

Mr. Lycoming

▼ *Paul McBride is the engine manufacturer's ambassador*

By **ROBYN SCLAIR**

General Aviation News

For three generations, there has been a McBride at Lycoming. The latest generation is Paul McBride, known at the engine manufacturing's factory as "Mr. Lycoming."

Recognized worldwide as one of Lycoming's key technical experts, Mr. McBride has been with Lycoming 38 years. He's "run the gauntlet," currently responsible for product and technical support. He also conducts technical symposiums and FAA IA renewal seminars, as well as providing technical support at trade shows throughout the world.

General Aviation News recently had a chance to sit down and chat with Mr. McBride about the Williamsport, Pa.-based company, its products, its problems – including the recent ADs – and the future. Here is the first part of that conversation. The second half will run in our Oct. 25 issue.

GAN: Lycoming started out as a sewing machine manufacturer?

Mr. McBride: The company was founded in 1845 by a lady, Mademoiselle Demerest. She was in the business of manufacturing sewing machines. In 1889 she moved the factory to where we are today, so we've been at that same address for a long time. That certainly has to say something for the company, with its deep roots.

GAN: That's for sure.

Mr. McBride: We're told that at peak production, they were producing about 60 sewing machines a day. They had offices in New York and Paris. It was apparently



we have been beaten over the head to take weight out. And we know with liquid cooling we're going to add weight. There's also the consideration that somewhere on the front portion of the aircraft you have to put coolant radiators. There's a potential for increase in drag, and from a mechanical standpoint, the potential for leaks. There's a lot of trade-offs.

GAN: I've heard so many people say that airplanes ought to be simpler. One of the things that so impressed me when I flew that Lancair was you put a key in and you turn it and it started just like a car.

Mr. McBride: We are certainly moving in that direction. One of the things we're working on and hope to have in certification is the EPIC system, in partnership with Unison. The EPIC system, which stands for Electronic Powerplant Integrated Control, is an electronic ignition system that also controls the fuel injector air mixture control. It's all done by a black box. Mike Kelly from Airplanes Inc. in Manhattan, Kansas, has had, for the last two years at Oshkosh, a C172 with this EPIC system installed on it. He's been doing all the prototype testing. What we're doing and will achieve shortly is a single lever operation device.

GAN: That would be nice.

Mr. McBride: We had the capability of doing that around the mid-1980s. We had a similar system, not nearly as sophisticated or compact, but we had one installed on a Piper Seminole. It was not well received by the airframe manufacturers. It was a bit premature.

But we never lost sight of the fact taking electronic ignition to a place where it has full redundancy. You know, FADEC (full authority digital electronic control) is real pie in the sky. Not that it can't be done or won't be, but with the EPIC system, should it fail it's fully redundant. It senses manifold pressure and rpm and cylinder temperature, and it's always doing self-diagnostics. If it loses any one of those three signals, it auto-reverts to fixed-point magneto timing.

Keep in mind that as we advance by GA standards in this technology, unlike the automobile people who do it quite easily, we also have an educational curve with the federal agencies because they don't have anybody who is way ahead electronically.

There are all kinds of hurdles you've got to clear to make sure it is going to be a safe product and have the integrity that we all need.

GAN: And of course it adds some cost too.

Mr. McBride: It will yes, initially, and it's no different than anything else we do in

"If we had half the volume of the automobile industry, we'd see a lot more reasonably priced items."

— Paul McBride



GAN: Do engines really have to cost as much as they do?

