that is now easy to access via databases. "The main job for us is to reduce the duration of the need-to-know component," he says. "We have put in place programs to reduce [training] time."

**Airbus and Boeing say mechanics using laptops will be able to hyperlink instantly to maintenance manuals that give in-depth descriptions of a modern airplane's systems. Theoretically, this means the large amount of memorization that is now a major element of maintenance training can be reduced greatly.** "The change in the A380 is you will be able to connect a notebook [computer to the aircraft] and get access to the maintenance manual," Pfeiffer says. "All the functions in the maintenance manual are linked to structural repair manuals and any information on the aircraft you need. It's all in one package."

### **Step Change**

**The timeframe needed to train mechanics is likely to become shorter.** "It's not about more training but changing the focus of the training," Pennington says. "The 787 is such a step change [in technology] that the training requirements are substantially different . . . There's this notion that longer training equals better training. We don't believe that."

Alteon's current maintenance training program consists of a 4- to 7-week "theoretical" classroom program, 10 days of "hands-in-pockets" walkaround training in which trainees observe mechanics in action, and OJT in which trainees complete a series of tasks while experienced maintenance technicians "look over their shoulder" and make sure a checklist of skills are demonstrated.



But Pennington says the program, while it has worked well for older-model Boeing aircraft, is inadequate and wrongly focused to train 787 mechanics. "We're looking to integrate the phases," he says. "We need to develop a much more integrated system. We're moving away from checking boxes and instead are focusing on developing overall competence."

**For starters, Alteon is bringing the laptop that mechanics will use to perform maintenance on 787s into the training classroom.** The trainees will "use the actual tool the laptop that will be used out on the line when they are performing maintenance," Pennington says. "Theoretical knowledge is required a lot less than the practical skills of accessing knowledge and information through the laptop. We need to develop technicians that can evaluate diagnostic systems."

The Boeing training subsidiary also will need to develop new training instructors. With computers moving into the classroom, a traditional "talk-and-chalk" lecturer no longer will be as relevant. "You will see a huge move from the instructor as lecturer to a coach who is more highly skilled in software," Pennington explains. He believes classroom simulation can replace on-aircraft training for maintenance personnel much as full flight simulators are used to train pilots.

**"Training is definitely changing with the new technology,"** Buergin adds. "We'll have to train instructors again. With 787s and A380s, manufacturers have built in new technology that's new to the industry . . . and this will have to be taught to the instructors."

### **Challenging Future**

But the number of mechanics required will not need to increase in correlation with aircraft fleets, Pennington asserts. The same technological developments that will alter maintenance training methods will lessen the need for maintenance workers. **"Aircraft maintenance requirements are decreasing with technology,"** he says. "Aircraft are more reliable now than they've ever been and will continue to get increasingly reliable." Buergin adds that 787s and A380s will be "communicating with the ground all the time. The ground staff will know before landing what needs to be done" in terms of maintenance work, giving mechanics a "head start."

**Does the changing nature of maintenance training and the growing reliance on computers mean a different type of aircraft technician will emerge in the future? "Although the role is changing, you still need the same commitment to safety,"** Pennington says. "You still need the **professional integrity** to be able to say an aircraft isn't ready to fly despite the enormous pressure to keep it operating on schedule."

Adds Pfeiffer: "We need the mechanics to have more understanding of computers . . . **We're looking for people that are interested in computers and interested in new systems.** [Recruiting A380 mechanics provides] a chance to take people who want to change something in their life, change their thinking."

Buergin expects more specialization among aircraft maintenance workers. "In discussions with airlines, we talk about the [future] need for two types of people: Mechanical engineers and computer specialists. To cover the complete aircraft,

including the advanced cabin and onboard entertainment systems, you will see more and more the need for specialists."

And with the new technology come higher operating expectations. Buergin says aircraft manufacturers are selling airlines next-generation planes which likely will not spend much time out of service for nonroutine MRO work. **Because of the technology, with the "right maintenance program these aircraft will never see a hangar longer than a few hours for five or six years,"** he says. "That's quite challenging from a maintenance perspective."

