



GNB Bugle

Vacuum Excellence Defined

January
2011

Why an Average Machine Shop Can't Leak Check Properly By

Marc Putz, Assembly Supervisor

Most of us in the industrial manufacturing business are familiar with machine shops. They can be very dirty and oily—or not, but I think most experts will agree that it is a place for machining and not so much an area for leak checking.

Fabrication shops are awesome places. As a matter of fact, GNB has a weld area and a large machine shop. These are the places where the manufactured products of the world take final shape.

Sure some will have a leak checker, but that is not their primary focus. Leak checking is an acquired skill, and to be good, the technician must be in the right environment, practice good processes, have the right training, and possess well calibrated equipment. It is easy to miss or mask a leak—especially



A GNB technician leak checking in the new clean room

on large structures. Once a product is in the field, a small leak becomes a large expense.

At GNB, we have been building vacuum products for 43 years, and we have trained technicians who leak check every day. We are specifically experienced at building leak tight vessels. We have vacuum design engineers, manufacturing engineers, and an assembly and testing area that is designed for leak checking. This is what separates us from the rest.

Anyone can push buttons on a helium mass spectrometer and spray helium, but it takes an expert to

correctly interpret the information that is received. For example, ambient atmosphere has a certain percentage of helium in it. So, the higher the pressure during a leak check, the more background helium you will pick up. This could mask a leak in the test piece. Other items that mask/mimic leaks are cutting fluid, material surface conditions, sealing surface conditions, o-ring groove problems, trapped volume areas, weld flux and spatter, starts and stops in the welding process, deflection problems, and metal joining methods.

In the vacuum business we use terms such as: Out-gassing, Leak- Rate, Rate of Rise, Deflection, Virtual Leaks, Permeation, Trapped Volume, Torr, Millitorr, 1.0×10^{-9} cc liters sec, 1.0×10^{-3} Torr, Turbo Pump, Cryo Pump, Roughing Pump, Booster Pump, Residual Gas Analyzer, Response Time, Viscous flow, Transitional Flow, Molecular Flow, Vapor Pressure, Gas load (Q), Pumping speed (S), Pressure (P), $Q = P \times S$, and Material Out-gassing Characteristics.

Employees in an average machine shop do not fully comprehend or appreciate the importance of these concepts; thus, customers often do not get what they expect to purchase. For example, a customer recently called us and needed a little assistance. A vacuum chamber that was started by a reputable machine shop near us had issues. It was a case where the selling price was very low, and the end result was unbelievable...unbelievably bad. At first glance, the chamber did not look too bad. The welds looked nice and the workers took pride in their work. Upon close examination, however, they had used smaller pieces of material and spliced them to save cost. The welds looked good on the outside, but they welded both inside and out of the material. Consequently, there were voids in the inside welds. Other parts were warped from heat distortion, and the chamber doors could no longer seal. Although the chamber looked nearly complete, it was unusable as a vacuum chamber.

We are experts in vacuum. From the design to the final leak check, we apply all of the best vacuum practices. We like to think that we are the best at what we do—we are Vacuum Excellence Defined! For more information please visit our Web site at www.gnbvalves.com for our product line and click on our new vacuum units conversion calculator.

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The name of this newsletter is **GNB Bugle**. When we win a large order at GNB, we are excited. So excited, that our expert trumpeter (and human resources person), Amy Long, plays Reveille on a bugle over our loud speaker system. However, many of our representatives, stakeholders and customers cannot hear the exciting news and share our revelry. This newsletter is another method of communication and announcement, and thus it is aptly named **GNB Bugle**.

