How I spent my summer vacation,
OR
My visit to the GasGas Factory

Author Background. I've ridden motorcycles since I was 10. A neighbor had a Honda Mini-trail z50 which needed an engine installed. They said I could ride it if I could get it running. (I've always been good with mechanical and electrical things.) At age 12, I was given a Honda SL100. That taught me even more about motorcycle in terms of electrical and mechanical systems. By age 17, I was working at a motorcycle dealer in Iowa as a mechanic/parts boy/salesman. I really learned all I needed to know about life at that shop. It's hard to believe that I started there 29 years ago.

I now have a few degrees in engineering, and run the Intelligent Vehicles lab at the University of Minnesota. My family has seven motorcycles; four street bikes (two for my wife, two for me), and three dirt bikes. I ride a GG EC300, my 12 year old daughter rides a KTM exc200, any my 10 year old daughter rides a TTR-125. We try to trail ride every weekend, and do a week-long trip in the Black Hills once per year.

My GG dealer is GoFasters. I've been interested in GG since 2002, when I bought my kids their first dirt bikes. I finally traveled to GoFasters to check out the bikes in great detail, and to ask a lot of questions. I was very impressed with both GoFasters and the design of the GG bikes. The design of the GG bikes is very straightforward, with no funky, goofy parts. GoFasters had in stock every part I asked about, which gave me even more confidence in the brand. I decided to join the club.

Arranging the tour. My wife had decided that the family unit needed a tour of Europe. We hadn't done a big vacation in three years, so we were due. My wife is a great fan of Europe, and lives to do European holidays. The itinerary was aggressive: Germany, France, Italy, Spain, and England in three weeks. Hmmm.

"Spain? Where in Spain?"
"Barcelona."
"Wanna' tour the GasGas factory? It's nearby in Girona."
"Sure."

Now, not many people take factory tours on vacation, and even fewer families do it. But, to be honest, I love engineering and manufacturing. I really enjoy seeing how people design, how they manufacture, how they assemble, how they test, and how they measure quality. I like it even enough to do factory tours on vacation. Luckily, I have a family tolerant of my geeky ways. They were all cool with the idea, so we decided that we'd try to get a tour. We devoted one day of three in Barcelona to GasGas.

With just a few email exchanges between Mark at GoFasters and me, the tour was set up. Josep Pou, the GasGas Race Team(s) Manager, agreed to provide us a tour on June 21,

2007. I was stoked, and looked forward to what was surely to be the best day of the vacation.

Homework. Visiting the GG website, one is treated to a front view of the factory and a bit of background on the transition into the new building. However, you only see the front view of one building. They don't have much on their website, so I thought about what I wanted to learn.

- Are there other buildings?
- Do they have another factory site?
- How much does GG actually manufacture themselves, and how much is done to their specs?
- How big is the engineering/design staff?
- How do they do quality assurance?
- How do they view the future?
- How do they see 2T engines in the future?
- Where is the company going?

I really was interested in the company and how they operated. I see quite a bit of chat on the GasGas rider forum about the future of GasGas in the US, and wanted to see if GG is here for the long run. I think they are.

SPAIN. Spain rocks. It's replaced Italy as my favorite EU country. At least the eastern side has; we didn't' travel any further west than Barcelona (which isn't very west). My wife had rented a GREAT flat in Barcelona. We hit Barcelona on the 20'th of June. After making the final flat arrangements, we walked to lunch, and then to the Olympic swimming stadium. (My wife was training for a team swimming crossing of the English Channel, so swimming was big on this trip.) After swimming and more walking, we decided on an early dinner (9:30 PM). It was the festival of Saint Joan, which is (apparently) celebrated by special breads and LOTS of fire crackers.

Figure 1 shows a photo of the roof of the building across from our flat. The Spanish like their TV!

The next morning, we hopped the train to Girona, the city with the train station nearest the GG factory. After talking to the world's crabbiest cab driver (the ONLY crabby person in all of Spain), we were off. Yee haw!

Eight Euros later, we arrived at the factory. We were going to take a picture of our arrival, but the receptionist ran out of the front door, and asked us (I think) what the hell we were doing. We explained we were here for a factory tour with Josup Pou. That seemed to calm her down a bit. The front of the building is shown in Figure 2.

