

Blown Out of Proportion

MY NAME IS BJØRNAR TYBERG AND I'M ALL THE WAY OVER IN NORWAY. THIS IS THE STORY ABOUT MY CAR, WHICH WENT FROM MY DAILY DRIVER TO AN ALL-OUT RACECAR. BESIDES THE WELDING, EVERYTHING WAS DONE BY ME. NO I DON'T WORK ON CARS FOR A LIVING - PLAYING WITH CARS IS JUST A HOBBY (I'M ACTUALLY AN EXPLOSIVES ENGINEER) - WHICH SEEMS BEFITTING AS I'VE BLOWN UP AND REBUILT MY WRX MORE TIMES THAN I EVER THOUGHT WAS POSSIBLE.

TEXT BJØRNAR TYBERG

PHOTOS JOACHIM NAESS







I had a major accident which would change my car's destiny forever.





I'LL LET YOU IN on a secret. My car, believe it or not, previously belonged to rally superstar Petter Solberg. The then blue 2003 STI V8 was Petter's company car the year he became WRC champion, so it certainly is something very special. I purchased it in January 2006 and had it for only an hour or so before I dropped it off at our local EcuTeK tuner for a remap and new exhaust. Back then I wasn't really after outright power; instead I wanted slightly more 'useable' power that would make the car more driveable.

Petter's STI was my daily driver on weekdays and on weekends I would take it to track days on ice (one of the benefits of living in a Nordic country! - Ed) for some fun. The track days were extremely addictive, and the next spring I had the car in for some coilovers from Australian company Drummond Motorsport, who are well known in rally circles.

During the summer I spent a lot of time researching and testing a variety of different wheel alignments. I also tested five different spring rates which, although tedious, allowed me to achieve the best handling setup for my driving requirements. Personally I wanted to get the chassis completely sorted before trying to coax more power from the engine, as I have a strong belief that handling is more important when it comes to fast lap times than a car that simply has loads of power.

After conducting around 3000km worth of setup evaluations on a variety of tracks, I had a major accident which would change my car's destiny forever. Coming into a sharp left I lost my brakes, and speared off the track hitting a tyre wall and the concrete barrier behind it. It was an enormous hit which not only set off all of the airbags but also left my STI with some pretty heavy damage. I was lucky that I wasn't hurt, but the car wasn't so fortunate. I pretty much had two options: throw it away or rebuild it. I chose the latter.

It took four weeks of non-stop work to get the STI back on the track. A new direction was brewing in my mind: I wanted to spend more time track racing, and so I decided to build it specifically for this. After such a big accident, the first alteration I wanted to do was to fit a roll-cage. After looking at a variety of different cage designs, I decided on a WRC-spec roll-cage sold by Custom Cages in the UK. As I was in Norway this posed a bit of a problem because it required welding. To get around this, a good friend of mine - who is a very good at welding - did some test welds and sent them over to Custom Cages for approval. The quality of his work was certified, and by the time summer had ended I had the full roll-cage welded into my STI, which had been stripped back. The FIA also approved the roll-cage for competition use.

I was back racing on ice by January 2007 and was immediately satisfied with both the car's handling as well as the chassis rigidity. So next on the agenda was to extract more power. The ECU was replaced with a MoTeC M800 (more Australian parts!) plug and play board, as I wanted to use a MAP sensor instead of MAF as it would make tuning so much easier.

Although I changed the turbo to an external 'gated GT3076 - which produced 276kW and 480Nm of torque - I soon grew bored of the power output and craved more. Yet again I turned to an Australian company, installing an APS TSR70 turbo kit, twin scroll exhaust manifold and 525 front-mount intercooler. However the biggest change was the purchase of a stroked 2.5-litre long block from legendary engine house Cosworth, which features a billet crankshaft.

I did all of the engine assembly myself, eventually having the car ready for tuning on New Year's Eve 2007. I was extremely fortunate that my local tuner, AutoConsult, were willing to tune my car on NYE, especially considering it was on their rollers until 7pm! Initially we only did a base map so that I could break the engine in properly before I attempted any serious ice driving again. After such a long build, it made sense to take things slowly and make sure everything was done right.

Over the following months I had some great track days on ice... until I hit a massive hole while going sideways in fourth gear. The impact sheered my right-rear coilover clean into two pieces and I must say I was pretty fortunate that it didn't cause me to go careening off the circuit. The right-rear was left at a sickening angle, and considering the speed I was doing I was lucky the car didn't flip!

In March 2008 I heard of a new racing series that was about to debut in Norway. It offered a novel racing format - each race weekend consisted of two races: one short (seven laps) and one long (30 laps) which allowed for pit stops and driver changes. As I studied the race regulations I realised that my STI would be eligible with a few minor modifications.