The Door to Success By Ken Harrison, President

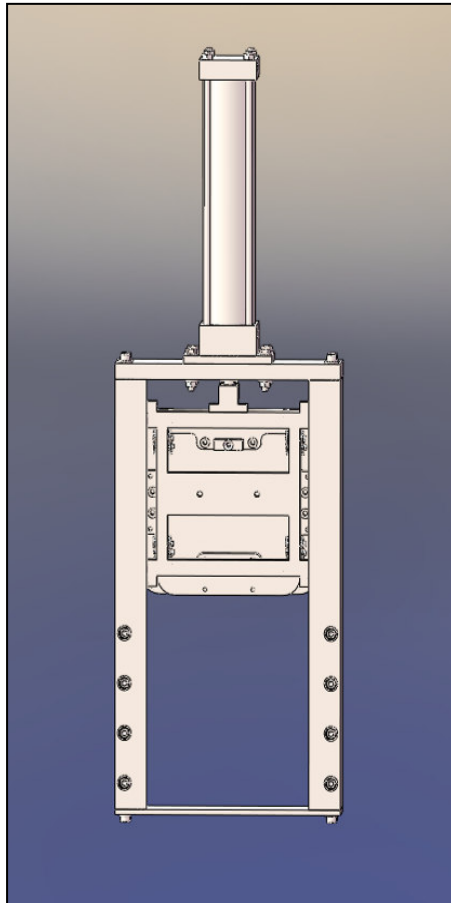
One of the simplest valves is a door valve. There are two reasons this valve is simple:

- It only needs to seal the easy way (the differential pressure helps the valve to seal)
- The valve mechanism requires no body or seals because it is always in atmosphere

Sometimes customers use gate valves as door valves. Although gate valves will work, it costs more than necessary. A valve that is designed as a door valve can be simple and relatively inexpensive.

GNB manufactures two types of valves specifically for the purpose of being a door valve. They are the flapper valve and the door gate valve. With a flapper valve, the door pivots around a shaft. This is a simple and cost effective mechanism, but it requires the space outside the vacuum chamber to allow the gate to swing 90 degrees.

A door gate valve has an advantage because it takes up less space, but it has more moving parts than a flapper valve. A second advantage is that it can have parts in common with other slit valves in the system. This can improve ease of maintenance.



Bodiless Door Gate Valve

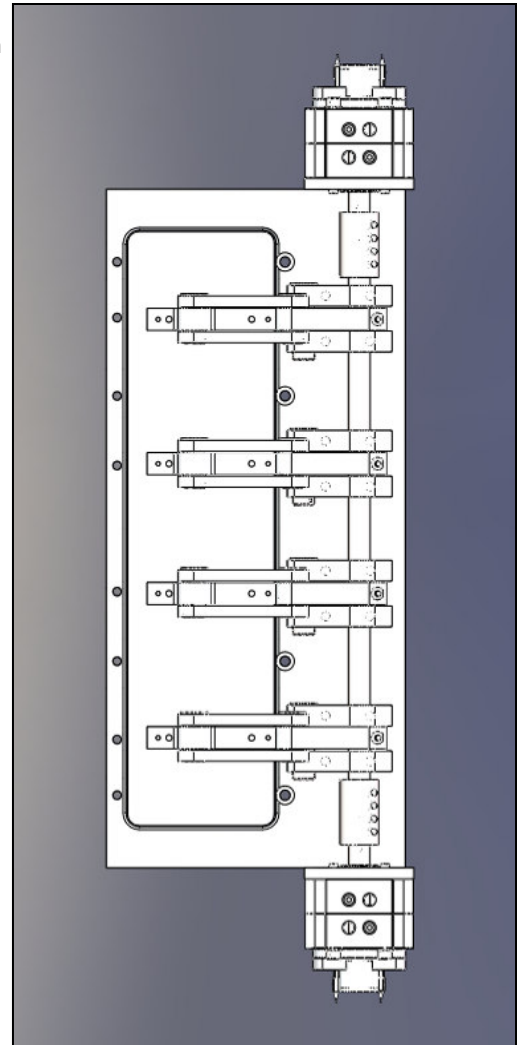
One special consideration that must be given to door valves is operator safety. Most gate valves are sandwiched between two items such as a chamber and a cryopump, thus there is no potential for an operator to insert any object into the valve. Because door valves are used primarily

for moving products between a room and a vacuum chamber, care should be taken to ensure that an operator cannot accidentally put their hand (or any other unwanted object) into the valve during operation. GNB offers the option of guards and shields that can prevent the chance of operator injury.