Mr. McBride: There again it's strictly a volume deal. Several years ago in the late 1960s, early 1970s, Lycoming offered what we called a cylinder piston and ring assembly kit. In that kit was basically everything you need to put a cylinder on an engine and fly away. Some of

the GA segment of our business. Our quantities are so small it is extremely difficult to get vendors to come on board because of the liability exposure — and they would rather produce mass quantities. So our volume is probably our biggest stumbling block. If we had half the volume of the automobile industry, we'd see a lot more reasonably priced items.

those were selling for as much as \$2,000 or more. I don't know how many years ago, we decided to change the cylinder kit. We knew there were a lot of engines coming back where the cylinders were absolutely junk. Some of the cylinders have been weld-repaired and we don't approve weld repair on cylinders or any stress area, so someone — I don't even remember who — said I wonder if we in-

creased our volume from the suppliers, if we couldn't offer a more attractive price and maybe get rid of a lot of these cylinders that have outlived themselves. Some of those cylinders had in excess of 12,000 to 15,000 hours on them. We thought if we can offer a more attractive price, maybe we can purge the field of a lot of this junk.

We took some of the parts out – we didn't offer the rocker arms, the rocker arm shafts, or the rocker box cover – but all of the other components required to replace a cylinder were put into this cylinder kit, which has become a very popular thing. Right now the average cylinder kit is priced around \$1,300. Some of them are up around \$1,500 to \$1,700 when you get to the turbocharged stuff.

It really surpassed our expectations because some of the engine overhaul shops in the field were discovering they'd get in an engine and they'd tear it down and they'd have to clean these cylinders,

PART II

Don't miss part two of our interview with Lycoming's Paul McBride. It will be published in our Oct. 25 issue.

which is a time consuming thing, and disassemble them and they'd get all done and they'd find the cylinder was cracked and they'd have to go out and buy a new cylinder anyway. So now they just go out and buy a new cylinder that has all the components and stick it on the engine. We've pumped up a lot of volume that way and did in fact reduce the price. We're always looking to do things so we can play the volume advantage thing.

GAN: Tell me about your family and Lycoming.

Mr. McBride: My grandfather first

started in 1916 or 1917. He was there a little over 44 years. My dad started in 1935 and worked here 47½ years. My wife was here eight years. My dad retired as the supervisor of engineering records and my wife worked for him. Then she ended up in the finance department. When we met, right when I got out of the Navy, she was working for my dad.

GAN: You've obviously seen the long-term picture better than most people at Lycoming. What do you feel Lycoming does best and what could it do better?

Mr. McBride: I would say one of the things we've probably done best is TBO (time between overhauls). That's very important to anyone who owns or is considering buying an aircraft. When I first went to work at Lycoming, the max TBO time was 1,200 hours. Now all of our engines are 2,000 hours and some of them are 2,400 — and that is a recommended TBO time. We know there are people who are going well beyond

those. One of the keys is the more frequently the thing is operated, the better off it is.

As far as the future to make things better, in addition to working on new, innovative programs, like the EPIC system, we are probably going to focus more on sustaining engineering. Sustaining engineering is where you take products you have that may have little glitches and get the glitches taken care of. Actually, it's what the Japanese have done with American products that have been developed. You take that basic product and make it better.

