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Hey all,

Yesterday after 10 months of hard work my 1927 FS was finally ready!

What started out as a simple rebore ended up in a totally reconditioned bike. In the last few months I changed the internals of my wide box to vintage close (and fixed some other parts while doing so). I also overhauled the clutch and designed and made an electronic ignition conversion. I replaced my 500 shortstroke block with my spare 600 one that I had bored and fitted with silk pistons by Moss Engineering. They also weighted my flywheel. My frontwheel was respoked and I tidied up the bike by fitting an outrigger cover. And to top it off I had my petrol tank resprayed since the paintwork on my modern Yamaha SRX turned out so nicely.

So there it was looking smart as ever. In fact, I fell in love with my Scott all over again. Wow.

Then came the time of the first testrun. After some trying the bike fired up and ran nicely on the electronic ignition. The ampmeter showed the battery was being charged too. So after a quick run up and down the street to test the gearbox and clutch (both worked fine) I went for a quick tryout around the corner. And after 200 meter disaster stroke...

Suddenly a noise as if one of my chains snapped sounded and I was just in time to pull the clutch. Of course that happened just in front of a garden filled with a lot of people having a party... After stopping there was no movement whatsoever in the engine so I pushed the bike home.

There I took off the transferports and the crankcase doors. And now the 100.000 \$ question: "what is wrong in this picture?"

Yes you are seeing it correctly, that is the gudgeon pin visible through the transferport!!! I am still trying to figure that one out myself... Any ideas???

When I took the door out on the LH side I was suddenly looking at this:

I am pretty sure the hole was not there before..

Looking closer at the big end screw you can clearly see a crack all around... there must have been some force there!

Some of the remainders of a brand new silk piston and a freshly bored 600 block...

So just two weeks before the Dutch Scott run I really really wanted to attend on the Scott I am left with an engine that is practically total loss. This reconditioned engine did only about 500 m before needing a complete rebuild, that must be a new world record.

Untitled

Needless to say that at the moment I am quite fed up with the whole thing... why don't I just collect stamps?

Erik

Back to top

Roger Moss

Joined: 31 May 2004

Posts: 369

Location: Leicester UK

Posted: Sun Jul 29, 2007 9:08 pm Post subject: Condolences

Hi Erik I am sure that I can speak for all Scott owners when I say how sorry I am that you have had such a disaster. I have never seen such a blow up. I see that there is a hole in the LH crank chamber. We are used to seeing holes in cases like this when a crank has failed, but in your case the crank has not failed. Has this been part of the destruction from above and there is a hole knocked through from above by the piston debris. It is sometimes difficult to decide what caused a problem, but in your case, unless there was some unusual cracking or weakness in a component, it is more likely to be something done while tuning that looked OK but caused some problem. For instance when Richard put a motor together with very close piston to head clearance and then the head gasket squashed down more than anticipated, so, although it turned over freely, the pistons hit the top when the engine exceeded about 2000 rpm. In your case, if the engine was built symmetrically, then I suggest that you study the still intact RH side to see if you can see a problem. Remember that the piston / rod assembly stretches about 0.7mm when it is revved, so that if you took out port bridges, as we do, then you must allow that the ring does not come into an enlarged open inlet port. We leave stumps to hold the rings in. I remember someone recently telling me that they thought it would be ok to leave the ring / rings unsupported over a wide gap. I am wondering if this happened as if the ring came out into the inlet port, it would pull the bottom of the piston off. Please understand that I do not wish to suggest that you have made a mistake in your tuning. I am just trying to find a logical reason for this. As regards tuning, then increasing the gas passages is entirely logical and if done correctly, certainly will not effect durability. The only possible adverse effect would arise from the increased torque at low medium revs putting a higher load on the crank set. If the rods are shimmed in the pistons, then the alignment is controlled and the loading on the cranks does not have the extra spikes that result from rod wag sideways. I had a water leak once that went into the crankcase. When I started the engine, it dredged up the water, sent it into the head, tried to compress it, failed and pushed the crankcase apart through the main bearings. I had spent untold hours on that case. Erik, I sincerely feel for you and wish you courage and determination in your adversity.