Finally, because the valves are simple, that does not mean users should sacrifice robustness or functionality. Sometimes, insert and "L" motion valves are used as door valves.

These are only effective if the chamber interface is perfect and the chamber does not experience di-

mensional changes from vacuum forces and thermal expansion during operation. GNB door valves are designed to overcome these issues. They apply pressure to compress the o-ring in the door and do not rely on the pressure differential alone for sealing. Furthermore, the door valves have adjustability so the gate can conform to its mating surface and the pressure on the O-ring can be adjusted all around the door sealing surface. The result is a valve that is very robust and will operate successfully under a wide range of applications



Flapper Valve

If you don't like something, change it. If you can't change it, change your attitude.

— Maya Angelou

A New Year's Resolution: Be an Excellent Professional

By

M. Kevin Mandeville Jr., Design Engineer

This year I resolved to become a better professional and a better engineer. While I know how I can be a better engineer, the challenge to become a better professional is a more interesting one. I had received a magazine which gave some advice on the matter, but as I did not actually read it before I gave it to a good friend of mine, I have decided to write my own article on what it means for someone like me to be an excellent professional. I hope you will find some wisdom in it as well.

Look like a Pro

In the early years of my career, I was swayed quite heavily by the allure of the engineering profession as one that was not beholden to the fashion world. A profession where bunny slippers and unkempt hair were signs of mathematical competence. I fear that by wearing ratty tee-shirts advertising concerts long since gone and not brushing my hair, I may have painted a picture of myself as having no concern for my personal image. I now desire to look professional. This does not mean wearing my three piece to work daily, but rather wearing clothes that are clean, neat, and fit well. It also means grooming myself more often than once a month. True, I still have my beard. But it is trimmed and my neck is shaved frequently. Additionally, by this time next year I plan to have lost a considerable amount of weight. These things will combine to give me a visual "WOW" factor and to look excellent.

Act and Feel like a Pro

In the past, "Pro" is not how people have described my behavior, but rather "Petulant." This coming year will see me learning to think before I speak, and filter out some of the unpleasanties that have marked my earlier arguments. A wise man once told me that emotional discipline is as hard as any other kind of personal control, but definitely worth it in the end. He was right about how hard it can be, but with perseverance I plan to see how right he was about its worth. Being right leads me to the next part of how I plan to be more professional this year. I know that I am always right. It's just an accepted fact. However, the trick to being right professionally is not to make people assume that I am right just because I am right, rather to make my point clearly, concisely, and, most importantly, pa-

tiently, so that they know that I am right. Lastly, as that last section shows, it is okay to have a sense of humor, provided that I keep it clean, appropriate, and well timed. Telling a customer that their angle valve is late because we used it to make hamburger patties is an example of not appropriate or well timed.

Acting like a pro also means interacting like a pro. Remember that anything you say will probably find its way around the shop. I know that I have to work on this and am very guilty of some non-professional interactions. This year, now that I realize my past sins, I will work on interacting with people, co-workers, vendors, and customers alike, with a professional's excellence.

Communicate like a Pro

The question I get most often is: "Huh?" This is partially due to my tendency to speak about 45% faster than my tongue can move, and this is partially due to my tendency to obfuscate discussion subjects via an intricate arrangement of excessive syllables delivered expeditiously on a monotonal frequency. In my attempts to be more professional, I will begin catering my word choices to the target audience, and save words like "obfuscate" for dealing with English majors. Speaking understandably is the first step to being understood. Writing professionally is something that I believe I am exceptionally competent in doing. If, dear reader, you wish to improve your writing skills, I would recommend some very helpful resources. Perhaps I can even write an article on improving written communication skills for the technical professional. Ultimately, I want the things I say and write to communicate effectively with an under pinning of excellence.