Before walking in, we noticed many street bikes in front of the factory. Mostly Suzuki and Yamaha street bikes; I don't recall any Kawasaki, Honda, or BMWs. There were also a couple of scooters. Most of the bikes had GasGas stickers on them. Passion for the brand runs deep at the factory.

Once the receptionist realized we were legit, she rang up Josep. Josep is a GREAT guy, very cordial, and genuinely happy to see us. We chatted for a bit, and then on to the tour.

Factory. Factory might be strong word. When I think factory, I think machine tools, foundry, fabrication, etc. GasGas is really somewhere between system integrator and manufacturer. Basically, all of the parts needed to assemble a motorcycle are provided to the factory. 2T engines, for example, are assembled at the factory using parts which are manufactured to GG specs. GasGas does all of the design work, and monitors quality control. Given the volume of production, this approach is the optimal way to approach the manufacture of the bikes. Cylinders come in fully machined, honed, faced, and ready to be assembled. Cases, sidecovers, cranks, etc., all come to the factory with the final machining complete. It might be better to think of the "factory" more as an assembly plant.

Photos. Surprisingly, photos were allowed during the tour!! I have NEVER been in a factory environment where photos were allowed. My daughters were in charge of pictures, so the quality won't be so hot. We also missed quite a bit of the tour photos because we didn't ask about photos until after we saw someone else with a camera. Sorry about that.

Factory layout. The factory consists of three floors. The layout (as I remember it…I think these are close. The only doubt in my mind is the location of the race shop…I think it is on the second floor behind the firewall by the 4T cylinder head assembly area) is shown in Figure 3. This building was occupied in 2002, having moved from the old factory located about 8 kilometers to the east. The old factory is now the home of HEBO clothing and accessories (which we also toured…more later).

Factory workers. The factory workers seemed cool; I only talked (through Josep) to the technician who was installing valve guides and seats in the 4T heads. Things are pretty casual; workers wore shorts, GG shirts, and sneakers for the most part. I didn't see any safety shoes, and very few pairs of safety glasses. As more of an assembly division, this seems reasonable.

Components. It is important to note that most of the components are sourced locally. For instance, a local foundry does all of the casting, and local machining facilities do the fine machining on the castings. A local company manufactures frames to GasGas specifications. Ignitions (Japanese Kokusan), carburetors, fuel injection systems, plastics, suspensions, wheels, tires, etc., are sourced from suppliers worldwide.

For instance, wheels are supplied to GasGas as a single unit: tires, those (awful) rim locks, rims, spokes, hubs, disk rotors, and rear sprockets (for the rear wheels). An example of wheel assemblies is shown in Figure 4.

GG has a specific assembly schedule, and orders parts to support that schedule. Ignitions, for instance, have a six month lead time (no "Just in Time" there), so assembly schedules have to be determined pretty far out in advance.

Sometimes the European holiday schedule is blamed for the "new model" delivery in the states, but given the relatively small volume of production of GasGas (14,000 units per year), they may not hold the upper hand with suppliers. KTM sells way more bikes than GG, and probably is able to maintain a closer relationship with suppliers. They schedule assembly based on component availability and market schedules.

Assembly. GasGas runs two line assembly operation; the south line is the motorcycle assembly line, and the north side is the quad assembly line. GG schedules the assembly of bikes (and therefore parts orders) months in advance. When we were at the factory, Pampera 125s (unique to the European market) were being assembled. The assembly line moves at a speed where the workers are busy, but not so hurried that problems or issues can't be addressed on the line. When you buy your new GasGas, you're not paying for someone goofing off on the assembly line. These guys are working.

Prior to installation, every engine installed in a bike is run on a dyno to make sure it runs, and makes power to within specification. Once the engine performance is documented, it is placed in the bike, and the rest of the assembly follows.

Assembled US Spec and European Spec bikes are shown in Figure 5 and Figure 6.

Machining done on site. GasGas does perform some machining operations on site. The key to four stroke engine reliability is really the cylinder head; that's really the element which separates the 2T engines from the 4T engines. To ensure the highest quality, highest longevity in the 4T engine, GG has devoted considerable resources to cylinder head manufacture and assembly. By controlling this aspect of the engine, GasGas really controls performance and durability.