My application was accepted and in May I turned up for my first ever 'proper' competition. In the lead up to the race I switched to E85 fuel and retuned the car, giving me 336kW at all fours and 560Nm. The first competition race went extremely well. I set the fifth fastest time in qualifying out of the 26 competitors, and finished the race fourth overall and second in my class. The second longer race wasn't as good. Although the STI was quick, after my pit stop on lap 17 I experience brake failure. Luckily I was able to pull the car up in time, saving it from any damage.

The thrill of racing was pulsating through my veins, and I couldn't wait for the four weeks between rounds to pass. Sadly though, I experienced more bad luck. In qualifying the manifold cracked, and by the time we had it repaired we had missed the first race. We did however have it ready for the second enduro, but we'd be starting from the back of the grid. Henrik - my second driver - did a sterling job of cutting through the field, and by the driver change pit-stop, we were in eighth position. Just as I attempted to rejoin the race I discovered the gearbox was locked in between first and second, leaving me with no choice but to retire. It was heart-breaking to say the least.

When I returned home I pulled the STI apart to assess the damage. The centre differential and gearbox were heavily worn, so I purchased a new six-speed 'box with DCCD, an STI GpN LSD for the front and a Cosco mechanical LSD for the rear. Once this was all done, I headed over to Sweden for two races that were being held there. Yet again, I experienced more problems. Although the practice sessions went without a hitch - the STI completed nearly 100% trouble-free, data-logged laps - the qualifying session saw an injector malfunction which caused a catastrophic engine failure. I was starting to think I was jinxed, but all of the dramas are part of racing.

I immediately placed an urgent order with Harman Motive for a new block and internals, which arrived a few days later. Yet again I was elbow-deep rebuilding the engine, with the STI up and running three weeks later. During testing I experienced a recurrence of the exhaust manifold cracking, and so I made the decision to pull out from the rest of the racing season and instead rebuild the STI into an all-out racecar for the following year.

The STI was stripped back to a bare shell so the chassis could be seam-welded. I modified the engine bay so I would have more space for intercooler piping, I made a new floor in the boot and I even designed a new centre console. Once these were completed, I decided to re-spray the STI from its trademark World Rally Blue to Pure White instead.

While it was getting painted I decided to rebuild the engine once more, this time going even more extreme. I had the block bored out to fit 100mm pistons and shaved a few hundredths off to bump the compression slightly. The water routing was modified and I installed a dry sump system purchased from Australian Subaru specialists, Tony Rigoli. By chance I was able to get my hands on an early-model Cosworth intake manifold which I inverted. The injectors were also upgraded to 1600cc units and I replaced all of the fuel lines and rails.

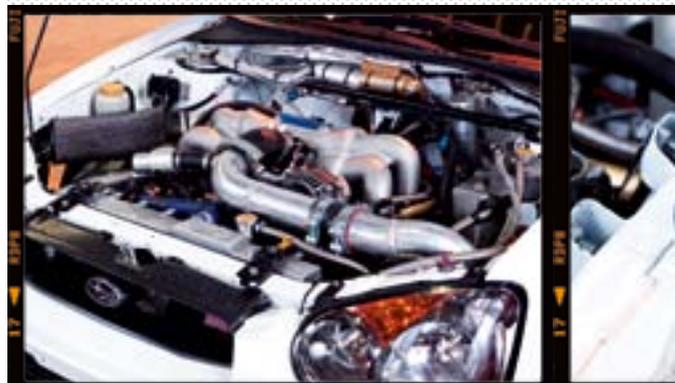
Having experienced two manifold cracks already, I enlisted Neil Clark from Thermal Logic in the UK to fabricate a replacement exhaust manifold out of Inconel, the same metal used for Formula 1 headers. Inconel is a hell of a lot stronger than steel and I had my fingers crossed that this would be the solution to my cracking issues.

I also made a new exhaust from the turbocharger back, with 3.5-inch downpipe splitting into two 3-inch sections under the car with 3-inch silencers to provide enough flow and be as quiet as possible. Due to the track regulations the maximum noise level is 100dB and with this setup it measured between 94-95dB.

A fuel cell was installed into the boot along with an oil tank, catch can, breather tank, fuel cooler, feeder pump and battery. The rear diff cooler, transmission cooler and main fuel pumps were all mounted in the space vacated by the factory fuel tank.

Once the chassis was back and I had everything installed, I began working on an all-new wiring loom to shed some unneeded weight as well as accommodate a few additional sensors. I hadn't done anything close to a car's wiring harness before, and it proved to be a lot more time consuming than I had planned. It took a few weeks before it was ready for testing. The strangest thing is, maybe because I had used up all of my bad luck, it came to life first go!