You may have noticed that none of these things have anything to do with my actual job function as a design engineer. In fact, not one of the improvements is specific to my career. However, these improvements are the little details that foster excellence by reducing personality-driven waste. By looking more professional and feeling more professional, I can be more confident in what I design. By communicating professionally, my customers will trust me and my professional advice. The effects are cumulative. Check in on me next year. I think that you will find that, as a professional, I am Excellent.



GNB, The Leading Supplier for Large Cryo Isolation Valves
By

Thomas Dobler, Customer Sales & Support Engineer

What are the reasons GNB is the leading supplier?

- GNB valves are available in all sizes from 4" (100mm) up to 72".
- GNB can be completely customized. We build the valve for you and do not force you to use a catalog product.
- GNB can build the valve with any actuator variant that you require (electric, pneumatic, manual,...).
- GNB can use different feed through and sealing technologies depending on your vacuum needs (elastomer or metal seals / bellows or shaft feed-through).
- GNB is equipped for the production of large components and can therefore offer you the best package available in the market. Please arrange a visit to GNB, and we will explain why we are the 1st choice for your large valve needs.

Why is GNB the best choice for your large valve needs?

- GNB valves are built for value and not just minimum production costs.
- GNB valves use a hardened stainless steel (no aluminum) mechanism that will last as long as you want to operate the system. Typically those valves are used for more than 20 years, and the only consumables are O-ring seals.
- GNB valves seal against 1.5bar both ways. This is important during cryopump regeneration when small overpressures can occur.
- GNB's unique sealing mechanism allows that most standard GNB valves can be opened against full differential pressure without damaging the valve.
- GNB has a worldwide sales and service network. Please

take a look at www.gnbvalves.com for more details.

- GNB has over 40 years of experience in custom valve production. We are happy to share our experience with you to ensure the perfect solution for your system.

What else can we do for your space simulation system?

- GNB valves are well known for space simulation systems but we also produce chambers and other large components for you.
- GNB has the experience of integrating sealing mechanisms in chambers. This can save space and can lower the costs of your system dramatically.
- GNB has years of experience in the production of cryo baffles that can be used to keep the heat load away from pumps, or if you run oil diffusion pumps, it will eliminate oil back stream problems.



Twas the Night Before Ship Date

By

M. Kevin Mandeville Jr., Design Engineer

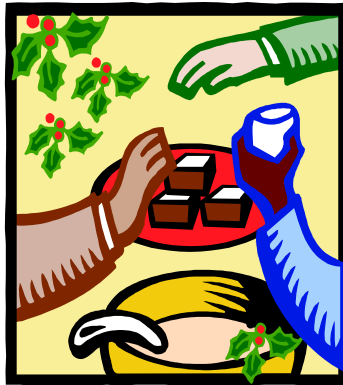


Twas the night before ship date, and all through the shop,
 Every worker was working, they just would not stop.
 The prints were all stapled to travelers with care,
 With hopes that all the dimensions would be there.
 The waterjet cutter was trimming his plates,
 The welders were bonding the parts to their fates.
 The machinists were cutting, with full workpiece beds,
 As visions of carbide tools danced in their heads.
 When all of a sudden there came such a tone,
 The leak check machine sang out long and low.
 For all of the valves were made with such care,
 That they wouldn't let in a drop of the air.
 QC approved the lot of new toys,
 For all of the good vacuum girls and boys.
 And as the valves were shipped all proper and right,
 I say: Vacuum Excellence for all, and to all a good night!