GAN

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Mr. Lycoming: Part II

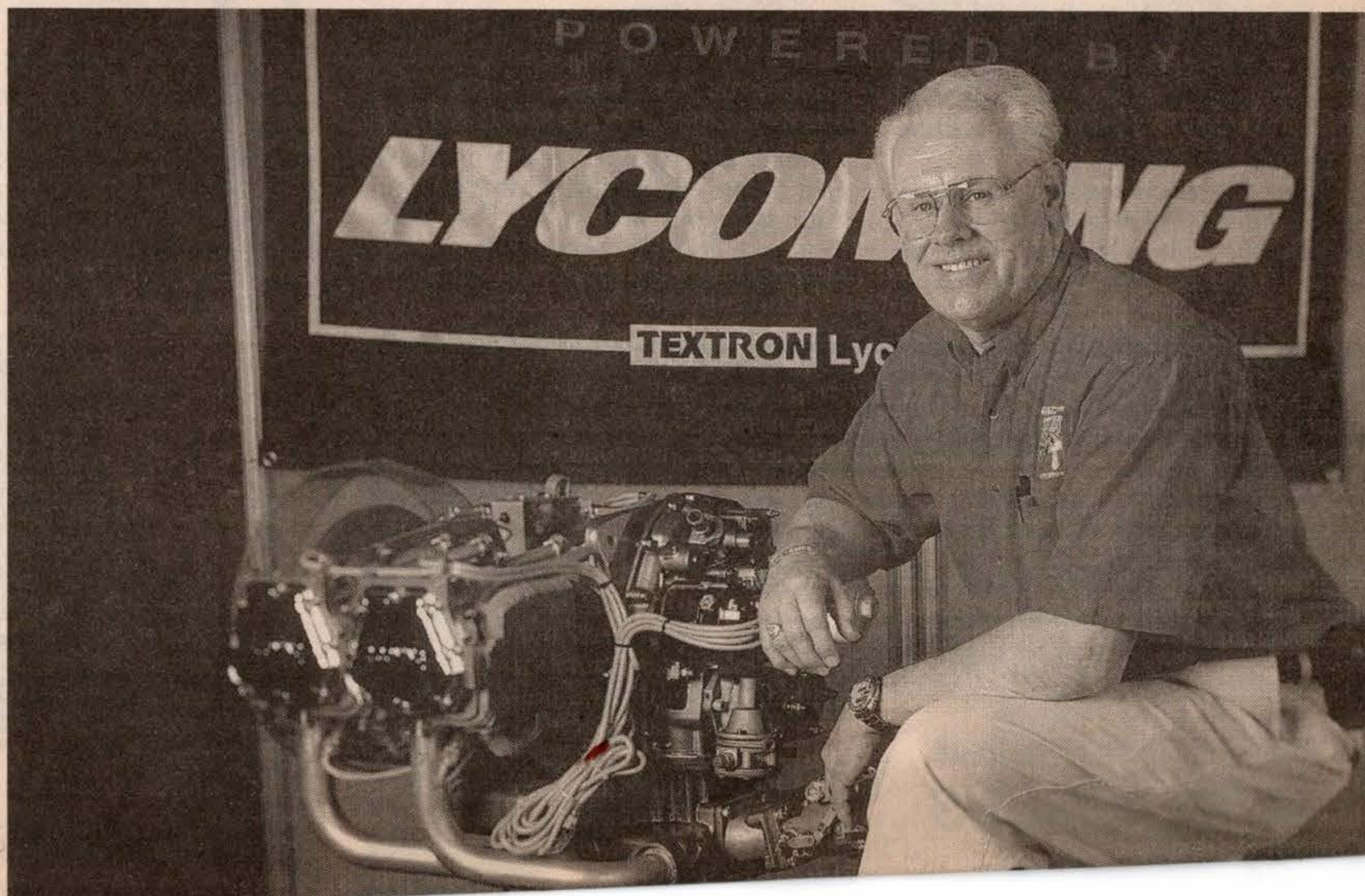
By **ROBYN SCLAIR**
General Aviation News

In the last issue of GAN, we brought you the first part of our interview with the affable Paul McBride, unofficially known far and wide as Lycoming's foremost – and undoubtedly favorite – ambassador to general aviation.

We wrap up the conversation in the pages of this issue, beginning with the inevitable question on so many pilots' minds: What's up with that crankshaft AD? It's a sticky issue for Lycoming and its parent company Textron. Mr. McBride was forthcoming, however, about his company's embarrassment over the problem, attributed to a metallurgical problem at a foundry. Also, if you think you should have received a recall notice but haven't, we've got contact information for you. (See "Chronically crankshafted," Page 29.)

After you read the rundown of jobs Mr. McBride has held at Lycoming, it's no wonder his knowledge, both formal and informal, is so vast. "You'll think I can't hold a job when I tell you all the ones I've had," he joked. Somehow Mr. McBride seems to have managed nicely.

