MCN's guide to

From the Sahara to Timbuktu our experts tackle extreme heat

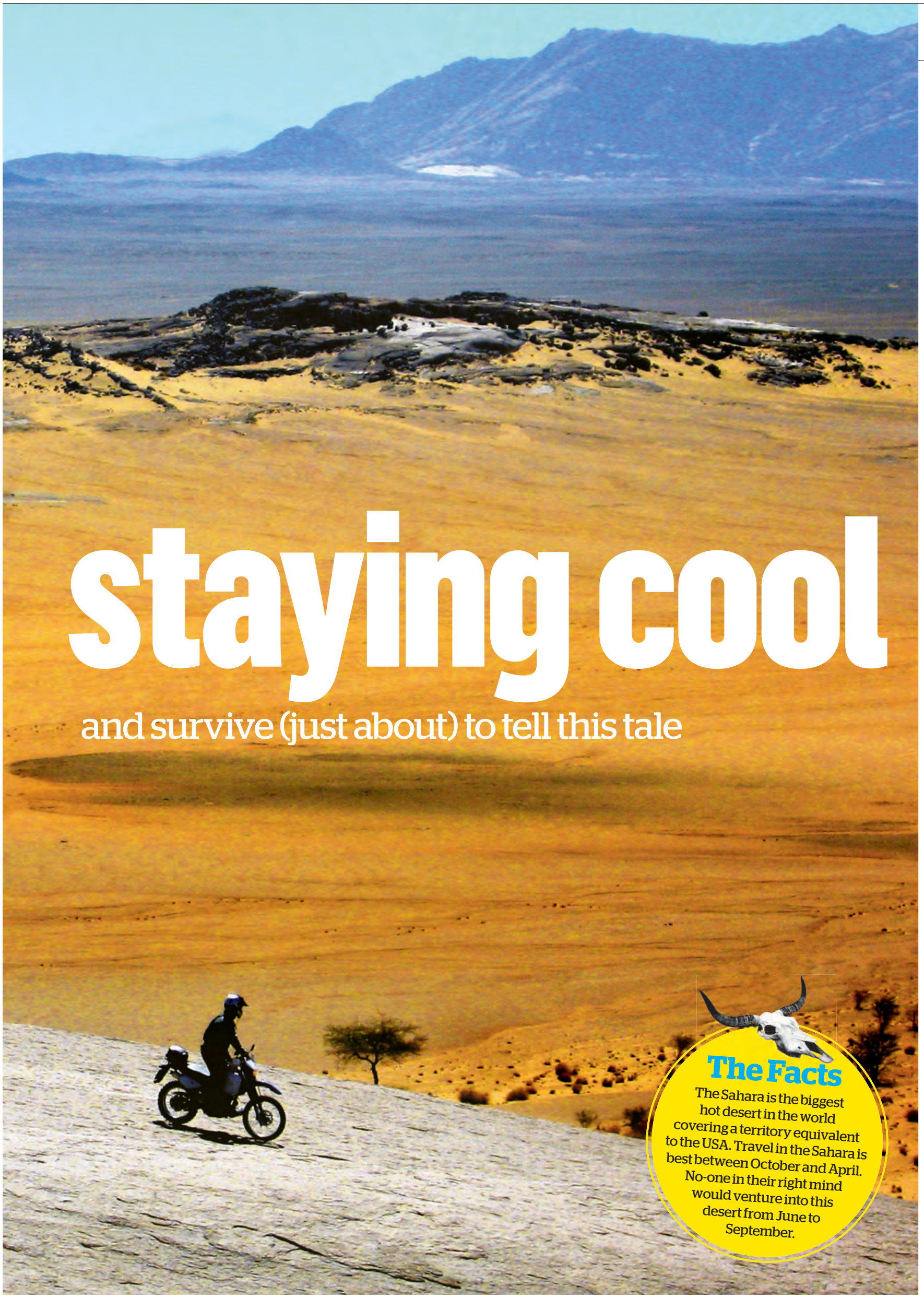
By Andy Davidson
STAFFWRITER

We all love the heat – that delicious warmth soaking into the back of our necks, pale blue skies, a beating sun, warm fingertips and glistening forearms. To the British it's a delicacy, a luxury we motorcyclists yearn for like kids with our noses pushed up against window panes, bored and waiting for the last trickle of rain and the first sign of summer.

As the last drop falls and the first rays of sunshine flood in, we don leathers and rush out to play. But as much as we love it, heat can be dangerous. We're not running around in shorts with water guns anymore. We're wearing heavy gear, riding 100˚C machines, probably not drinking enough water and riding further and longer than ever.