Very Kindest Regards Roger

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Back to top

Richard Moss

Untitled

Joined: 12 Nov 2004
Posts: 62

Posted: Sun Jul 29, 2007 9:43 pm Post subject: Erik : (

Hi Erik,

I'm so sorry..

I can of course well imagine your frustration.

I see this as a good excuse for getting very drunk.

Its all do-able of course.. but i will be interested to know exactly what happened...

My very best wishes

Richard

Back to top

rhixon

Joined: 19 Apr 2006
Posts: 9

Location: New York, USA

Posted: Mon Jul 30, 2007 12:46 am Post subject:

Hi Erik,

I'm sorry to see all your hard work undone! Keep your chin up, friend, I'm sure you'll get her back together good as new again!

Rick Hixon

Best regards,
Rich Hixon

St Andrews Society of the City of Albany
1947 Flying Squirrel Frame 4920

Back to top

Erik

Joined: 10 May 2005
Posts: 410

Location: Moerdijk, The Netherlands

Posted: Mon Jul 30, 2007 7:08 am Post subject: Re: Condolences

Hi Roger,

This time I took even greater care to do everything according to the book. I knocked up the crank with great care and used a new nut and bolt. I measured the play several times (in and out the frame) and it was 0,3 mm, so perfect. I gapped the rings at 0,009" and doublechecked if there was enough left of the bridges to support them. There was, even after assembling and tightening down

Untitled

the block. I did not find a single piece of ring so far so I guess this is not the problem. I also shimmed out the little ends with the appropriate play so there was no sideways movement. The other piston by the way looks absolutely fine through the rh transferport.

To be honest, I can think of nothing that can cause the piston to turn on it's axle. As you can see the gudgeon pin is still in its hole in the piston. As I cannot imagine the pin being sheared, so the little end must have twisted the same amount...

And the hole in the casing? It must have been the debris, but on the other hand, most of it (at least the larger parts) I took out from the space below the piston and not from the well where the smaller parts were...

The only thing I can think of that might have caused the trouble is the amount of space around the piston skirt at bottom stroke in the casing. I enlarged this while this was a 500 casing to take the Silks and made sure it was enough. While turning the engine over and during the first testrun in my street this space was enough. Maybe the piston expanding while running seized here? But to be honest, I think this not the case too as I made sure the play around the piston was quite large.

But I guess you are right, I will not know it until I have disassembled the motor. At this moment I do not know when that will be. The Scott Run is in two weeks and although my bike obviously does not run I might take it there anyway just to make photographs with the other Scotts (a Dutch classic motorcycle magazine has asked me to write an article on the run and make pictures and I would sure like my Scott to be in it). So, you all might have to wait for a few weeks to see what was wrong.

But on the other hand, I am not sure I can wait that long...

On the one hand I do hope it was a stupid mistake on my account. That way I can blame myself. If it was a component weakness it would be extra sour for me after all the hours spend on flowing the casing etc...

To be continued for sure!

Erik

PS: The night after this happened our daughter was crying a lot at night keeping us awake (as if I was not awake already trying to figure out what went wrong). When we just had about had it with her I took her out of bed. The way she then looked at made me forget all the crying instantly....
The same with my Scott. Even if it blows up on me, I still just love it.... Any other bike I would have given a gigantic kick but not this one.

Stupid isn't it...

Back to top

alex.helf

Joined: 31 May 2004

Posts: 88

Location: Austria EU

Posted: Mon Jul 30, 2007 9:53 am

Post subject:

Hi Erik!

Deepest sympathy - I feel with you.

Untitled

But: Don't give up!

"Keep them on the road"

Alex

Back to top

Roger Moss

Joined: 31 May 2004

Posts: 369

Location: Leicester UK

Posted: Mon Jul 30, 2007 11:24 am Post subject: Further thoughts

Hi Erik

I have just finished writing a long email to you and then visited our message board and found that you had eliminated the possibility of ring expansion into the inlet tract as the possibility I had feared. This makes the main point of my email redundant, but I wrote it in a spirit of helpfulness and as you were, in your email to me, considering your options, then I will copy my private email to you here, in case it has any interest to others. It will also go some way to illustrate why our deliveries tend to be long -- we are busy writing emails!!! As regards the crankcase clearance for the skirt of Silk pistons. SS cases were machined to just take a +60 SS piston which is 3" dia, but some LS cases were bored less as a +60 piston is 0.0625" less on dia.