### Crossed Fuel Lines

When an aircraft is damaged and subsequently rebuilt, care must be taken not only to ensure that the manufacturer's instructions are followed but that everything works as it should. Sometimes, in our haste to get an airplane back in the air, **we cut corners. We don't use alternate methods to verify that all the big parts are attached and working as they should.** Even though an initial test flight indicates the engine runs and the airplane flies, it doesn't mean everything is working as it should. A brand-new Private pilot flying a just-repaired Cherokee 180 learned this lesson the hard way.



On August 3, 2002, at about 1539 Eastern time, a Piper PA-28-180, crashed into trees and terrain just off the approach end of Runway 7 at the Cheraw Municipal/Lynch Bellinger Field Airport in Cheraw, S.C. It was a typical summer afternoon in South Carolina, with clear skies, warm temperatures and good visibility; just the kind of afternoon on which a new Private pilot would want to head out to the airport and fly his new-to-him Cherokee around the patch.

On the day of the accident, the pilot/owner was observed performing a preflight inspection and then taxiing to Runway 7. The Cherokee then took off and remained in the traffic pattern. One witness noted the airplane appeared to be at traffic-pattern altitude on the downwind leg. Another witness reported observing the airplane on the downwind leg and **losing power** at about 3/4 of the length down the runway toward the threshold.

That same witness added that the accident aircraft's engine sounded as if it "... wanted to start once more but then did not refire." A third witness reported hearing the engine and stated, "It was [sputtering] then it cut back on; then it went back off." Several witnesses reported that, from the point the engine lost power, the flight path was similar to an airplane flying a normal traffic pattern.

Subsequently, the airplane was observed flying low on its final approach. It then disappeared behind trees. The pilot/owner died in the crash; the only passenger aboard survived with serious injuries.

### **Investigation**

The airplane came to rest upright on a heading of 246 degrees, approximately 46 feet from the initial ground scar location. A straight-line heading of 070 degrees was noted from a tree impact point to the main wreckage. All components necessary to sustain flight were attached or partially attached to the airplane.



Piper Cherokee

The left wing fuel tank was intact; it contained approximately 13 gallons of 100LL. The right wing fuel tank held approximately 20 ounces of 100LL. The tank was not compromised and there was no evidence of fuel stains aft of the fuel filler cap or of the sump drain. No obstructions of the fuel delivery or fuel vent system were noted. The fuel selector was found positioned near the right fuel tank detent; impact damage was noted. No fuel was noted at the lines at the fuel selector valve; the electric fuel pump switch was found in the off position. Only residual fuel remained in the fuel hoses located in the engine compartment area; **the fuel hoses had not failed**. Approximately one ounce of fuel was drained from the carburetor bowl. The engine was removed from the airplane and a serviceable propeller was installed. The engine was started and operated to approximately 2250 rpm using only the engine-driven fuel pump; investigators found no discrepancies during the engine run.

### **Provenance**

This was not the first time this aircraft had been damaged. According to the NTSB, the airplane was involved in a bounced-landing event on November 23, 2000, which resulted in minor damage that did not require filing an accident or incident report with the safety board. Nevertheless, the insurance company considered the airplane a constructive total loss and sold it to an aircraft salvage company on March 15, 2001. Subsequently, the airplane was disassembled and sold to a subsidiary of the salvage company before being transported to South Carolina and purchased by the accident pilot.



**Piper Fuel Selector**

According to the mechanic who reassembled and repaired the airplane -- and performed the last annual inspection -- the aluminum fuel lines aft of the fuel selector valve were bent and damaged to the point that he could not determine routing of the lines to the fuel tanks. After the damaged lines were repaired and the wings were installed, he connected the fuel line from the right fuel tank to the forward port of the fuel selector valve and the line from the left fuel tank to the aft port of the fuel selector valve.

Following repairs to the airplane, the mechanic added 10 gallons of fuel to each tank to run the engine and check for leaks; the fuel tanks were filled before completing the annual inspection. Following the annual inspection, he test flew the airplane to check the flight-control rigging and to look for any other problems; no discrepancies were reported.

The NTSB determined that the fuel line from the forward side of the fuel selector valve should be connected to the left fuel tank and that the line from the aft side of the fuel selector valve should be connected to the right fuel tank. In other words, the connections to the fuel selector were reversed when the airplane was reassembled.