With August 2014 tipped to be a record-breaker, this guide covers the extreme elements of heat, from the world's largest hot desert to what it's like to race the Petronas superbike while it's on fire. While you may not ever get to do any of that, the heat can still creep up on you. And you never know, you may find yourself in Mali one day, roasting in 55˚C with no water. So read up, drink up and stay cool.

CHRIS SCOTT



staying cool

and survive (just about) to tell this tale

50°C SAHARA

Some like it hot, *Chris Scott*

Once I crossed the Atlas I descended into the cauldron of the Saharan interior. By 10am it was too hot to think straight, and as I rode south the heat rose to 50 degrees. As the cliché goes, it was like riding into a fan oven or standing in front of a ginormous hair dryer. I had to stop every 30 minutes for a drink and I found myself knocking back 10 litres of water a day.

That was all my bike could carry so water became an obsession. When I tried to stretch out those intervals to make the water last, a dryness crept down my gullet. Dehydration bakes you from the inside as you breathe in air 10 degrees hotter than your body. At night I'd wake up croaking with a bone-dry mouth and have to splash it back into shape using a couple of litres.

Now I understand that without water or shelter, in two days you'd be too far gone to help yourself. With my brain frazzled, I rode where I shouldn't have and got in trouble with the police, lost some days and on the way back north started feeling ill. I realised all water and no salt was giving me a dull headache. I drank some salty water and felt less bad surprisingly quickly.

Things can get a lot worse than that in the Sahara, and pretty quickly too. In the late 90s I was among the first riders to get into Libya and soon found myself riding across the Hammada el Hamra plateau, a 300-mile track with only two known wells. It was April, a time of year when temperatures accelerate quickly, often accompanied by sandstorms.

> 'Unexpected heat had riders passing out and drivers literally dying at the wheel'
>
> CHRIS SCOTT, ADVENTURER

There's no solution to carrying enough water when it's over 40 degrees in the desert. The remoteness and exposure added a level of threat which made it feel like walking a tightrope. Further north, in neighbouring Tunisia, the unexpected heat had riders flaking out and drivers literally dying at the wheel.

I ended up getting lost, veering into the dunes and running out of fuel. Luckily I was with two Germans in a jeep; they left me with 20 litres of water – maybe three days' worth if I lay still in the shade. They returned that afternoon, having come across an oasis with a fuel dump. I still wonder to this day what it would have been like to lie there for days, watching the water level drop in the jerry. You can't afford to make mistakes out here.

And you don't have to go to Libya in April to get out of your depth either. A couple of years ago, two Portuguese brothers were riding behind Erg Chebbi in southern Morocco on big Honda Varaderos. It was June and they'd been

Continued over

The Facts

The Sahara is the biggest hot desert in the world covering a territory equivalent to the USA. Travel in the Sahara is best between October and April. No-one in their right mind would venture into this desert from June to September.

» struggling to keep the heavy V-twins moving, when the third rider in the group observed they were more than just exhausted. He went off to look for help, came back within an hour, but found the brothers dead from heat stroke – the hot-weather equivalent of hypothermia. That's how quickly it can all go wrong when you're pushing your body in extreme temperatures and it's not the first time it's happened.

The best advice I can give is don't head off into remote arid regions during very hot weather alone; the margin for error is just too small. So stay away from the Sahara (including southern Morocco) in summer, just as you'd not tackle Everest in winter or lay on an al fresco wedding during the Amazonian wet season. If you do ride in the heat, use rehydration tablets and drink frequently, rest in the shade (take your own if you have to), know where water or help might lie ahead and read my survival tips!

Extreme heat survival

Wrap up to keep cool. It's a normal reaction to want to strip off and wear as little as possible when it's hot. However, exposing your skin to air that's hotter than your body temperature (37˚C) will only increase your body temperature and make you feel worse. Riding in a T-shirt will mean that with the combination of the sun and the hot air whipping over you, the cooling layer of perspiration on your skin will evaporate faster than your body can produce it. Then you will sweat more to compensate and dehydrate even faster, you'll feel better up to the point when you pass out. So seal your jacket cuffs, close all vents and let a humid sub-climate develop against your skin to stop your body drying out. Your gear will insulate your body from the hot air surrounding it as you keep your perspiring skin in the shade. The best way to keep cool is to wear a soaking wet T-shirt under your jacket; you'll be amazed at the difference it makes – but you must be sealed up or it will dry out.