GasGas receives raw cylinder head castings from a local foundry. Those are shown in Figure 7.

There are three CNC machining stations on the second floor of the GG factory. The machinging stations clean up the heads in preparation for the installation of the valve seats and guides. The machining stations are shown in Figure 8. (Sorry for the photo quality, the batteries in my daughter's camera were low).

Machined heads ready for seats and guides are shown in Figure 9.

Seats and guides are HAND Pressed by one technician. Heads are heated in an industrial oven, and guides and seats are kept frozen, just like at my shop at home. Once the heads cool, the valves, springs, and seals are installed. Surprisingly, rarely is valve lapping performed. Once the springs, valves, and seals are installed, the head is placed on a jig, and is pressurized. If the pressure drop is small enough (which happens a great

percentage of time), the cylinder head is ready to go (without valve lapping), and is forwarded to the engine assembly area. The installation area is shown in Figure 10.

Race Shop. Even more surprising was the visit to the race shop. During our visit, Trials Competition bikes were being assembled in the shop. All sorts of tricks, like magnesium engine cases, swing arms, etc., were to be found. The magnesium cases were trick, and surprisingly light. Here the techs were serious about getting the bikes ready. The factory bikes receive a complete rebuild after each competition. Magnesium engine cases are shown in Figure 11.

Research, Development, and Design. GasGas employs 17 engineers and designers who are responsible for the design, development, and introduction of the entire GasGas line. This is REALLY a lean workforce, yet they are able to produce competitive machines year after year. In contrast, Yamaha probably has that many engineers assigned to just the WR 250F. Given the limited resources available, GG does a phenomenal job.

How do they do it? They concentrate on the fundamentals. Most people think that to be competitive, a complete redesign of a motorcycle line is needed every three years (Japanese business model). GG simply doesn't have the resources to do this. Instead, by relying upon a fundamentally sound design (engines, for example), they can tweak and make the incremental improvements necessary to compete at a high level. Instead of a three year design cycle, their cycle may be 10 to 12 years.

By getting the 10-12 year cycle right, the subsequent tweaks and modifications provide the necessary incremental improvements to maintain a competitive product. I also get nervous when the design cycle is three years. "All new, all improved, huge performance upgrades!" So my three year old bike isn't very good? Were you holding out on me? That approach sells bikes, but kills resale, and really lessens *value* to the consumer.

GG also maintains a close relationship with their suppliers. For instance, new frame development is performed in concert with the frame supplier. GG used to have on-site tube bending and welding jigs for frames at their R&D shop. However, over the years, the relationship with the frame manufacture solidified, and now the GG engineers work with the supplier to develop prototype frames. By taking advantage of this relationship, the development cycle can be shortened

As a consumer, I like this long product design cycle philosophy. That means I can incrementally upgrade my bike for a reasonable cost, and I am also assured parts availability. This can't be said for many of the other brands. One joke I have learned over the years reflects this:

> Question: How do you prevent the spread of the bird flu?
>
> Answer: Assign it a Yamaha part number, and no one will be able to get it!

I can go to GoFasters, order any part, and be assured they'll promptly be sending one along.

A few photos of the R&D shop are shown in Figure 12 and Figure 13.

Warehouse. The GG factory is also the spare parts warehouse. The cache of spare parts occupies nearly 2/3's of two floors in the factory. As we were walking through, we saw a stack of the older nickel plated frames (just like my 2002). Rest assured, if you bend your frame beyond repair, you'll be able to get a new one; see Figure 14.

GG commitment to support of the bikes, even the older bikes, is impressive. They're here for the long run.

HEBO. The factory tour lasted from 10:00 AM to 12:30 PM. At 12:30, they close the plant for lunch/siesta. The family unit headed out to lunch, and returned at the Factory at 2:30 PM. Josep then took us over to the HEBO facility, which consists of a design building and a warehouse. We were allowed into the showroom to check out all of the new gear. The office manager, who was SUPER nice, showed us the 2008 catalog, and allowed us to pick out what we wanted. We purchased T-shirts, hats, and left with a new found respect for the work that goes into HEBO gear. When my SIDIs die, my next pair of boots will be Hebo. I have big hands, and Hebo gloves fit me better than any other brand. The Hebo showroom is shown in Figure 15.

