FLY ABOUT

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NAC

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PRESIDENTS REPORT

Hi all, welcome to the April/Easter edition of the Fly About. I hope you have had a happy Easter and took it easy on the Eggs. The weather was not too bad for flying so I hope you also did a few hours of flying over the break.

PGL is due for its one hundred hourly again so the hours were clocked up fairly quickly and great to see Poppy being flown. I believe the radio in PGL is being repaired under warranty and a replacement radio is fitted to keep us in the air.

While on the subject of flying, next year 2018 will be our 50th anniversary of the Northam Aero Club, how time flies. When you look at the Inaugural Plaque we are so privileged that so many of our original members are still with us and still involved in the Aero Club.

We need to start planning for this memorable event so if you have any suggestions please contact me. Any members or persons that we should invite we will try and contact them. My thoughts for the event date is April 2018 or early August 2018, this being before the Dowerin Machinery Field Days in late August. We would like to invite the RAAF to be a part of this big occasion and we need to give them six months notice in advance. For this event I was thinking of a Saturday fly in followed by a sit down dinner – stay overnight so those that have travelled can return home Sunday. Once again please don't hesitate to phone or email me your thoughts.

Between Kim Lawrence and the Shire mowing the airfield, it really does look a treat and thanks must go to both the Shire and Kim. Planning is still on track for the National Ballooning Championships in September and I believe the balloons are up and flying and some baskets were seen in the main street of Northam last week. Fantastic. Registration for the Championships are coming in already, great to see. To keep up to date with all the news of the Ballooning Championships check out the website at www.northamnationals.com or the Facebook page to purchase the limited edition ballooning badges for this year's event.

Thats about all til next month. Happy Easter with plenty of flying.

Cheers, Errol
0429 880 149

Club Captain's Report
April Competition Goomalling sortie

Our team NAC flying comp was Sunday 9th April. "Goomalling sortie"
A cross country mini air trial with ground waypoints to be identified etc.
We flew from Northam to Goomalling,then on to Meckering and return to base.
Each team NAC pilot nominated his own time for the journey
So not a race just a safe little cross country to be enjoyed.
Team NAC pilots who fly team NAC comps each month give themselves the Opportunity to keep their flight skills current, honed and proficient.
This is evident in the close scoring on comp days.
We all enjoyed a lovely day and the excellent flying conditions.
Judges: Shaun, Megan and junior member Mikayla.
thank you, your work is highly valued.
Great morning teas: -Beth, Gail and Megan - thank you ladies once again !
Results:

Place	Aircraft type	Registration	Crew
First	Cessna 152	VH-BFC	Peter Hill
Equal Second	Cessna 172	VH-PGL	Ashley Smith
			Howie Piestersie
Third place	Cessna 172	VH- PGL	Dave and Marg McFarlane
Fourth	Cessna 172	VH- PGL	Geoff Winsor

Howie is impressing with his growing prowess-
He flew PGL for the first time and just missed out on top spot, well done Howie!
All pilots flew well and flew safely, we had a good day.
Next comp is Sunday 14th May, er- what a good way to spend "Mother's Day"…"a bridge too far": another cross country.
All pilots have a fully detailed comp sheet with 4 weeks to go as usual.
And lots of opportunity to fly a practice run or two in the club aircraft eh?
Hope to see you all Sunday 14th May 9 am at Northam airfield for some Good flying!
Seats are always available for those who would like to go up of course, just ask.
Until then ,thank you,stay safe,

Peter Hill Club Captain 0450415947 prh@aurora.net.au

FAI Has Ratified Balloon World Record

Claim number : 17900
Sub-class : AM-14 / Mixed balloons : 16 000 to 22 000 m³
Category : General
Group : Not applicable
Type of record : Distance
Course/location : Northam Airfield (Australia) - Bonnie Rock, Mukinbudin (Australia)
Performance : 33'521,4 km
Pilot : Fedor Konyukhov (Russia)
Balloon : R-550 / Cameron Balloons
Date : 23.07.2016
Previous record : 33 195.1 km (03.07.2002 - Steve Fossett, USA)
==========
FAI congratulates the Pilot on this splendid achievement.