Plain water isn't enough

When it's very hot you're losing more than water in your sweat; vital mineral salts and electrolytes are also flushed out. Guzzling water will quench your thirst but it won't replace the electrolyte your body needs to function.

Mix a teaspoon of table salt with four spoons of sugar in a litre of water. Or get in the habit of dropping sports rehydration tablets into your water container. In case of severe exertion, use pharmaceutical oral rehydration salts (ORS) but treat them like medicine, not a drink.

I've watched people who were staggering around one minute recover just like that after a shot of ORS. Mild dehydration starts when a person has lost just 2% of their total fluid. The signs are easy to recognize: thirst, loss of appetite, dry mouth and headaches.

If you lose more than 5%, riding your motorcycle is going to get challenging. So before you set off for a long ride in the heat, drink a lot of water as hydration should start 24 hours before. Use a wearable hydration system and carry on drinking when you get off your bike: it can take up to two hours to rehydrate. Try to avoid cold water and ice, which can shock your system, making it harder for your body to absorb.

Turn over for surviving Senegal

Think this doesn't affect you?

We lose half-a-litre of sweat a day doing nothing, but we could lose a litre an hour riding on a hot day in the Lake District. Dehydration kicks in once 2% of our water volume has been lost, by the time you feel thirsty you are already there. Go over that and it's severe headaches. Go to 15% and it's organ failure.

TIPS

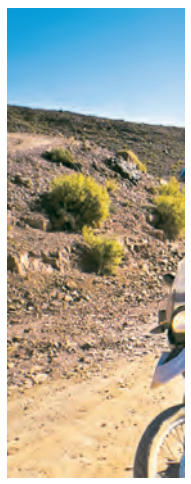
- Dark colours absorb heat, light colour suits reflect it
- **Keep your boots on, otherwise the ground and engine will heat your feet and swell them up**
- A helmet provides insulation against hot air and protects from the sun
- **Soak a scarf with water and wrap it around your neck, it will micro chill the blood passing through the carotid artery in your neck on its way to the brain**

Find shade, rest and rehydrate

CHRIS SCOTT

In extreme heat, add salt and sugar

No trees? You'll be glad of your own shade



'Don't go off into remote arid areas alone in extreme heat; the margin for error is too small'

CHRIS SCOTT, ADVENTURER

BOILING BIKES

OLD SCHOOL - AIR COOL

Why keeping your bike cool isn't all about water

Chris Scott

AUTHOR, 'THE ADVENTURE MOTORCYCLING HANDBOOK'

The benefits of one engine-cooling system over another are not clear cut. Liquid-cooled engines don't necessarily run cooler than air-cooled, if anything the liquid enables them to run hotter, but the temperature in the barrel varies less and is more evenly spread which enables cleaner, more powerful and more efficient engines.

The problem is the liquid-cooling system is the cause of more than half of engine breakdowns in the desert, and stuck in traffic on a hot day, some radiator fans are barely better than wafting a newspaper.

Heat-shedding efficiency varies greatly from model to model. Take Honda's CG125, in developing countries these air-cooled, carb-fed dinosaurs are ubiquitous. Their secret is they're not trying to put out 120bhp/per litre, like the flash bikes we run. But nor are they producing minimal emissions. Air-cooled engines need to run relatively rich (higher fuel-air mix) to keep the exhaust port cool, and that is not compatible with exhaust fumes that are good for the daisies.

Despite the complication, liquid-cooling is best in the long run, but better still is any cool-running motor, however it's cooled.

Even the best desert bikes can get stuck

1988 YAMAHA XT600

Chris Scott's ultimate desert bike

1 A rack keeps baggage off the silencer. My previous Ténéré caught fire when baggage pressed on the sidepanel alongside the silencer.

2 No screen on this Yamaha Ténéré but a small one is a good idea.

3 Water bottle holder (Camelbaks hadn't been invented back then).

4 Sawn-off mudguard to improve airflow, this XT600 was prone to hot cylinder heads.

5 Michelin Desert tyres remain stiff even at low pressures needed for traction in soft sand. Less carcass flex reduces heat build-up, wear and punctures.

6 Small oil cooler came standard but, away from steady highway cruising, the cooling benefits are probably negligible.

7 Engine running 20-50 motor oil – probably more effective than the oil cooler.

8 An O-ring chain tends to expand over a long day and appear slack, but it will cool and retighten overnight.

9 Take care opening sealed fuel containers like jerrycans. When shaken around petrol builds up pressure like a can of Fanta and heat makes it worse.