For the exterior I had a friend manufacture replacement rear door skins and side skirts out of carbon, which saved a lot of weight. The front windscreen was sourced from a WRC car, which is made of thinner glass and also has a demister which is perfect for ice racing. The rear windscreen and rear passenger windows were replaced with Lexan alternatives. +



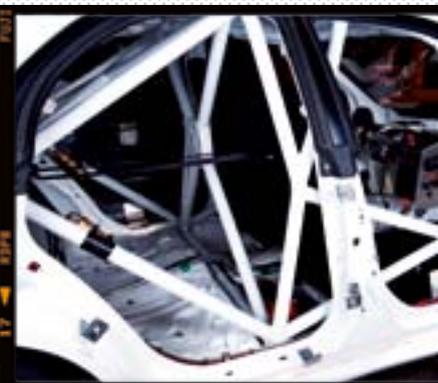


The car was tuned on New Year's Eve.





The manifold is made from Inconel, the same metal used in F1.





By June of this year the STI was finally ready. We performed a new re-tune to check if everything was OK and the results we found were astonishing. The new intake/exhaust manifold and turbo-back exhaust gained nearly 80kW. Now the Subaru put down 415kW and 590Nm on the dyno at about 18 psi boost.

I debuted the new car at Arctic Circle Raceway, which is just north of Norway. In my opinion it's the best track in the country and in the summer months there's daylight 24 hours a day! This was a shake-down test, allowing me to iron out some small hiccups in the electrical system and also allowing me to reprogram the sensors so they read the right values.

In July I headed over to Sweden for the first race with my new setup. As I've only ever done a handful of laps around this particular course, I booked a test session the day prior to the race to familiarise myself with the layout and to fine tune its setup. By qualifying I was brimming with confidence, but during my flying laps I always caught traffic. It was incredibly frustrating, with the final grid having me in 26th position out of 32 racers.

During the second lap of the first race I lost fourth gear; it wouldn't engage at all. There weren't any crunching noises or anything like that; it just wouldn't slot in. Eventually I finished the race sixth in my class and 19th overall, which wasn't a bad result considering I was missing the most crucial gear for this particular track. Despite the gearbox problem I lined up for the second race, finishing third in my class and 12th overall.

I didn't open the transmission casing until I had returned home, and that's when I discovered that all of fourth gear's teeth were broken off. Luckily a friend of mine had a spare gearset in his garage, so I've since fitted this as a temporary fix.

The development of my STI project is still ongoing, with my attention concentrated on strengthening the gearbox. I'm contemplating an aftermarket gearset or, just maybe, a sequential system. It never stops does it? Perhaps the dramas I've had are part of fate's twisted joke on me being an explosives engineer; it seems I'm always diffusing things blowing up on my car! +

SPECIFICATIONS

OWNER

Bjørnar Tyberg

RIDE

2003 Subaru Impreza WRX STI

ENGINE

Subaru EJ25T 2.5-litre horizontally-opposed four-cylinder turbocharged

ENGINE MODIFICATIONS

EJ25 custom closed deck bored 100mm with compression ratio 8.7:1, Cosworth 100mm pistons, Cosworth H-rods, Cosworth billet crankshaft, Cosworth machined head, Cosworth intake valves (+ 1mm), Cosworth exhaust valves (+1 mm), Cosworth camshafts, Cosworth 0.7mm head gasket, Litchfield water pump, custom made water routing, Cosworth reversed intake manifold, 70mm throttle body, custom made dynamo bracket, Neil Clark custom made Inconel steel exhaust manifold, Garrett GT35 turbo, Tony Rigoli oil pan, Moroso 3-stage dry sump, Earl's filter relocation, Peterson's 3-gallon oil tank fitted in trunk, Koyo radiator, 1600cc injectors, custom made fuel rails, custom made fuel lines, Aeromotive fuel pressure regulator, Bosch 044 fuel pump x2, Aeromotive A1000 feeding pump, all fuel and oil lines made from stainless steel braided hoses/aluminium tubing with AN fittings, MoTeC M800 ECU, MoTeC E888 expander module, MoTeC Sport Dash Logger, MoTeC Shift Light Module, MoTeC GPS 10Hz, MoTeC CDI 4 ignition, Mercury CDI coils, Magnecor leads, NGK racing plugs, Neetronics DCCD controller, custom made wiring loom, sensors (exhaust gas temp on each cylinder, water temp, oil temp, oil pressure, fuel pressure, intake temp, boost and wideband lambda), oil cooler, gearbox cooler, rear diff cooler, servo oil cooler, fuel cooler