The goal of the Fedor Konyukhov RTW flight in July 2016 was to beat the record of 13 days flying around the world in a balloon, held by Steve Fossett since 2002.
The Round the world flight was completed and Fedor arrived back safely to Western Australia. It was an incredible event for all those involved directly and indirectly.

"It is amazing what turns up in your inbox!"

Please find attached pictures of:

1. Electro Alpha aircraft currently being built by the manufacture Pipistrel in Slovenia. We are the exclusive agent for their electric aircraft in Australia and our first Electro Alpha is scheduled to arrive at Jandakot in June. We already have pre-approval from CASA and RA Aus to get it certified as an LSA training aircraft, which will be the first 2 seat electric aircraft certified in the southern hemisphere. The best part is that it will only cost us a few dollars of electricity per hour to operate, so we'll be able to provide very affordable training, with easy one lever thrust/regen control, low maintenance, minimal noise, negligible vibration and no pollution!
See these video of the Pipistrel Alpha Electro and a video review of the Pipistrel Alpha Electro for your reference.
2. FlyKart is our hovering go-kart proof of concept platform, whereby we are validating the safety benefits of ducted electric VTOL multi-rotor propulsion, as well as our triple redundancy fly-by-wire avionics systems. Leading up the eventual CASA approval and certification of VTOL Air Taxis. You can watch the Fly Kart Maiden Flight Testing Video, which was developed in partnership with Trek Aerospace (see also the concept of an eventual VTOL electric air-taxi attached).
3. Our SolAirPort ecological architecture design concept that we're proposing for Rottnest Island in the future as we transition our fleet of aircraft from petrol to electric in our Rottnest.Aero business. Whereby the Solar provides more than enough power to charge the batteries of the aircraft and the shade makes for a more comfortable experience for the passengers.
Look forward to hearing your thoughts on these activities and welcome any promotion and support you can provide of our sustainable aviation vision in the future.
I was unable to find any contact details of Cheryl Greenough online, so can you please provide me with her email and/or phone number?
Look forward to seeing your article about our electric aircraft activities. I welcome your club members to visit our Electro.Aero website and register their interest in getting involved in our sustainable aviation projects.
Let's keep in touch and explore some great opportunities together!

Regards, Josh

Joshua Portlock

Executive Chairman - Founder

Mobile: +61 (0) 409 011 447

Electro.Aero Pty Ltd

Alectro Alpha in flight—Left Hand Front

Right Hand Side—Rear

Above—Fly Kart

Rottnest SolAirPort – Solar recharge station for the Electro Alpha

UPDATE

01 April 2017

2017 National BALLOONING Championships NORTHAM, WA

ONLY 22 WEEKS TO GO

The National Ballooning Championships 2017 will take place between 2 and 9 September 2017 in Northam. The event is just around the corner and the Planning Committee is busy making preparations for the event.

Business and Activity Opportunity

There will be an increased number of people in Northam during this event. This will provide the perfect opportunity to run an activity or to open your business as people will be looking for things to do, places to eat and things to see during their visit to Northam.

Contact the Shire of Northam's Community Development Officer, Michelle Blackhurst by email cdo@northam.wa.gov.au or telephone 9622 6100 so that we can assist you to market your activity to the community.

Pilot Registrations

Registrations for Balloon Pilots to attend are now open and the Committee has started to receive registrations from Pilots who will be attending.

Volunteers

Would you like to be amongst all the action and join us for a week of fun and do something you'll never forget? The Committee is searching for volunteers for the following tasks:

- Drivers with a 4WD who are able to tow a trailer with the balloon and basket and drive the pilot and crew to the launch field and retrieve the balloon once it has landed.
- Balloon Crew. You would be helping set up the balloon for launch and packing the balloon away once landed. This is a very physical task so you would be required to do some heavy lifting.

Training will be provided for all tasks.

This is a great opportunity to get up close and personal where the action is and spend the week chasing balloons. Please only apply if you are available from 5am-9am and then 3pm-6pm, from the 2/9/2017 - 9/9/2017.