▼ *Paul McBride talks about ADs, engine failures and the aviation career that has taken him worldwide*



GAN: What's going on with the FAA Airworthiness Directive on crankshafts? We were talking about the quality of metal having been determined to be the problem. Is that correct?

Mr. McBride: Yes, the material itself was the culprit. Needless to say, it is extremely embarrassing to us. When the first AD note came out it was from April of this year back to 1999.

And then we had additional problems. Right now the numbers might be 100 total crankshafts, maybe more – as many as our good friends at Continental a few years ago.

Lycoming is very, very indebted to Continental for sharing information. When we finally knew what we had to do, Continental was very helpful in saying 'we experienced this same basic thing, here's what the process is like.'

GAN: Can you be more specific?

Mr. McBride: My understanding is that once this in-

vestigation reached a certain point, we confirmed that there was contamination in the material when it was poured at the foundry. There are two service bulletins with corresponding ADs, service bulletin 552 and 553.

Now we've come up with another AD note that applies to service bulletin 554 regarding crankshaft gear bolts. It's not the same thing, but it does have that word 'crankshaft' in the text.

GAN: The first two deal strictly with metallurgical problems?

Mr. McBride: Yes.

GAN: And 554 deals with gear bolts. What's the problem there?

Mr. McBride: That's also a metallurgical problem. For some reason we replaced a cadmium-plated bolt that we'd used for years with a zinc-plated bolt. Apparently a couple of them failed. I don't know whether

it was a hydrogen embrittlement situation, or what. This latest service bulletin, 554, is replacing all of the zinc-plated bolts.

This is a real challenge to get our arms around. We have our arms around those engines that left our facility whether they be new, overhauled, or rebuilt, but shelf inventory at the distributor level gets real tough to track down.

GAN: Are you going back to the cadmium-plated bolts?

Mr. McBride: Yes. We're going back to the cad bolts.

GAN: In your relationships with customers, distributors, all the way down the line to your financial relationship with your paycheck, what's the big effect of all of this?

Mr. McBride: We hope to recuperate some of this through insurance and through the vendor source or

their insurance. I understand we are self-insured, so it would be like a deductible, I suppose, on your automobile insurance. You hit a certain number and then your insurance takes over.

GAN: In terms of peoples' attitudes toward Lycoming products, are they still fairly positive?

Mr. McBride: Yes, and this involves all three of these service bulletins, as it has in the past with service bulletins that required engines to be removed from service. People certainly are concerned and somewhat aggravated because it's a loss of their flying capability. The tendency is for the guy to jump down your throat.

But at the same time they are appreciative and have been quite understanding that this is all done in the interest of safety. So he'll stand back a

couple of paces and say "gee you're paying for me to have this engine removed, and send it to you guys. You're fixing it up and probably putting a lot more money in it than I would if I had to do this repair in the field, and then you're paying for it to be put back in. My only inconvenience is being without the airplane for several weeks while it's getting re-

paired."

So they are pleased with our approach and with the overall logistical support that we've cranked into each one of these service bulletins.

GAN: That's good. We would hope so. Were these service bulletins generated by failures or accidents?

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Mr. McBride: I would say failures, rather than accidents. Because there were not accidents involved with each failure.

GAN: How many were there?

Mr. McBride: On service bulletin 553, there was one accident in the state of Michigan and there were unfortunately three fatalities. That's when the NTSB and the FAA came in because we'd been working on service bulletin 552 and this one fell outside the calendar time frame we'd established so we had to expand it.

But it's important to stress that not in every case has there been an injury or death associated with a failure of the component.

GAN: How many incidents are we talking about?

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GAN: How many incidents are we talking about?

Mr. McBride: On the first service bulletin, 552, I think we had a total of 14 reported failures of crankshafts.

GAN: And then you had the one accident on 553?

Mr. McBride: Yes.

GAN: And 554, the gear bolt, was that the result of a non-fatal accident?

Mr. McBride: Yes.

GAN: Is there a time frame for getting everything sorted out and replaced?