### **PIA's safety issues continue to worry**

**KARACHI:** Amidst media reports that the top management of Pakistan International Airlines is being





summoned to Islamabad to explain its plan of action to combat rising losses, there are information that warnings have been issued over [safety standards](#).

European Aviation Safety Agency (EASA) has placed PIA under scrutiny after a series of inspections carried out on aircraft operating into UK, Germany, Norway, France, Denmark, Italy and other EU countries, aviation officials told The News on Monday.

[The national flag carrier was issued written warnings to improve maintenance of its aircraft fleet. However, there are fears its engineering department has so far made no effort for proper rectification of emerging defects on Boeing 747, Boeing 777 and Airbus 310 aircraft operating into Europe.](#)

Sources close to EASA, quote the example of PIA's Boeing 747s, which operated into European cities before being barred on safety concerns.

However, when contacted, PIA officials denied that the airline had been blacklisted by the European Union. "However, PIA aircraft like other airlines are inspected at European destinations," said spokesman Imran Ghaznavi.

The PIA official, however, conceded that the European Commission has communicated "certain observations" pertaining to minor defects and general appearance of PIA aircraft. [But some aviation officials say that the defects were not minor.](#) On August 24, an EASA official, Christine Smith, gave a written warning to PIA, regarding [fuel spillages](#) from the aircraft due to its defective re-fuelling system. The report quoted a fuel spillage of 80 litres on July 31, 2004.

Earlier on January 20, Graeme Chehyne, General Manager Total, the company that provides fuel to PIA at Heathrow, had cautioned the airline that out of 520 PIA flights re-fuelled during 2003, [there were over 12 flights where fuel spillages through vents were reported.](#)

[This is almost 1:43 venting against the average of 1:2425 experienced for refuel operations of all other airlines.](#) Total had sought assurances from PIA to ensure within eight days that "no future venting occurs during our refuel operations" at Heathrow, sources said.

The oil firm had specifically mentioned the registration of two PIA Boeing 747s with a history of such defects including fuel spillages during refuel, above the essential minimum safety requirements set by EASA.

Investigations by The News reveal that when PIA initially got five Boeing 747-367 aircraft from Cathay Pacific, there existed no such problems. [But two of the aircraft had the digital Smith Fuel Quantity Indication System, which had a history of erroneous indications, and as such are not recommended in the industry.](#)

PIA officials say, however, that PIA has reacted promptly to observations made by the EU. The airline says that it has submitted an action plan and briefed EU officials about the competence and commitment of PIA to address these issues. A team of PIA and CAA delegates also visited Brussels where they submitted this action plan, the airline says.

### **False Fuel Indications Leads to Ditching**

**Beech E55 Baron, Destroyed. Two fatalities, two serious injuries, one minor injury.**

The owner of the airplane told investigator that the fuel quantity indicators mounted in the instrument panel did not work properly. Before departing from Redmond, Oregon for a flight to Friday Harbor, Washington, on July 1 2005 the pilot used the fuel tank sight gauges to check fuel quantity. The left gauge showed 45 gal. (170 liters) and the right gauge showed 55 gal. (208 liters), which the pilot believed was sufficient for the 1 hour, 50 min. flight.



**The airplane was descending to land when power was lost from both engines. The pilot ditched the airplane in the ocean about 8 mi (13km) from the destination. Two passengers were killed; the pilot and one passenger were seriously injured. The surviving passengers said that the airplane hit the water hard in a lightly nose-down attitude and immediately began to sink.**

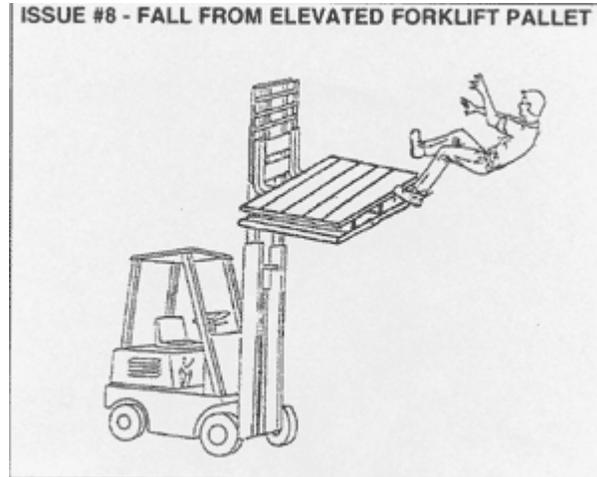
**Then NTSB report said that maintenance had been performed on the airplane four months before the accident to replace leaking fuel cells and that the fuel sight gauges were installed incorrectly, resulting in float travel being restricted by wing structure. "If the sight gauges had been properly installed, they would have read in the cross-hatched (unusable) area" the report said.**