Merchandise

Limited edition Ballooning badges are now available for $5 (plus postage if required). These can be purchased from the Northam Visitor Centre or you can place an order for a badge via email bbacclements@bigpond.com.

Sponsorship Opportunity

The Planning Committee are offering a limited number of sponsorship opportunities. If you are interested in finding out more, please contact us via email northamballooning@gmail.com.

Engine Basics: Detonation and Pre-Ignition

Written by Allen W. Cline

Reprinted from Issue 54 of CONTACT! Magazine, published in January, 2000

All high output engines are prone to destructive tendencies as a result of over boost, misfueling, mis-tuning and inadequate cooling. The engine community pushes ever nearer to the limits of power output. As they often learn cylinder chamber combustion processes can quickly gravitate to engine failure. This article defines two types of engine failures, detonation and pre-ignition, that are as insidious in nature to users as they are hard to recognize and detect. This discussion is intended only as a primer about these combustion processes since whole books have been devoted to the subject.

First, let us review normal combustion. It is the burning of a fuel and air mixture charge in the combustion chamber. It should burn in a steady, even fashion across the chamber, originating at the spark plug and progressing across the chamber in a three dimensional fashion. Similar to a pebble in a glass smooth pond with the ripples spreading out, the flame front should progress in an orderly fashion. The burn moves all the way across the chamber and , quenches (cools) against the walls and the piston crown. The burn should be complete with no remaining fuel-air mixture. Note that the mixture does not "explode" but burns in an orderly fashion.

There is another factor that engineers look for to quantify combustion. It is called "location of peak pressure (LPP)." It is measured by an in-cylinder pressure transducer. Ideally, the LPP should occur at 14 degrees after top dead center. Depending on the chamber design and the burn rate, if one would initiate the spark at its optimum timing (20 degrees BTDC, for example) the burn would progress through the chamber and reach LPP, or peak pressure at 14 degrees after top dead center. LPP is a mechanical factor just as an engine is a mechanical device. The piston can only go up and down so fast. If you peak the pressure too soon or too late in the cycle, you won't have optimum work. Therefore, LPP is always 14 degrees ATDC for any engine.

I introduce LPP now to illustrate the idea that there is a characteristic pressure buildup (compression and combustion) and decay (piston downward movement and exhaust valve opening) during the combustion process that can be considered "normal" if it is smooth, controlled and its peak occurs at 14 degrees ATDC.

Our enlarged definition of normal combustion now says that the charge/bum is initiated with the spark plug, a nice even burn moves across the chamber, combustion is completed and peak pressure occurs at at 14 ATDC.

Confusion and a lot of questions exist as to detonation and pre-ignition. Sometimes you hear mistaken terms like "pre-detonation". Detonation is one phenomenon that is abnormal combustion. Pre-ignition is another phenomenon that is abnormal combustion. The two, as we will talk about, are somewhat related but are two distinctly different phenomenon and can induce distinctly different failure modes.

KEY DEFINITIONS

Detonation: Detonation is the spontaneous combustion of the end-gas (remaining fuel/air mixture) in the chamber. It always occurs after normal combustion is initiated by the spark plug. The initial combustion at the spark plug is followed by a normal combustion burn. For some reason, likely heat and pressure, the end gas in the chamber spontaneously combusts. The key point here is that detonation occurs after you have initiated the normal combustion with the spark plug.

Pre-ignition: Pre-ignition is defined as the ignition of the mixture prior to the spark plug firing. Anytime something causes the mixture in the chamber to ignite prior to the spark plug event it is classified as pre-ignition. The two are completely different and abnormal phenomenon.

DETONATION

Unburned end gas, under increasing pressure and heat (from the normal progressive burning process and hot combustion chamber metals) spontaneously combusts, ignited solely by the intense heat and pressure. The remaining fuel in the end gas simply lacks sufficient octane rating to withstand this combination of heat and pressure.