Mr. McBride: Nothing's defined, but we're cranking up. We are hiring new people off the street, because we're ramping up to get ready for this. It will probably be a 24/7 operation in some areas of the facility. We are preparing to really open things up and to be in the best position to get as many man-hours devoted to this as we can.

GAN: To producing and replacing components?

Mr. McBride: Right.

GAN: Was there more than one foundry with the contamination problem?

Mr. McBride: I think there was only one. We buy from a vendor and the vendor would go to the foundry.

GAN: You are known as Lycoming's ambassador. You've been at the company 38 years. What has your career been like? Didn't you leave the company for a while and then come back?

Mr. McBride: I started out as an oiler,

then on the machine floor second shift, then back to assembly. Then service hangar as a mechanic on the floor, then I was a service rep, then I went to OEM sales. I had accounts like Cessna, Beech, Mooney, Hughes Helicopter, a few others. I was the distributor manager when I resigned. Then I went out to an engine overhaul shop in the Midwest, Schneck Aviation. We did

overhauls on Lycomings, Continentals and Franklins.

When you work in a big company, sometimes you can't see the forest for the trees. I was at Lycoming for 10-1/2 years before leaving in 1974 and going to the Midwest. Believe me it gives you a different perspective. When I came back in 1976, I was a service rep.

CHRONICALLY CRANKSHAFTED

"Oh that's a lovely subject right now," Paul McBride joked when we asked the inevitable question about Lycoming's approach to resolving the company's troubling run of crankshaft incidents. Nevertheless he made it clear that Lycoming's choice is to step up to the plate with the utmost accountability — and deep pockets.

The root cause of the incidents, according to internal company documents, is "Material overheated during the fabrication process, resulting in an irregular grain boundary condition that is not relieved in downstream processing. Grain boundaries act as initiation sites for microcracking and subsequent fatigue."

Ten outside laboratories and consultant groups have been involved, according to the same source. Lycoming says it has "completed detailed metallurgical and chemical analysis on over 120 crankshafts. Test results indicate material embrittlement compared with older forgings.

"Examination of specimens fractured at room temperature indicate honeycomb-like features. They vary in size and are not found in older, pre-1997 crankshafts."

Textron, which owns Lycoming, issued a statement last month estimating \$27 million as the price of making the situation right. The company says it recalled some 950 engines in August to replace potentially faulty crankshafts. Then another

was found in an aircraft beyond the August recall, forcing a mandate to inspect an additional 738 turbocharged engines.

Lycoming has established a comprehensive program to compensate aircraft operators for their inconvenience. The company offers:

- Repair of engine including a press forged crankshaft
- Replacement of any parts not up to standard
- Removal and installation
- Freight inbound and outbound
- Alternative transportation
- Optional weekly flat fee payment to defray incidental costs
- Remote hangar fees, if away from home
- 12-month warranty

One final item from the internal documents Lycoming provided is telling. It states "Lycoming's intent: Do the right thing, minimize customer impact, assure that this never happens again."

More information is available at Lycoming.Textron.com or (570) 323-6181.

—Robyn Sclair

GAN: Was there any trouble coming back?

Mr. McBride: When I decided to come back, I was welcomed with open arms. I worked for some of the best people that anybody could ever work for — very, very knowledgeable people, more than willing to tolerate a young kid and teach him what they knew.

I was transferred to the engineering

department and worked in experimental engineering. I went back upstairs as a service rep, and next thing, I became assistant director for the piston engines and then director. I did that up to 1989, then I took over when Ernie Tyler and Tom Byer, who did all the trade shows, retired.

It was a natural fit at the time. Lycoming was downsizing, so the company said you do all of the trade shows worldwide – and while you're at it, since you have all this technical background, we won't need to send a service rep to answer questions. They rolled it all into one.

There were some years I was on the road 200-plus days. It really served the company well that we were able to consolidate the technical stuff, and be out there and wave the flag for Lycoming and do it efficiently.