I have found that the location register diameters on cases and barrels are not as consistent as we might hope and therefore when you put a barrel on to a case, try to wag it about a bit to see how precise this location is. This can put the axis of the barrel out of line with the clearance bores in the case. It can also compromise the alignment of the faces for the transfer port covers making it difficult to get them to hold all gaskets equally. I have also seen reboreds that were significantly off centre to the true barrel axis, although I would hope not in this case, as we bored it for you and we have a special workholding fixture with accurate datum features. OK I copy today's email to Erik.

Dear Erik

Please excuse me if I speak openly.

I admire and completely understand your spirit and wish to do your engine preparation yourself.

Although it is risky to make an assessment on photographs only, I think that a piston ring may have been able to open out into the enlarged inlet tract where the bridges were removed.

If I take the example of Richards engine, he has tried to prove that he can make an engine, based on standard Scott components, that is more powerful than those I make and has used a different type of head and very big inlet tract. As regards this inlet tract, when the piston is at bottom of stroke, the bottom edge of the SINGLE ring can just be seen starting to come into view into the top of the wide inlet port that has had some of the bridges removed to aid gas flow. If we take the ring as nominal 1.5mm and allow 0.7mm for max possible overtravel, we still have 0.8mm of ring held within a complete bore and thus not able to expand out into this wide port. If Richard decided to add a second ring, this would open out into the unbridged inlet port and smash the engine. If it is wished to use two rings, then a small "stump" sections of the removed bridges must be left to hold the lower ring from being able to escape into the port.

I was surprised when you decided to use two rings, but assumed that you had left enough of the bridges to hold in the second ring. If this was a late decision and if this is what has happened, then it has been a very expensive mistake and you have my complete sympathetic understanding.

Please do not imagine that everything I have done over 40 years has been successful. I have made painful mistakes but have learned from them.

This is why the latest Sports Engine has been produced slightly detuned from full race spec, as it will spend its life in California. As a point of possible

Untitled

interest, it took me about one full week to measure adjust and set everything in the engine build so that all clearances volumes and other critical measurements were known, not just guessed at. Paul Dobbs will race it next weekend against the top riders on excellent much developed bikes. It will be interesting to see how it goes.

Engines.

My opinion is that a well prepared standard Scott engine with iron barrel, can be almost as powerful as one of my sports engines, at considerably less cost. The major difference is that the Moss crankcase has a lower inlet floor to give a bigger inlet passage. The flywheel is reduced to 8.75" dia to clear this and I add a weight ring in the flywheel to compensate for this and add a bit more weight than standard. The barrel in iron can be as good as an alloy one as regards gas flow. The other items, High comp head and big transfer port covers are needed. As regards the inlet, then you either need a big carb, approx 34mm, or cheaper is the Y branch inlet manifold with two smaller standard oval flange Mk 1 concentric carbs.

What I used to do in the past was to get a Scott case and have a good welder, build up in the area underneath the inlet tract and then clean it up, so I could lower the inlet floor of a standard case. When I did this, I cut out the front to be able to make solid bosses so the case could be clamped securely as the standard Scott case is weak here. I then found that if I put a sheet aluminium cover over this front opening, but put it on packers, that there was an advantageous cooling air flow that kept the inside of the cases from becoming too hot. When I take the cover off, then chain threading is much easier. Please also remember that I did not start out to offer these items commercially. They were done by me for me and the criteria was to have only the highest strength and quality. In this case my own castings are from high strength, low expansion heat treated alloy and are in strength and performance terms about as far removed from the mediocre Scott items as a Trabant is from a Ferrari.

The main and I believe original concept of mine to increase the cross sectional area of the inlet tract, was to remove the "Spectacles" that are the roof of the inlet tract in the crankcase and to use the underside of the block to perform this duty. The practice of lowering the floor of the inlet tract is useful if ultimate performance is wanted but is not really beneficial unless you use a bigger carb than standard.