Detonation causes a very high, very sharp pressure spike in the combustion chamber but it is of a very short duration. If you look at a pressure trace of the combustion chamber process, you would see the normal burn as a normal pressure rise, then all of a sudden you would see a very sharp spike when the detonation occurred. That spike always occurs after the spark plug fires. The sharp spike in pressure creates a force in the combustion chamber. It causes the structure of the engine to ring, or resonate, much as if it were hit by a hammer. Resonance, which is characteristic of combustion detonation, occurs at about 6400 Hertz. So the pinging you hear is actually the structure of the engine reacting to the pressure spikes. This noise of detonation is commonly called spark knock. This noise changes only slightly between iron and aluminum. This noise or vibration is what a knock sensor picks up. The knock sensors are tuned to 6400 hertz and they will pick up that spark knock. Incidentally, the knocking or pinging sound is not the result of "two flame fronts meeting" as is often stated. Although this clash does generate a spike the noise you sense comes from the vibration of the engine structure reacting to the pressure spike.

One thing to understand is that detonation is not necessarily destructive. Many engines run under light levels of detonation, even moderate levels. Some engines can sustain very long periods of heavy detonation without incurring any damage. If you've driven a car that has a lot of spark advance on the freeway, you'll hear it pinging. It can run that way for thousands and thousands of miles. Detonation is not necessarily destructive. It's not an optimum situation but it is not a guaranteed instant failure. The higher the specific output (HP/in3) of the engine, the greater the sensitivity to detonation. An engine that is making 0.5 HP/in3 or less can sustain moderate levels of detonation without any damage; but an engine that is making 1.5 HP/in3, if it detonates, it will probably be damaged fairly quickly, here I mean within minutes.

Detonation causes three types of failure:

1. Mechanical damage (broken ring lands)

2. Abrasion (pitting of the piston crown)

3. Overheating (scuffed piston skirts due to excess heat input or high coolant temperatures)

The high impact nature of the spike can cause fractures; it can break the spark plug electrodes, the porcelain around the plug, cause a clean fracture of the ring land and can actually cause fracture of valves-intake or exhaust. The piston ring land, either top or second depending on the piston design, is susceptible to fracture type failures. If I were to look at a piston with a second broken ring land, my immediate suspicion would be detonation.
Another thing detonation can cause is a sandblasted appearance to the top of the piston. The piston near the perimeter will typically have that kind of look if detonation occurs. It is a swiss-cheesy look on a microscopic basis. The detonation, the mechanical pounding, actually mechanically erodes or fatigues material out of the piston. You can typically expect to see that sanded look in the part of the chamber most distant from the spark plug, because if you think about it, you would ignite the flame front at the plug, it would travel across the chamber before it got to the farthest reaches of the chamber where the end gas spontaneously combusted. That's where you will see the effects of the detonation; you might see it at the hottest part of the chamber in some engines, possibly by the exhaust valves. In that case the end gas was heated to detonation by the residual heat in the valve.
In a four valve engine with a pent roof chamber with a spark plug in the center, the chamber is fairly uniform in distance around the spark plug. But one may still may see detonation by the exhaust valves because that area is usually the hottest part of the chamber. Where the end gas is going to be hottest is where the damage, if any, will occur.
Because this pressure spike is very severe and of very short duration, it can actually shock the boundary layer of gas that surrounds the piston. Combustion temperatures exceed 1800 degrees. If you subjected an aluminum piston to that temperature, it would just melt. The reason it doesn't melt is because of thermal inertia and because there is a boundary layer of a few molecules thick next to the piston top. This thin layer isolates the flame and causes it to be quenched as the flame approaches this relatively cold material. That combination of actions normally protects the piston and chamber from absorbing that much heat. However, under extreme conditions the shock wave from the detonation spike can cause that boundary layer to breakdown which then lets a lot of heat transfer into those surfaces.

Engines that are detonating will tend to overheat, because the boundary layer of gas gets interrupted against the cylinder head and heat gets transferred from the combustion chamber into the cylinder head and into the coolant. So it starts to overheat. The more it overheats, the hotter the engine, the hotter the end gas, the more it wants to detonate, the more it wants to overheat. It's a snowball effect. That's why an overheating engine wants to detonate and that's why engine detonation tends to cause overheating.