**NTSB said that the probable cause of the accident was 'the pilot's failure to refuel the airplane, which resulted in a dual loss of engine power during normal descent due to fuel exhaustion' and that a contributing factor was "the incorrect installation of the left and right wing fuel sight gauge/float assemblies by unknown persons."**

## [FORKLIFT FALL LEAVES KIDS WITHOUT FATHER](#)

In life, Jeffrey Mills made a difference. In death, he also made a difference, but with a huge impact.

The 37-year-old husband and father, who died after **falling from a forklift** in Michigan, donated his heart and other organs to a children's hospital. Mills suffered serious injuries from the fall while working at Classic Chevrolet. **He was reportedly working on the forklift when he fell about 15 feet (4.5 meters) to the warehouse floor. Police say Mills was not wearing a safety strap or belt at the time.**



An OSHA investigator for the state will determine how the fall occurred and what factors contributed to the fatality.

It was reported that Mills, who lived in Howard City, was a loving father to his seven children. His wife, Kris, hoped for a miracle as she stood by his side in the hospital. But that miracle never came.

## [Managing Your Arthritis](#)

There are more than 100 different types of arthritis, but all have one thing in common: The pain can interfere with your ability to do the things that you enjoy.

### **FAST FACTS**

Five ways to treat arthritis — naturally!

Exercise

•

Diet

•

Heat and cold therapy

•

Acupuncture

•

Glucosamine and chondroitin





Arthritis is the leading cause of disability in Americans older than 15.

The number of people with arthritis is staggering. In 2005, 66 million adults in the United States — nearly 1 in 3 — had either been diagnosed with arthritis or were living with undiagnosed chronic joint pain and other symptoms. Although the risk of some types of arthritis, such as osteoarthritis, increases with age, **more than half of those affected by all types of arthritis are younger than 65.**

**It doesn't have to be that way.** If you have arthritis, there are steps you can take, starting today, to protect your joints, reduce pain, and improve mobility. But living with arthritis often requires a multi-faceted approach, which can involve drug treatment, physical therapy, **exercise** and even complementary therapies.

Better drugs with fewer side effects are also available for treating the pain of arthritis. There is a large arsenal of medications available to treat the various kinds of arthritis. New drugs have brought significant relief to rheumatoid arthritis patients, although not without some potentially dangerous side effects. Other promising new drugs are emerging. For example, the U.S. Food and Drug Administration recently approved an interleukin-1 inhibitor for use in treating rheumatoid arthritis. Better drugs with fewer side effects are also available for treating the pain of osteoarthritis.

Despite the variety of medications available for arthritis, physical therapy remains a cornerstone of traditional treatment. Physical therapists focus on restoring or maintaining physical function by designing an individualized treatment program for you. The physical therapist first will thoroughly evaluate your pain, functional ability, strength, and endurance levels, then will provide advice about ways to ease pressure on your joints while building muscles to support them. Physical therapy can take place at a hospital or outpatient clinic, in the therapist's office, or in your home. Some activities can be done alone; others require the therapist's assistance.

One in four people with arthritis use some type of complementary therapy. You are likely to have much less guidance when it comes to deciding whether to use complementary therapies, and which ones. Such therapies literally run the gamut from A to Z — from acupuncture to zinc supplements. And they're popular: One widely cited 1997 paper estimated that one in four people with arthritis used some type of complementary therapy. Although hundreds of such therapies exist, only a few have actually proved to be effective when evaluated in rigorous studies. To become a wise consumer of complementary therapies, become a skeptical one. Don't buy into any treatment that promises a cure. If you are contemplating any physical or complementary treatment, you should first discuss it with your doctor to make sure it will support, rather than hinder, your arthritis management plan.

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