Then they pulled me back inside for product support. But I escaped purgatory when they put me back out in the field

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— Paul McBride

as a sales rep. So, I've run the gauntlet.

GAN: How encompassing are the seminars that you do? How are they scheduled?

Mr. McBride: It's a shotgun approach. We do a lot of FAA IA renewals. Aviall, our largest domestic distributor, does three or four regional maintenance symposiums a year. They'll have many of the major manufacturers come in. It's usually a two-day session.

I also speak to EAA chapters. Requests come in almost daily. It's easy for me to do since I enjoy it. I do not have a canned presentation. I stand up with

no notes. At Aviall, I'll usually do a three-hour stint. After introducing myself and telling them my history, I talk about things that are most frequently discussed, the kinds of questions they ask at Oshkosh and Sun 'n Fun.

I lean very heavily on what we're seeing in aging aircraft, things we've never seen before. If you call the factory, and tell them it's doing this or that, the guy at the factory – and everyone in the room will smile when I make this next statement – is going to say 'we never heard of that before.' Every factory responds like that.

We're an engine manufacturer; we're familiar with new products. If you're talking about an aircraft engine that's 30 or 35 years old, there might be something we haven't seen before. I'm no smarter than anyone else in the industry. My advantage is I have a good cross-section. When I do these seminars, I learn from what people experience in their own little hangars. I get to take advantage of that benefit by sharing it with other people.

When they took me off the road, the president at that time explained that he didn't see where I offered any value to Lycoming by going worldwide doing these seminars. He was not of an aviation

background.

It is extremely difficult to justify having someone out on the road doing nothing but maintenance seminars and things like that, because there's no yardstick to prove value. But you know it's getting to these guys and dispelling some myths and rumors.

GAN: An interview I did about a year ago was with Rod Machado, the humorist speaker/instructor. He commented that we cause our own problems in the air. Engines are so reliable that they just do not fail today. It's 95% pilot failure and pilots just won't accept that. But from your perspective as an engine manufacturer, do engines fail?

Mr. McBride: Yes engines do fail, but I always draw a parallel to a human being. A classic example is when someone has a heart attack. I would guess that for a couple of months before the heart attack, that person noticed their left arm ached a bit and they just didn't think much about it. An engine is like a human body. There is no such thing as a catastrophic failure without warning signs. Maintenance people have to be smart enough to recognize those signs. I used to do accident investigations years ago for Lycoming. It's very interesting to know that it's not the mechanical things that hurt you. It's the human element.

It's also an educational thing. Besides the oil pressure screen and filter that you inspect, there's an oil suction screen in the bottom of the sump that also should be inspected at every oil change. There have been several cases where we'd go to an accident site and there would be gray paint on the safety wire on the suction screen. I'd say to the FAA and the NTSB: "I wonder what kind of maintenance this engine has had in its lifetime?"