In all tuning there is a law of diminishing return. In today's world culture where many find it easy to exploit others, it is difficult to ask someone the question, "How much can you afford to spend" together with "What characteristics would you like to achieve" If we can ask this openly and get an honest answer, then we can make a proposal that can get as much of the final requirement for the money available as possible. Most folks are very wary of being open about what they can afford, lest we take advantage of them, so they plead poverty. We then make the best proposal we can within what we imagine to be their budget, but well realising that we could have made a much better engine at a higher price.

We have tried to help others by putting as much information as possible on our website and in newsletters, but it is impossible to put 40 years Scott experience and 55 years engineering experience on a site and still try to earn a living. Recently we attended to a customer who had received an engine but said it did not run properly. When we checked out the bike, the first thing we noticed was that all chains were very tight, we say like a bow string! Where do you start in your assumption of the basic knowledge of the average owner?

OK final statements

I think that you had possibly got 99% of a good engine, but made one mistake. It is sad, but we must never be defeated.

If you had either brought the engine and we could have built it together here as a check, or assemble it yourself loosely, to be sure it all fitted together, then send to me and I would measure rod travel and set bump clearances and head volumes and assemble.

Things will be a bit slower here, now that Richard is largely working elsewhere, but while I am still working, I will always try to give extra help to those who try to help themselves.

OK a few ideas here for you to think about

Kind Regards

Roger

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Untitled

website www.mossengineering.co.uk

[Back to top](#)

Erik

Joined: 10 May 2005

Posts: 410

Location: Moerdijk, The Netherlands

Posted: Mon Jul 30, 2007 11:40 am Post subject:

Thank you Roger for you elaborate reply. And thanks all for your sympathy.

It seems the only way to put an end to all speculation is opening up the engine. But as I wrote earlier this might have to wait a few weeks.

But when time comes I will post the results here (and on my website).

So stay tuned!

Regards,
Erik

[Back to top](#)

Erik

Joined: 10 May 2005

Posts: 410

Location: Moerdijk, The Netherlands

Posted: Sat Aug 18, 2007 7:03 pm Post subject: No words...

No words needed....

[More on my website](#)

Back to top

Roger Moss

Joined: 31 May 2004

Posts: 369

Location: Leicester UK

Posted: Tue Aug 21, 2007 9:15 pm Post subject: Hydraulic lock

After seeing the con rod bent, it indicates that this was the result of the piston stopping suddenly and the flywheel inertia could not dissipate quickly. I have been told of such damage where cars have been driven through floods. I had a water leak in an engine years ago and the engine started and then when the throttle was opened, it dredged the excess fluid in the bottom of the crankcase through to the top. There was more than the combustion space, so it cracked my crankcase across the main bearing bores.

Conclusion. Always drain wells before starting after a rebuild or after leaving bike unused for above a week. It is a safety first procedure and when you drain the wells, you can see if there is any water or debris.

So Erik, it was likely to be either a water leak or a total excess of fuel and oil. We are all very sorry that you have had such a devastating experience and send our best wishes for your eventual rebuild.

Roger

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Back to top

malcwebb

Joined: 31 May 2004

Posts: 16

Posted: Tue Aug 21, 2007 10:51 pm Post subject:

Erik

Last most of us I am pretty stunned by the damage to your engine. I have seen some blow ups on grass-track when con-rods break, but not a bent rod like this. One of my other interests is large stationary steam engines. I have recently been reading the memoirs of a chap who built and serviced these monsters. I have been struck by the amount of damage done to these machines when "slugs" of water get into the cylinder, and it did cross my mind that your damage was similar to one particular set of photos that I have seen of a mill engine "smash up" in Lancashire in the 1950's.

The strange thing is that your cylinder head didn't pull the studs out, on steam engine water "Carry-overs", the cast iron cylinder covers are usually the first to split. Glad to see that you have kept your sense of proportion, (and adventure). Good Luck!

Malcolm

Back to top

Erik

Untitled

Joined: 10 May 2005

Posts: 410

Location: Moerdijk, The Netherlands

Posted: Wed Aug 22, 2007 6:38 am Post subject:

malcwebb wrote:

The strange thing is that your cylinder head didn't pull the studs out

That might be because it is (or better was...;o) a blind head barrel.