As an aside, HeBo roughly translates in Catalun (the local dialect) as "the best." It is really good stuff. If you get a chance, try some. You'll be pleased.

History. GG has a rich history, as we well know. They appreciate their history and success, and have devoted a section of the factory to their bikes. They have on display championship winning bikes, military bikes (developed under military contracts), and even a prototype street bike. My wife and kids really liked that. Photos are provided below in Figure 16- Figure 18.

End of the day. After we finished our tour of Hebo, Josep dropped us off in the historic section of Girona. It is beautiful. Lots of shops, stores, and Gelato. We toured for about an hour, then headed back to Barcelona.

We decided to eat in the flat that evening, so after a trip to the DIA (local grocery chain), we had a nice meal. While doing dishes at about 10:00 PM, I heard what I first thought was a Rolling Stones cover band (June 21 is the international day of music (at least in Europe (note the irony))). Anyway, it wasn't a cover band, it was the Stones! They were playing a concert at the Olympic stadium about a mile from our rented flat. My wife, daughters and I sat our balcony, and listened to the entire concert. We could hear it perfectly. The first part of the play list included "Start Me Up", "Let's Spend the Night Together," "Wild Horses," and "You got me Rockin'." It was a great end to a really good day. (I am happy to report that Spanish beer is quite good, too.)

Summary. GasGas production volume has been constant, and about 14,000 bikes and quads per year. They are committed to the 2T engine; I held a catalytic converter equipped 2T exhaust which was heavy, but also allows the 2T engine to meet upcoming emission standards. (See Figure 19.) I asked about fuel injection/direct injection, and the word was that with catalysts and proper carburetor tuning, it isn't necessary (yet). This is in line with the GG philosophy of incremental development whereby something isn't done just to be sexy, but it's done to be competitive.

I also met Brian Gillen, who is the director or R&D. He's young, smart, and enthused about the brand. He's also an American who has worked previously for Magnetti Marelli for HD and other motorcycle manufacturers. *The guy leading the R&D effort for GasGas is an American*. I think that if a unified dealer voice was heard, and that the dealers had a voice in distribution, GG can become a much stronger brand in the US. The fact that an American is in charge of R&D sends a strong message. We should capitalize on this, and support dealers here in an effort to strengthen the GG brand here in North America.

Figure 1. View of Barcelona Roof Tops from our Flat. The Spanish like their TV.

Figure 2. The author at the GG factory. It's a pretty building, but function comes first. (Note the pallets in the building front).