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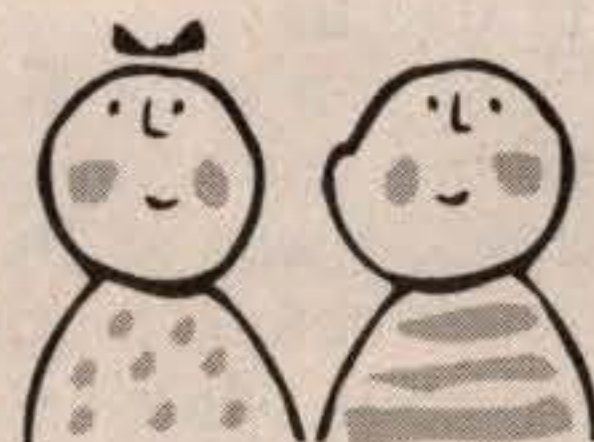
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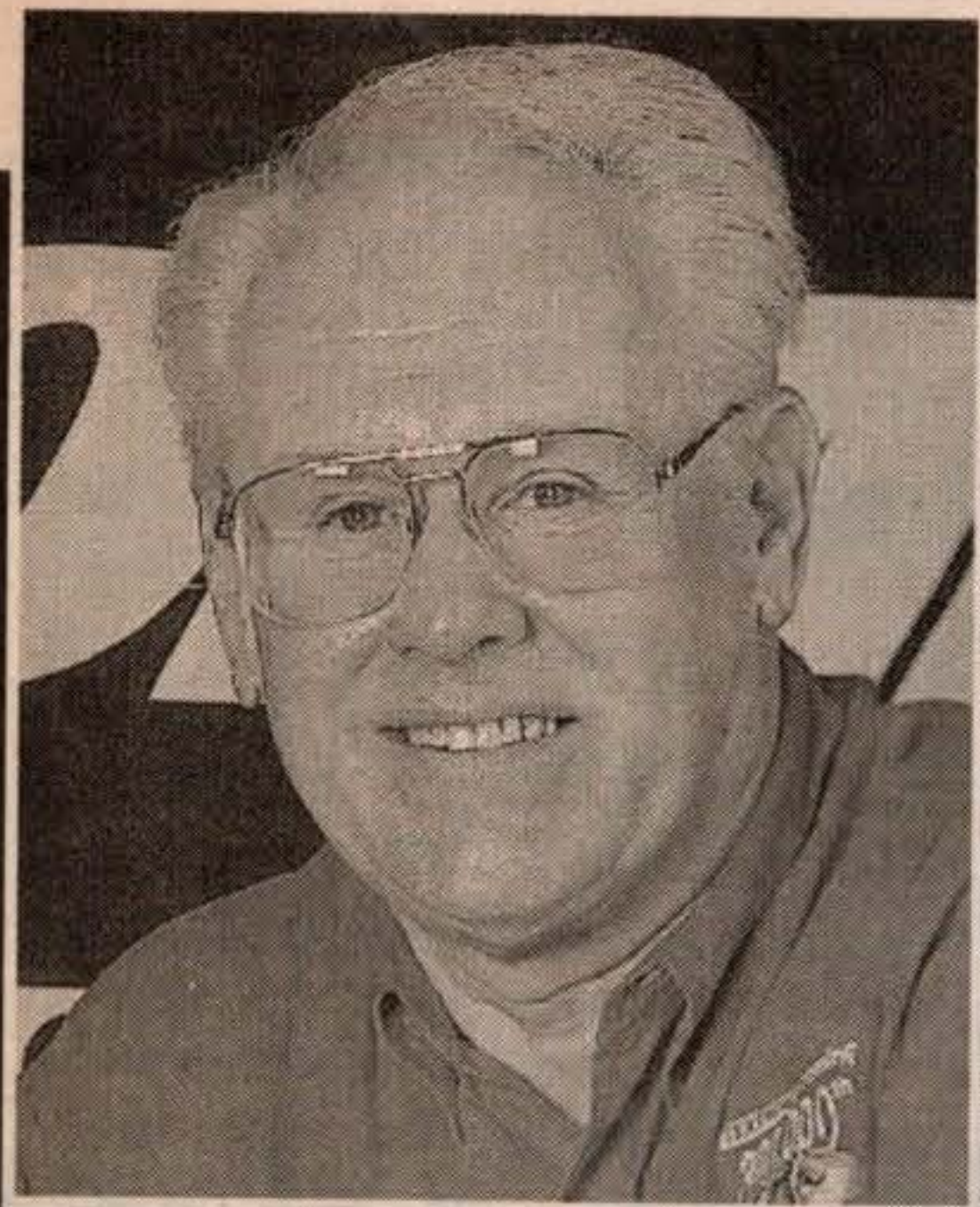
GAN: Do you interface much with maintenance people around the country? What do you think of the general quality of mechanics?