PROS & CONS

WATER-COOLED

✚ Improved engine longevity

✚ Enables hotter but leaner running motors – more fuel efficient; higher performance; reduced emissions

– Added complication of radiator, water pump, thermostat and hoses

– Failures in cooling systems account for most breakdowns

AIR-COOLED

✚ Simple and it works – but best add a temperature gauge

– No cooling when stood still

– Only low-tuned engines produce little heat

– Runs richer than water-cooled, so less fuel efficient

– Can wear out sooner than water-cooled engines

Visit: saharaoverland.wordpress.com for more info on Chris Scott

You might want to strip, but covering up works best

'Heat exhaustion is characterised by impaired mental function, fainting, fast heart rate and breathing, a body temp over 40°C, dry skin, zero sweat and goosebumps. Get the victim into a bath as water conducts heat faster than air'

✚ DR. PAUL ROWE

AFRICA HOT DESTINATIONS

When it really is a matter of life or death, ***Simon and Lisa Thomas***
368,000 miles, **78** countries, **11** years and counting

It's 55 degrees and I feel like a boil-in-the bag chicken. We're riding our loaded BMW GS's at walking pace and the heat that's washing over me from my now 170 degree engine is horrendous.

Christ, just breathing feels like I'm sipping air from a furnace. In Senegal's southeast corner we've been riding a stony cattle track through bush scrub for two days and only covered 69 miles. We left Kedougdu with 40 litres of water; we have four remaining.

We're exhausted and my mouth tastes like a bag of arse covered in dust. Yesterday was tough and we hoped today wasn't going to be worse. Satadougou village sits just inside Mali and only three miles from where we camped last night.

Mistake 1

We thought we would be there in no time, until I slam on the brake, my jaw hits the tank and a knot of panic launches from my gut into my mouth. Perhaps it was the heat, dehydration, inexperience, stupidity or that we just miss-read the map but neither Lisa nor I had interpreted the meandering Senegal/Mali border as a river.

"It's too deep to ford and there's no sodding way I'm riding back the way we came," Lisa states adamantly.

At the bottom of the steep riverbank an ancient pirogue (dug-out canoe) rests at the water's edge. "I have a boat, it's OK for one ton!" exclaims the pirogue owner triumphantly in heavily accented African French. "That's not a boat," I murmur flatly. "It's a hollowed-out tree trunk".

Either ride back or grow a pair, load the bikes and trust that this guy can get us across. With the help of four local men from Satadougou, we load the bikes into the protesting pirogue and precariously paddle them across. On the far side we pay £1.19, three crumpled cigarettes and a BMW key fob. I take a long slow hot breath of relief, what feels like my first in the two-and-a-half hours the process has taken. The 10 litres of river water we've siphoned into our water bags will get us to the small village of Kenieba just 50km farther north.

Mistake 2

The track has narrowed, the rocks are breeding, the heat is debilitating and I'm learning to hate my GPS, which is now just a reminder of exactly how little distance we've covered. We've crossed half a dozen dry riverbeds and negotiated countless steep gullies. My concentration is waning and my balance is faltering.

Stopped to stretch our now cramping calves, Lisa, her head bowed, whispers: "why didn't we soak ourselves and our riding kit in the river to cool down?" "I didn't even think about that" I confess, shaking my head, suddenly ashamed not to have recognised this now obvious cooling opportunity.

Mistake 3

Amidst a sea of sun blonde tall grass there is no shade and we guzzle the water, not for a second thinking about keeping a reserve and assured that we'll reach Kenieba a mere 30km farther north by afternoon.

Mistake 4

My lips are parched, the water's gone

TIPS

- Try to cover as many miles as you can between 4am and 7am, it's the coolest time of day
- **Don't forget that in high temperatures an easy ride can quickly become challenging**
- Try to take a route into higher elevations where it's cooler
- **Take something to make your own shade**

We all dream of adventure, but it's not all a bed of roses

SIMON AND LISA THOMAS

MALI

- The 24th largest country in the world
- Population: 14.5 million
- Region: ¾ of Mali lies within the Southern Sahara
- Mali is one of the poorest countries in the world
- Most famous city: Timbuktu

The crossing cost £1.19. A fortune in a land where average pay is 69p per day

'That's not a boat, it's a hollowed-out tree trunk, but we have to trust this guy to get us across'

SIMON THOMAS

and my mouth is drier than a dead dingo's donger, to quote an Aussie mate. My brain's having a hard time processing the track ahead.