2010 Holiday Party

By
Amy Long, HR Manager

Fa la la la la la la la la...it's that time again! GNB has been very fortunate to have a wonderful year of growth in 2010. We have added several new employees, machines, and many new types of equipment to make our company stronger. Our holiday party this year was a celebration of all of this. We had approximately 100 people. The night was full of excitement and laughter. Our great vendors and reps were kind enough to donate several gifts and gift cards so that every employee went home with something from the raffle. That just starts out the season right. The food was spectacular, and as usual was prepared by our dear friend Marie at Todo Un Poco. No one ever goes home hungry and her food has no calories...love that part! We were able to loosen things



up a bit with a comedian/magician. Nothing like hearing and watching the laughter on people's faces when their fellow employees are pulled up on stage. We even got our president, Ken Harrison, up there. He had to wear a special Christmas outfit which you can see in the picture. He was such a good sport as well as the other helpers. I still don't know how the magician did all those tricks so well. The photographer captured a lot of great moments and took couples shots that we gave to the employees. We are a good looking group I might add. We look forward to many more great years and holiday parties here at GNB.



Winter Safety

By
Amy Long, HR Manager

About this time of the year, you are feeling the cooler temperatures of winter. In winter, hypothermia becomes a danger that you must watch out for. Anyone that works outside, including laborers, loggers, sawmill employees, and construction workers, needs to take precautions and be prepared in case you or a co-worker need emergency care.



Heatstroke is the most prevalent hazard in the summer but in the winter any prolonged exposure to freezing or cold temperatures can cause serious conditions such as trench foot and frostbite. In some extreme cases, such as falling into cold water, exposure can quickly lead to death.

The first item of importance is knowledge of hypothermia. Hypothermia is the condition that can occur when your body's core temperature falls to a low enough temperature as to impede or to im-

pair normal brain or muscle functions. Exposure to cold air, cold water, or a combination of the two can cause a body to lose heat rapidly. Heat loss can occur when you contact anything cold or wet (such as snow or wet clothing) or through evaporation, which occurs during normal breathing and perspiration.

Symptoms of hypothermia include uncontrolled shivering, slurred speech, clumsy movements, a fatigue feeling and acting confused. If you notice these signs, in others or yourself, call for help.

Here are some tips for helping employees prevent hypothermia:

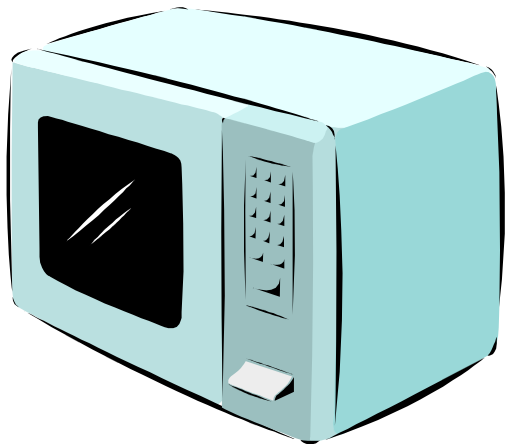
- Recognize the conditions in your workplace that may present a potential danger.
- Train workers to recognize the symptoms of hypothermia and understand treatment procedures.
- Dress for the weather. The best clothing for periods of cold or wet environments includes a breathable layer next to the skin, an insulating layer such as wool, (wool insulates even when wet), and a waterproof outer layer.
- Hydrate. Dehydration speeds the onset of hypothermia. Drink warm, sweet beverages but avoid coffee, tea, and hot chocolate or other drinks with caffeine. Always avoid alcohol.
- Eat warm, high-calorie foods such as pasta.
- Do not work alone. Use the buddy system. Working with someone increases the likelihood that one worker will recognize symptomatic danger signs.

Technology – Streamlining the way we work, or make Popcorn
By
Kirk Carter, Director of Supply Chain Mgmt.

Technology has brought us so many awesome things like cell phones, computers, global positioning systems, laser printers, and scanners. Can you imagine a world without these things? I can...I'm 50! Yes, I've been alive long enough to witness color TV, computers, cell phones, GPS, and the best thing ever invented, the microwave.

So when someone asks me how technology has impacted GNB, I tell them look around; we have many microwaves.