Mr. McBride: When I'm doing my regular job I'm in people's hangars almost on a daily basis. We are seeing a lot of the more knowledgeable, hands-on mechanics come up to retirement and leave the industry. There are some fantastic trade schools that offer excellent training, but my personal view is that they are more interested in cramming these kids to pass the exam, rather than teaching them basic knowledge, which concerns me. I'll put the FAA in the same category.

We're losing the guys who have hands-on practical experience and it makes it extremely difficult. I would very much like to see an apprenticeship or journeyman program in the aviation industry. CASA, the Civil Aviation Authority in Australia, has had an apprenticeship program for a long time – for as long as I can remember – although I hear they are going to do away with it. I really think that's how mechanics should be trained.

When I worked as a mechanic on the hangar floor, there was a rule: If you worked on an engine on an aircraft, you flew in that aircraft on the test flight. Now they don't do that. There's no responsibility attached to it. A lot of that is because insurance doesn't cover it. But that was the old mechanic's creed: If you worked on it, you flew it. I think it had some merit.

GAN: Do you find a lot of ignorance



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— Paul McBride

among aircraft owners and operators as to how to really operate an engine with finesse and care?

Mr. McBride: Yes and no. I think there's an awful lot of hangar talk, which is not always good. When I do seminars, I hold up an operator's manual and say

'now how many people in this room have read the operator's manual for the specific engine they are operating in their aircraft?' and there aren't a lot of hands that go up. Then I make a very bold statement and say 'One thing I have learned is that people in this industry do not read or take direction well.' I think it's a pretty accurate statement, unfortunately.

GAN: In terms of operation or in general?

Mr. McBride: Both. The most difficult thing for me to understand is why owners and operators, pilots and maintenance people can't grasp the importance of frequent oil and filter changes. You'll get guys who say 'Oh I change my oil and filter once a year whether it needs it or not.' And it doesn't work.

GAN: What about diesels? We hear this word thrown around every few years.

Mr. McBride: Some day there will be a viable diesel powerplant. There are several offerings right now in the marketplace. Remember when NASA awarded a contract of \$10 million to Continental to make a good proposal on an alternative fuels engine?

Lycoming's management at that time said, "OK, we didn't get the contract, we didn't get the \$10 million from NASA, but we're going to proceed on our own and develop one." That program was designated NGE for New Generation Engine. We worked on that project diligently. That program has recently come to a halt, however. They looked at the economics, the potential for sales, airframe applications and so forth. Cessna and the other

airframe manufacturers were keenly interested, but when they really crunched the numbers, they felt they would have a struggle to sell 100 units a year.

We know we can make a diesel engine. There are some other things we don't know. Number one is how are we going to keep the prop on it? Every operating diesel engine, because of its high compression has a power pulse that causes a lot of vibration. It's a pounding thing. I know our good friends at Hartzell have been involved in trying to adapt propellers to some of the diesel applications. The root of the propeller needs to be so heavy and thick, so again what we're doing is engineering around an inherent condition, so you have to beef up and that means extra weight. In the airframe manufacturers' eyes weight is their worst enemy.

People are very concerned about what we're going to do when there's no more avgas. Well, I'll tell you, I don't know that that's really going to be a prob-

lem. We may not have the avgas that we have today. We know that it's moving toward unleaded and that's an issue, as far as compatibility with components and materials that we use. Advancements in electronic ignition, which we are very much up to speed on, will help. If you can adjust the timing, you can compensate a lot if the octane rating happens to be lower than what we have today.

GAN: Do you fly?

Mr. McBride: Do you think I'm crazy? I don't fly. People can't understand that. I used to have that burning desire years ago. I'd get up at four in the morning to fly with someone. But after a little accident investigation, you learn it's not the mechanical things, it's the human things. You learn very quickly that if you are not consistent in your flying, it'll bite you. From 1966 to today, I probably travel 150 days a year, so the only thing I do in a consistent manner is travel on company business!

GAN



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