Lisa's already picked herself up after three heavy spills. She's not saying much. Exhaustion is setting in and my hamstrings threaten to cramp each time I stand on the pegs. We've thought about stopping to camp but small bush fires are popping up and the thought of burning to death in our tent while we sleep isn't really working for us.

Feeling like a pair of beaten desert donkeys we roll into Kenieba late in the afternoon and for £6 find a room with a dirty mattress on a concrete floor. Without warning my legs tighten and I'm gripped in a vice-like pain as every sinew in both my legs spasm and contract so violently I'm panicked.

Only with the help of two men who've rushed to help get me walking, do the cramps finally subside. These are the worst cramps I've ever experienced. Lisa and I have drunk two full glasses of water mixed with salt. In the corner of the dusty room our once black riding jackets are powder white and standing rigid upright on the floor, we've both lost so much salt through sweat

Continued over

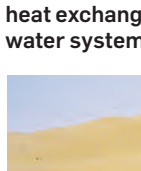
'The problem with sweating is that you're losing salt and water, and if you replace this by drinking only water you will end up depleting your body of salt. This results in one of the early symptoms of heat-related illness – heat cramps.'

DR. PAUL ROWE

BOILING BIKES
HOT METAL

Engine heat is all about friction

Neil Spalding
AUTHOR OF 'MOTOGP TECHNOLOGY'

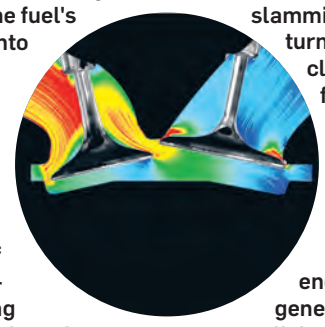


Heat is an inevitable consequence of friction, and it's friction that's responsible for the majority of heat generated by a motorcycle. Manufacturers have found various ways of reducing it, which brings benefits as more of the fuel's energy is converted into forward motion. But still only 30% or so of the fuel's energy makes it to the rear wheel.

Engine designers work to reduce heat right from the start of the cycle, with a well-designed inlet drawing in fuel and air efficiently and getting it swirled up and into the combustion chamber, which makes sure the right amount of fuel/air mixture is in the best possible place to get an effective burn.

Many bikes are working to reduce friction from the moment you press the starter button, with heat exchangers that use the bike's water system to warm up the oil as quickly as possible on start-up, so it can effectively reduce friction inside the engine, then to draw heat away from the oil to stop it overheating and becoming too thin.

While improved surface finishes and coatings can cut friction and modern oils are thinner and demand less of the oil pump, there is only so much that can be done – inevitable actions like the piston slamming up and down and turning the generator, clutch, gearbox and final drive chain all create friction. Each bearing and surface adds to the price, which mounts up and ends up as heat.



Large, powerful engines typically generate more heat than small, low-powered ones, but high revs on a smaller engine will create more friction while a big piston can have a detrimental effect on the combustion chamber, again increasing friction.

So it's about a trade-off for manufacturers to ensure the best possible combination for keeping down friction and, consequently, heat generated.

Only 30% of the energy in your petrol makes it to the rear wheel

'Cramps, nausea and hallucinations weren't included in our plans'

SIMON THOMAS

» that we've crystallised our riding gear. I didn't even know that was possible. Today we started late; it took half the day just to rehydrate. We're north of Kenieba. The horizon's been nothing more than a melted blur all day. The heat's unrelenting, my thermometer reads 56.6 degrees. It's 6pm and we're wobbling along a narrow track, squeezing our bikes between thickets of barbed thorny bushes. The 45 litres of water we're carrying mean we've got an extra 45 kilos to deal with. We've downed 15 litres each today, neither of us need to piss, our throats are parched and we've stopped sweating.

It's taken hours to make just a few kilometres and the water's getting low. At the bottom of a steep escarpment we find dappled shade under a lone acacia bush, it's decision time. To our east, we can see the narrow track that we'll need to take, to reach Kassama. As exhausted and dehydrated as we are, it looks like a cluster f**k waiting to happen and we've already got a ton of shit-creek action going on.

I don't want to do this anymore. Our once dreamy bike adventure is backing us into a corner and snarling. "We can't risk getting stuck in those mountains," Lisa finally babbles. I grunt in agreement. We'll head north to Bafaoulabe, for Christ sake it's only 56 miles as the crow flies.