Well, at least I know now what caused the blow up. I will make a nice work of art of all the pieces to hang on the wall and then move on.

My Scott will ride sometime that is for sure!

Cheers,
Erik

[Back to top](#)

Ted Robinson

Joined: 04 Oct 2004

Posts: 28

Location: Coventry

Posted: Thu Aug 23, 2007 9:54 pm Post subject:

Eric, when you took the crankcase door off did you actually see water in the crankcase or an excess of fuel or oil? Best wishes Ted.

[Back to top](#)

Erik

Joined: 10 May 2005

Posts: 410

Location: Moerdijk, The Netherlands

Posted: Fri Aug 24, 2007 10:45 am Post subject:

Ted, there was no water or excess fuel/oil when I took the door off. I guess the large hole in the crankchamber was the easy way out...

There were no waterleaks by the way.

Erik

[Back to top](#)

Untitled

Roger Moss

Joined: 31 May 2004

Posts: 369

Location: Leicester UK

Posted: Mon Aug 27, 2007 10:03 am Post subject: Hubris. A condition innapropriate to mankind

Below an email from Erik with another proposition from Colin Hough, who is always well worth listening to and my reply.
I would never wish to appear dogmatic as I am human and thus heir to all the imbecility that goes with that condition----

Hi Roger,

Colin Hough send me an email on my engine blow up. Below the two paragraphs with his theory. It seems quite logical....
What do you think?

Email from Colin

On a second subject of the cause of the failure: looking at the photos it appears to me that the piston has failed in a 'pulling down' mode rather than 'pushing up' as would be the case if liquid got into the combustion chamber. If it were to have failed in compression, I would expect the initial failure to be above the gudgeon pin as the rod bent, but it looks like it is below. Is it possible that the initial failure was the barrel such that the piston was on its way down when it hit this and stopped such that the con rod / gudgeon pin pulled themselves out of the piston (and hence broke it) on the side opposite to the jam and then, on its way back up, it pushed the now distatched piston up so that it jammed and bent the rod?

I offer these comments just in case it gets you thinking along other lines as I find it difficult to imagine enough water/liquid filling the space in a single revolution.

....
Cheers,
Erik

Hi Erik

I would certainly not claim absolutely that your engine failure was due to a hydraulic lock.

I just think it highly likely as I have had a similar problem but admittedly at, or soon after initial start up.

Certainly the bent rod was caused by top pressure and the lack of damage to the piston above the g/pin would suggest this.

The proposition is that having bent the rod, that this action broke off the piston below the skirt and this section was then punched through the bottom.

Colin's theory would require a significant obstruction to occur in the lower cylinder that the piston would hit. The piston would not break so easily across the gp bore if it was the skirt that hit, as this section would be in compression.

We ask ourselves just where the piston would have to be held in order to pull off the skirt section.

Imagine you tried to make a rig up to do this. Where would you hold it?

If the piston was abruptly restrained above the gp bores the flywheel inertia could pull off the skirt, but this would not bend the rod.

Only a very significant restriction above the piston gp bores would do that. The rogue element is that the barrel was sleeved.

I have always avoided this practice as I was unsure of the strength of the

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remaining cast iron core, especially for higher output engines.

If it were my engine, I would put the cause as 70% possibility to a hydraulic lock, but then this is only one man's opinion, but, as I said, based on a similar occurrence some years ago.

I do not think it will help any to agonise over what could have gone wrong, you just need to go forward when you are able.

There is plenty of evidence to show that this is not a typical occurrence and that a Scott engine correctly assembled with accurate components will give a spirited performance for many reliable years.

Certainly the modifications we do have been proved over nearly 40 years of racing.

I will emphasize that Richards recent blow up was caused by using a much reduced bump clearance with a welded case

These were experimental procedures on his part and not used on customers engines

From years ago I decided that a Scott piston rod assembly will stretch 0.027" in use and it would be wise to use a bump clearance of not less than 0.035" and preferably about 0.050" /0.055"

Kind Regards

Roger