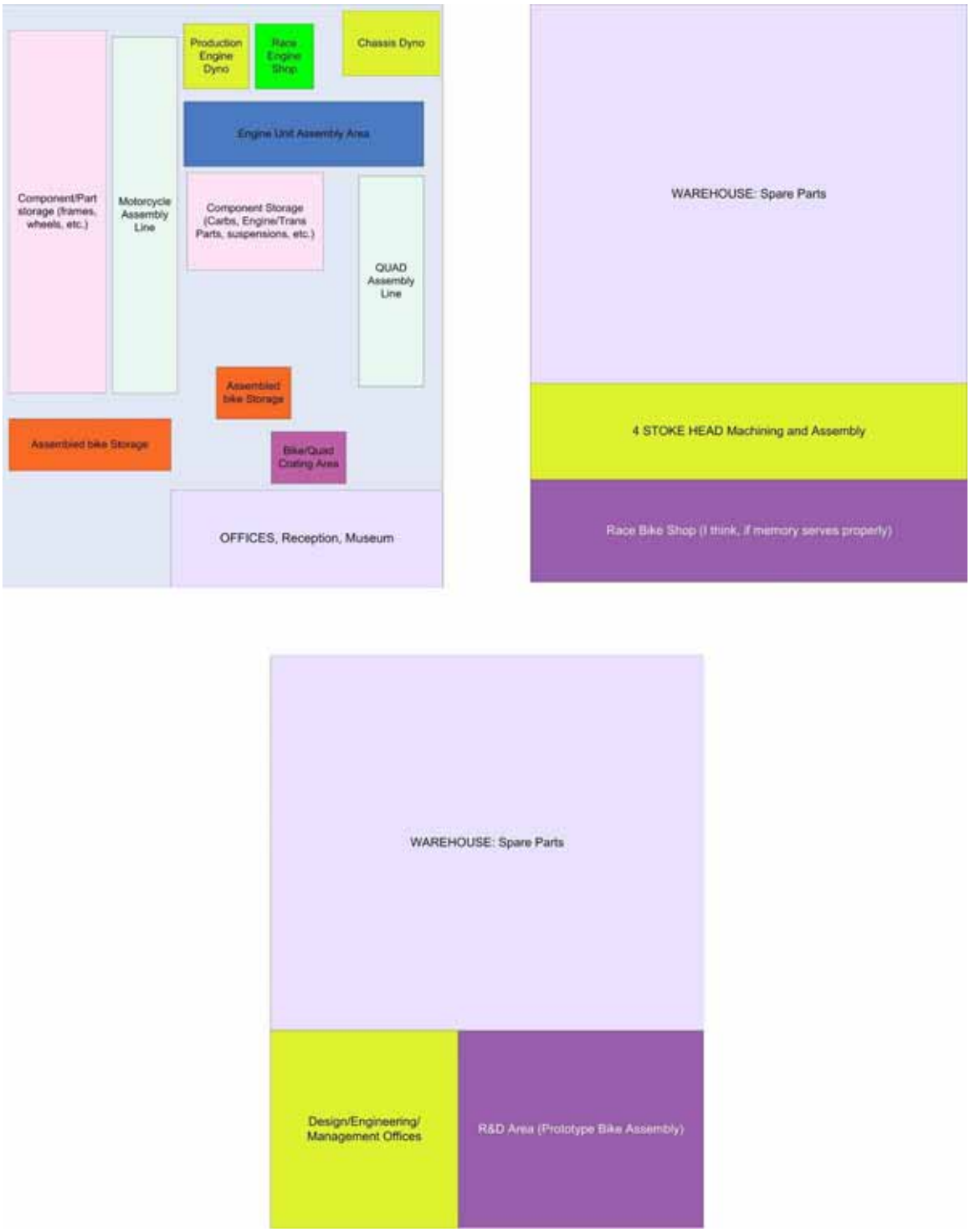

Figure 3. Layout of the GG factory. The factory space is used quite efficiently. Note the warehouse of spare parts…those aren't parts for assembly, but for bikes already sold. Parts availability isn't a problem, and this should comfort those thinking about the brand. I've had no problem getting any parts.

Figure 4. Wheel assemblies near the assembly line. Generally, wheels come laced with tires, sprockets, rim locks, and brake disks mounted. I am not sure of why tireless wheels are on the rack.

Figure 5. Foreground: assembled bikes ready for the US (note no 2T exhaust systems…FMF systems are installed in the US when the bikes arrive). Background: parts are in big blue crates. Further back in the photos are crates of PWK 38 Carbs, Marzocchi forks, etc. It's a gearhead's heaven.

Figure 6. Eurospec bikes. Note that the exhausts here are installed prior to shipment. From left to right: Meredith, Amelia, Kathleen (barely visible), and Josep Pou.

Figure 7. Raw 4T cylinder head castings, straight from the local foundry.

Figure 8. Three CNC machining stations for 4T cylinder heads. Sorry about the photo quality; low batteries precluded use of flash here.

Figure 9. Cylinder heads after final machining but before valve seat and valve guide installation.

Figure 10. Discussion of the valve guide/valve seat assembly process. This is THE GUY who assembled your 4T heads. Furnace used to heat heads is visible in lower right of photo. Pneumatic hose to check for valve leakage is passing right behind Meredith's head (yellow line). Freezer used to cool guides and seats is not shown. Arbor press used to seat guides and seats is to the right of the furnace.

Figure 11. 2T magnesium engine cases. These things are INCREDIBLY light and trick. Really a nice piece of work. I was nervous about dropping them; Josep looks nervous, too.

Figure 12.. R&D shop on third floor. New developments in the world of Trials.

Figure 13. More R&D shop. This is the Euro-spec Pampera 125. It's a four stroke with electric start and a nice LCD speedo/tach unit.