Many times you will see a piston that is scuffed at the "four corners". If you look at the bottom side of a piston you see the piston pin boss. If you look across each pin boss it's solid aluminum with no flexibility. It expands directly into the cylinder wall. However, the skirt of a piston is relatively flexible. If it gets hot, it can deflect. The crown of the piston is actually slightly smaller in diameter on purpose so it doesn't contact the cylinder walls. So if the piston soaks up a lot of heat, because of detonation for instance, the piston expands and drives the piston structure into the cylinder wall causing it to scuff in four places directly across each boss. It's another dead give-a-way sign of detonation. Many times detonation damage is just limited to this.

Some engines, such as liquid cooled 2-stroke engines found in snowmobiles, watercraft and motorcycles, have a very common detonation failure mode. What typically happens is that when detonation occurs the piston expands excessively, scurfs in the bore along those four spots and wipes material into the ring grooves. The rings seize so that they can't conform to the cylinder walls. Engine compression is lost and the engine either stops running, or you start getting blow-by past the rings. That torches out an area. Then the engine quits.

In the shop someone looks at the melted result and says, "pre-ignition damage". No, it's detonation damage. Detonation caused the piston to scuff and this snowballed into loss of compression and hot gas escaping by the rings that caused the melting. Once again, detonation is a source of confusion and it is very difficult, sometimes, to pin down what happened, but in terms of damage caused by detonation, this is another typical sign.

While some of these examples may seem rather tedious I mention them because a "scuffed piston" is often blamed on other factors and detonation as the problem is overlooked. A scuffed piston may be an indicator of a much more serious problem which may manifest itself the next time with more serious results.

In the same vein, an engine running at full throttle may be happy due to a rich WOT air/fuel ratio. Throttling back to part throttle the mixture may be leaner and detonation may now occur. Bingo, the piston overheats and scuffs, the engine fails but the postmortem doesn't consider detonation because the the failure didn't happen at WOT.

I want to reinforce the fact that the detonation pressure spike is very brief and that it occurs after the spark plug normally fires. In most cases that will be well after ATDC, when the piston is moving down. You have high pressure in the chamber anyway with the burn.

To be continued and finalized in next Fly About…...

NAC Fellowship

Catch up with friends at the Members Bar
on Saturday and Sunday nights
from
5.00pm to 7.00pm
great prices and good people, what more could you ask for.

Northam Aero Club, Withers Street, Northam

Drop in to find out what is happening around the Aero Club.

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WANTED

The Club has need of a digital TV

The old one has gone to the big TV store in the sky
If anyone has a Digital TV they would like to donate or sell at a reasonable price, please call Matt on 0407873700

NORTHAM AERO CLUB

BAR ROSTER 2016—2017

FEBRUARY		
4th-5th	-	Crofty
11th-12th	-	Dave
18th-19th	-	Peter
25th-26th	-	Howie

MAY		
6th-7th	-	Crofty
13th-14th	-	Dave
20th-21st	-	Peter
27th-28th	-	Howie

MARCH		
4th-5th	-	Matt
11th-12th	-	Dave
18th-19th	-	Mike
25th-26th	-	Crofty

JUNE		
3rd-4th	-	Matt
10th-11th	-	Dave
17th-18th	-	Mike
24th-25th	-	Crofty

APRIL		
1st-2nd	-	Peter
8th-9th	-	Dave
15th-16th	-	Howie
22nd-23rd	-	Matt
29th-30th		Mike

JULY		
1st-2nd	-	Peter
8th-9th	-	Dave
15th-16th	-	Howie
22nd-23rd	-	Matt
29th-30th		Mick

Bar Hours

IF UNABLE TO DO YOUR ROSTERED DAYS PLEASE MAKE ARRANGEMENTS TO SWAP WITH SOMEONE

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NEXT CLUB COMPETITION

9am Sunday 14th May 2017

The Northam Aero Club Committee meeting will be held at the club rooms on

Sunday 14th May 2017 at 1:00pm