But honestly, looking past the microwave there are plenty of awesome technological advances that keep GNB ahead of the pack. Take, for instance, the IT Department.; IT is known as



Information Technology or at GNB the "What's Wrong with the Computers and Phones" Department. At GNB our Controller is in charge of IT. Funny, a guy called a controller is in charge of things

that can't be controlled. Computers have a mind of their own. If they work, we're happy; if they don't, the Controller needs to check the plugs.



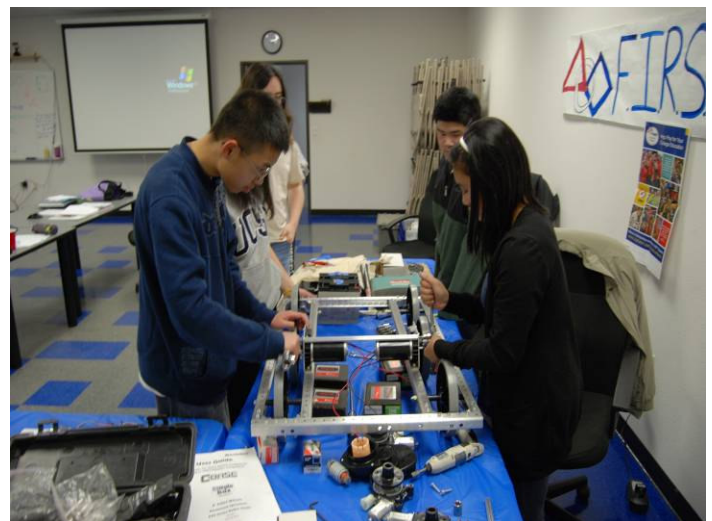
Occasionally we come in to find there is no Internet! Can you imagine, NO INTERNET! Maybe we should just go home. It's hilarious to see people without the Internet. Helpless souls, they are usually 40 years old or less. If you are older than 40, you already know what to do when there is no Internet. You laugh at everyone else and pick up a telephone. Yes, and you may need a telephone directory while you're at it! Internet aside, GNB has all the great doo-dads and gadgets that make a company run efficiently and top notch. We're just not sure how they work.

My advice for all you technologically challenged: close the microwave door, push 1 minute, and see if the kernels pop. If not, go another 30 seconds.

GNB Sponsors the Laguna Creek FIRST Robotics Team
By
Tim Gates, International Sales Manager

This year, along with a generous grant from NASA and Platt Electric, GNB is sponsoring the local Laguna Creek High School FIRST Robotics Team. Over the course of the next 6 weeks, a team of technical volunteer mentors will collaborate with a dedicated team of high school students to design and build a robot for this year's regional FIRST Robotics Competition at UC Davis.

What is the FIRST Robotics Competition? It's dubbed a "varsity sport for the mind." FRC combines the excitement of sport with the rigors of science and technology. Under strict rules, limited resources, and time limits, teams of high school age students are challenged to raise funds, design a team "brand," hone teamwork skills, and build and program a robot to perform prescribed tasks against a field of competitors. It is as close to "real world" engineering that a student can get. Volunteer professional mentors lend their time and talents to guide each team.



The robotics team working to together

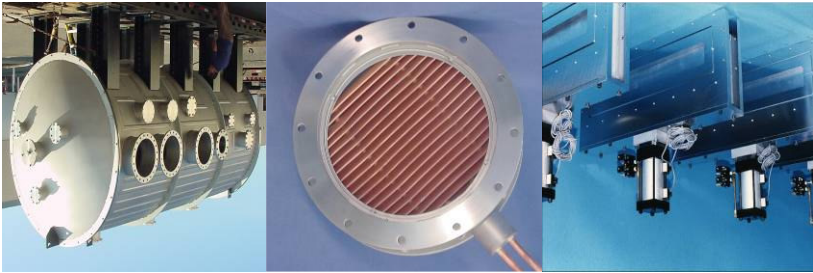
Meet M. Kevin Mandeville Jr., Design Engineer
By
Amy Long, HR Manager