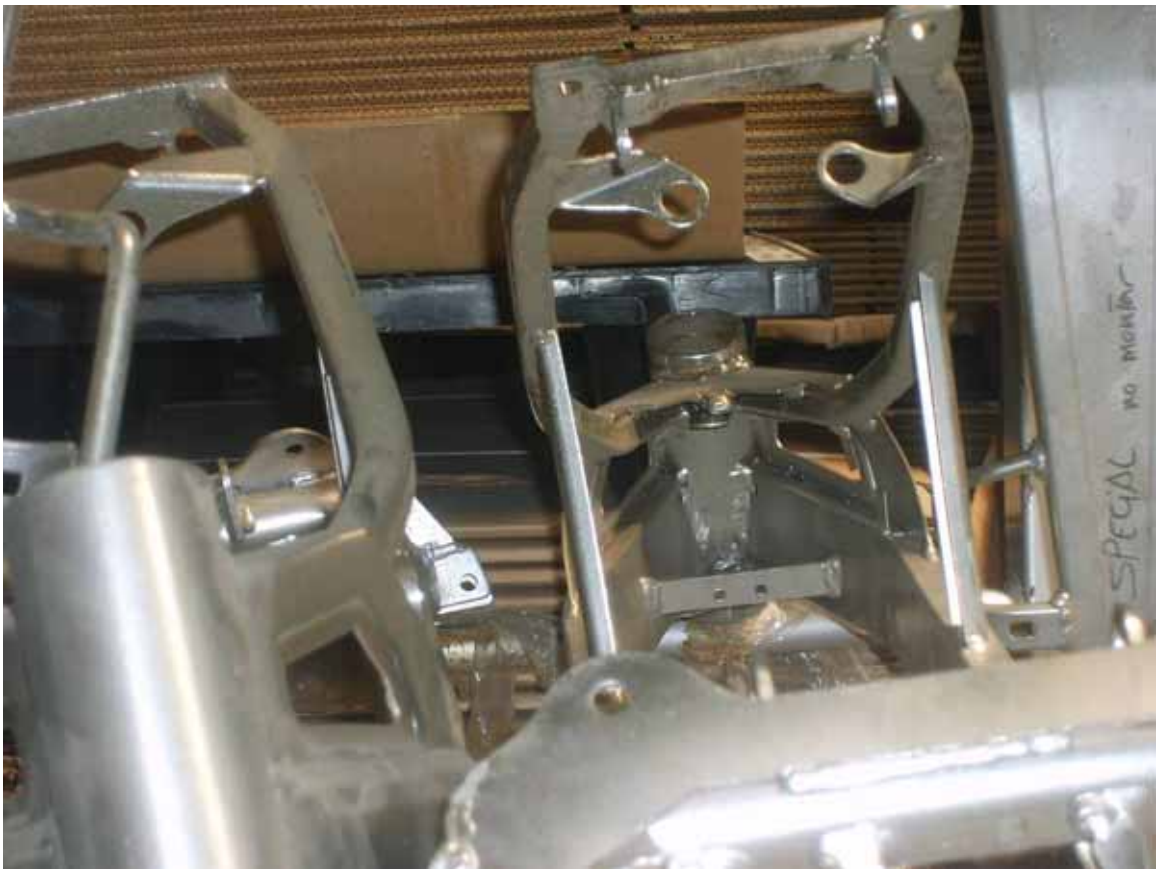

Figure 14. Nickel plated enduro frames. We saw about 20 in the warehouse.

Figure 15. Sweet hydration pack. I should have bought it, but since I already had one, I decided not to. Of course, a month later, I crashed and wrecked the one I had. Oh well.

Figure 16. The GG factory museum. There's quite a bit of history here. Military vehicles developed under contract are shown at the back (note roll cage); Paris-Dakar bike at very right. .

Figure 17. Here's what started it all: The first GG Trials bike. Engine by TM.

Figure 18. GasGas street bike. Looks like an old VFR.

Figure 19. Author with Catalyst-equipped 2T exhaust. Really heavy. The catalyst is the "traditional" honeycomb configuration. Weight might be due to dual layers for noise abatement and structural rigidity (rock damaged exhaust may crush honeycomb, restricting gas flow).