DRIVETRAIN

Exedy triple-plate clutch, JDM 6-speed close ratio gearbox, STI GpN LSD front, DCCD center diff, Cosco 1.5/2-way rear diff, RCM carbon fibre propshaft, DSS Stage 5 rear axles, DSS front axles, '06 STI front hubs machined to fit 5x100 PCD and '03 coilovers, '06 STI rear hubs machined to fit 5x100 PCD

SUSPENSION & BRAKES

Proflex EVO 3 55mm coilovers (3-way adjustable) with remote reservoirs, Öhlins springs, modified Drummond Motor Sport top mounts front and rear, Whiteline swaybars, Whiteline adjustable rear trailing arms, Whiteline/STI GpN bushings all over, front ball joint relocation and tie rod adapters, Tilton pedal box, custom made brake lines, hydraulic handbrake, Performance Friction floating rotors front, StopTech rotors rear, Performance Friction 01 brake pads front and rear.

WHEELS & TYRES

Summer: OZ Ultraleggera 17x8-inch gold wheels x8 with 24/61-17 Michelin slick tyres, Speedline 17x8-inch silver wheels x4 with 24/61-17 Michelin rain tyres, STI wheels 17x7.5-inch with Toyo R888 tyres, Winter: OZ Racing 16x5.5-inch wheels with 145/80 - 16 Pirelli studded tyres, Speedline 16x5.5-inch wheels with 145/80 - 16 Michelin studded tyres

INTERIOR

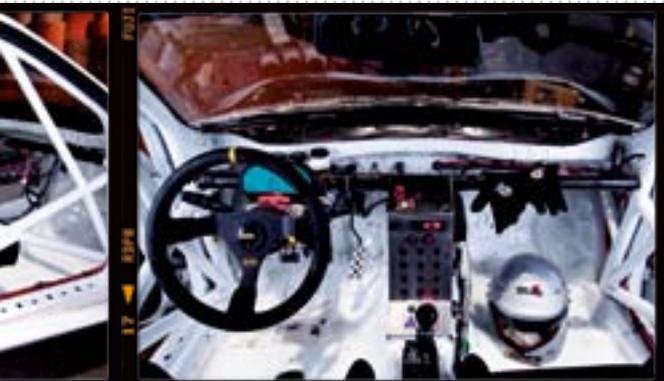
Stripped interior, OMP WRC seats, Schroth 6-point harnesses, custom weld-in roll cage WRC spec, OMP steering wheel, carbon fibre door cards, custom made aluminium center console

EXTERIOR

Cusco front lip, Cusco/custom made aluminium undertray, RCM bonnet vent, S204 carbon fibre rear wing, carbon side skirts, carbon door shells rear, WRC front window with heat, Lexan windows rear side and rear, STI aluminium boot lid

THANKS

Brett at Celtic Motorsport (former employee at Harman Motive) who provided me with an incredible service and helped source a lot of parts he doesn't normally sell (www.celticmotorsport.com), AutoConsult (30 years experience with building and tuning rally and race cars) who helped me with the dyno tuning and gave me a lot of answers when I ran into things, Ståle Holck (Holo Traktor Service) from whom I borrowed the garage for the welding, and Henrik (Mr IceMan) my co-driver and sponsor worker ♣



THE BUILD PROCESS

TEXT CHARLES KHA

PHOTOS BJØRNAR TYBERG & JØRN INNSET

WITH LITTLE HESITATION, Bjørnar Tyberg goes down as one of the most dedicated car owners to have ever graced the pages of ASM. Seemingly faced with a never-ending bout of misfortune, Bjørnar has constantly taken his problems on the chin. While anyone else would have thrown in the towel and given up on such a demanding project, Bjørnar has stuck with his STI and rebuilt it bigger and better after each and every hurdle.

What is truly amazing is that he's undertaken all of the modifications - sans welding - himself. Bjørnar will be the first to admit that doing everything with his own two hands has made his project all the more difficult. However through a systematic approach, trial and error, and pure dedication, he's created an AWD weapon that can be deployed in even the most inclement of conditions.

The images taken during his STI's build are testimony to Bjørnar's meticulous attention to detail. Crucially, Bjørnar's approach isn't that of a conventional modifying enthusiast, but rather that of a race car engineer. Starting with the foundation - the chassis - he's constructed a formidable platform that ensures not even a single ounce of performance is lost. And the only thing more frightening than his insane commitment is how much he's poured into this STI! 🏆



PHOTOS NSK RUDSKOGEN



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PHOTOS JØRN INNSET