By the side of the track I watch helpless, as Lisa, unable to think coherently sits on her bike, kills the ignition, drops her head and cries. We've got to keep going. We made the decision to head north two days ago. On the outskirts of Bafoulabe, the smooth tar under our wheels feels strange, the quiet before a storm. Without a village or a well in sight we'd ran out of water and resorted to drinking the brine from cans of vegetables we were carrying. Cramps, nausea and hallucinations weren't included in our dreams of adventure. Yesterday I'd stared blankly as I watched Santa Claus, complete with his team of reindeer, pull right past me on the track. Real enough to touch? Sure. Our kidneys ache like they've been hammered by Mike Tyson. We're lucky to have made it and we know it.

'Here's our hot picks'

DIFFICULTY RATING: 5 STARS = VERY DIFFICULT, 1 = EASY

LAS VEGAS

TEMPERATURE: 72°C
RATING: ★★★★★
Based in Nevada's arid desert we gazed in shock as the thermometers on the bikes recorded a heat spike of 72°C, and the road beneath us began to melt.

INDONESIA

TEMPERATURE: 35°C
HUMIDITY 80-90%
RATING: ★★★★★
Riding in 90% humidity was wearing. The roads were in poor condition and flooded but getting into the mountains offered respite.

AMAZON JUNGLE

TEMPERATURE: 35°C +
HUMIDITY 90%
RATING: ★★★★★
The 560 mile route along the ruins of the BR-319 is dotted with rickety wooden bridges, some up to 20m-long crossing sheer drops.

THE KALAHARI

TEMPERATURE: 45°C
RATING: ★★★½★
Covers 350,000 sq miles. It has a cooler climate than the Sahara as its altitude ranges from 600 to 1600 meters. Cold winters, hot summers.

INDIA

TEMPERATURE: 50°C
RATING: ★★★★½
We travelled through India in March and April 2010 when mean temperatures were the highest recorded in over 100 years, approaching 50C in many parts. Good timing eh?

THE GREAT VICTORIA

TEMPERATURE: 30-40°C
RATING: ★★★★½
The Great Victoria is the third largest desert in the world after the Sahara and the Arabian Desert. Other deserts mainly surround it.

Visit: 2ridetheworld.com for more information on Simon and Lisa Thomas

HOT RACING

IN THE HOT SEAT

If you thought the desert was hot, try a WSB bike on fire...

Case study 1 | Ducati 2004

When Ducati first came to MotoGP they concentrated solely on power and speed. Their powerful engine produced a lot of heat but to get rid of it they needed a big radiator which would have caused drag.

Instead, the engineers pressurised the cooling system and raised the boiling point of the coolant which meant the engine ran hotter. Ducati was left with great aerodynamics and a small but very hot radiator.

The Ducatis topped the speed charts but riders suffered badly from the heat. The initial bike had no radiator exhaust ducts to route air out of the fairing, so the hot air blew back directly over the rider and an engine running at 100°C meant everything it was bolted to ended up the same temperature.

Even the steering damper lost its oil because of heat-induced expansion. Eventually Ducati introduced a temporary fix: a new fairing with 'rider cooling ducts' and larger radiator exhaust ducts.

Case study 2 | Petronas 2003 WSB Oschersleben, practice

James Haydon: "Before this picture was taken I said to my wife: 'I think this bike is going to kill me, it's evil, I don't know what to do'. I decided to ride and halfway through the engine started to blow and fill the airbox with hot oil. It then spat out onto the exhaust and turned into flames.

"I saw what was happening, aimed for the barrier and jumped off just before it went up in a ball of fire. It wasn't the first time that happened, I think it set me on fire two or three times before. Anyway, the team fixed it up and I reluctantly got back on the next day for the race. Mid-race the gear box broke and the bike flipped me breaking my ribs, fingers and damaging my neck.

"They tried all sorts of things to cool it down at pitlane like fans and dry ice. It was by far the hottest bike I've ever ridden. Racing means sitting on an engine with a couple of wheels so it's always going to be hot, but this was intense." MCN

ICE BATH

PAEROA ROAD RACE, NEW ZEALAND FEBRUARY 2011

MCN SENIOR ROAD TESTER: ADAM CHILD

The temperature was pushing into the 30s, which might not sound hot, but I had only just flown in from a snowy UK and was getting ready to race straight away. I was about to put my leathers on when Tony Rees's (multiple NZ road race champion) wife offered some great advice. She removed all the beers from the mechanic's cooler and threw my under-suit into the icy bath. Before my race we dug it out and I slipped into it and chucked my leathers on top. We had to warn everyone to not use the murky ice at the bottom of the cooler!

Iced undies? Don't mind if I do