1. What city were you born in? **I was born in Ontario, CA. Not Canada. I've never been to Canada. I hear it's nice though. They filmed X-Files there in British Columbia, and now a vast number of Sci-Fi TV shows are made there. But no one makes movies in Ontario, CA. Except maybe on Youtube.**
2. Where did you grow up and what was it like there? **The basic problem with that question is that it assumes I grew up. However as a "youth" I lived in So Cal for 15 years then moved to the Wine Country. Wine Country is nice. The flag is a goblet of merlot, and the national anthem involves a lot of slurred words.**
3. What did you enjoy doing as a child? **Getting into trouble mostly. You think I'm kidding? I loved to explore and learn about my world. I loved to find ways to modify the world around me to accomplish what I wanted accomplished. I'd design things, or procedures, for getting what I want. The problem, however, is that I didn't always think, "Will I get in trouble for doing this?" and the answer was usually, "YES!!" I also enjoyed mountain biking, model building, and music.**
4. What is your favorite outdoor activity? **Diving. I am an avid SCUBA diver, and also enjoy spear fishing and diving for abalone. But just being on the shoreline can be enough for me sometimes. The Sonoma coastline is a jewel of California, in my eyes, that is underrated. You can hike, surf, dive, camp, or just crack open a book and sit on a rock for hours on end, letting the wind blow around you and smelling that fresh sea air. Throw in a campfire, breakfast and coffee...Well, I'd be a good boy for sure if I knew heaven was like that.**
5. What were some of your first jobs? **I worked for my Grandpa Robin and Uncle Will a few times disassembling, fixing, or maintaining metering equipment. It was those experiences that taught me that you have to "get a wrench in there." When I design, I try to keep this in mind so that there isn't a tech somewhere down the line cursing my eyes for putting the three inch screw in a hole with one inch of clearance. Later on, I worked as a bus driver and a apartment assistant manager.**
6. What did you like to do in your free time? **What do you mean "did?" I still have free time (I just don't sleep)! I use it to read, gather random trivia (like how to deliver a baby in a car), annoy friends and coworkers, and increase my knowledge base. The most important thing I do with my free time now is play with my 17-month old son, Liam.**
7. What mischievous prank did you pull on someone and how did it affect you? **In the spirit of appropriateness, I'm going to tell you a prank that was pulled on me instead. After graduation, my mom was telling me to get a job, but I was enjoying being lazy too much. My brother then came in and told me that the local park had a problem with geese attacking the guests and was offering \$20 a goose to help them reduce the population. I called my buddy, also named Kevin, over and we grabbed some rope and canvas bags. We showed up at the park and chased down a ranger to ask him where the goose problem was. He looked pretty puzzled. I told him what my brother told us. Between sobs of laughter, he managed "Your...brother...sent.. you... to chase...wild geese? He sent you...on...a...wild...goose...chase!" As for how it affected my brother: he got tossed in the mulch pile.**
8. Are you married? Any children? **I have been married to my beautiful wife Christy for...let's see...carry the one...take the square root...apply the Lagrange...a long time. We have a son, Liam.**
9. Is there something you wish you could do over again? **If we are the sum of all our experiences, times the derivative of all the people we've known, doing anything over again would drastically affect us and anyone we've ever known. So no, I'm fine with my decisions so far. Even my stupidest mistakes have been learning experiences.**
10. Tell me about a memorable moment in your life; a time you will never forget. **I delivered my own son, in the car, at 3:20 am, on the county line. Not only will I never forget it, neither will the auto detailers...**
11. What great historical events you have experienced in your lifetime? **I watched the Challenger disaster, rode out the Northridge quake, and was there for the alien invasion of Earth by the Ploknorielioiaiuans. Five years and I can't pronounce it still. What's that? You don't remember the invasion? They came down and beamed up all the smart people, returned them in exchange for Elvis' whereabouts and made all the dumb people forge...Oooh. Never mind...**
12. What are the goals you are still working toward? **I am working on getting a PE license in the next few years, and saving up so that when I retire I can open a mead brewery.**

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