

THE GEO-SAMPLER

Spending as much time in the lab as we do, we certainly know our way around pounds, milliliters and the occasional cubit. But recently pondering both furlongs and fathoms, we got to wondering, how well do we really know our units of measure? Sure, we can easily adjust from the English to metric systems, but how do we all measure up?

IT ALL ADDS UP.

Simply put, a unit of measurement is a definite magnitude of a physical quantity, defined and adopted by convention and/or by law, that is used as a standard for measurement of the same physical quantity. And as such, any value of the physical quantity can be expressed as a simple multiple of the unit of measurement.

A length, for example, is a physical quantity measured in, say, meters. Or if you're going old school, inches, feet or yards. But we'll get back to the metric system later.

Turns out, units of measure were some of the earliest tools invented by humans, as it came in handy when building pyramids, fashioning clothing or bartering for food or geotechnical testing samples.

We think you can get a good sense of where the rubber met the road when you see one of the earliest references to units of measure, in "The Magna Carta" of 1215, "the great charter." With his official seal, King John agreed, "There shall be one measure of wine throughout our whole realm, and one measure of ale and one measure of corn--namely, the London quart." Not only did this help early bartenders figure out how much to serve, it helped lay the foundation for lots of things, including American Law.

Before the near global adoption of the metric system, many different systems were in place and often based on dimensions of the human body. Standardization became important, as measures could differ drastically not just from place to

place, but from person to person. While the origins of the metric system date back to France in 1791 as "for all people for all time," the current system continues to evolve. And in fact experts in the field continue to redefine the ampere, kilogram, mole and kelvin in terms of the basic constants of physics, thereby ensuring that all the base units are in theory available to everybody. Lest you think this is a fast process, this work is expected to be completed in 2015.

So just how important is a standard unit of measure?

Consider the NASA Mars Climate Orbiter, which was accidentally destroyed on a mission to the planet Mars in September 1999 instead of entering orbit, due to miscommunications about the value of forces: different computer programs used different units of measurement (newton versus pound

force). Or the 1999 Korean Air cargo flight 6316 from Shanghai to Seoul which was lost due to the crew confusing tower instructions (in metres) and altimeter readings (in feet). Three crew and five people on the ground were killed and 37 were injured.

But back to the original question that got us started on all this. A furlong is 201.16800 meters or one-eighth of a mile, equivalent to 220 yards, 660 feet, 40 rods, or 10 chains. A fathom is 1.8288 meters or six feet, which was originally based on the distance between the fingertips of a man's outstretched arms. So that, uh, really settles that.



Always go to other people's funerals, otherwise they won't come to yours.

—Yogi Berra



Somebody wake up the donkey.

In some states, including California, Florida, Nevada, and Hawaii a motorist can be cited for driving too slowly.

In Alabama counties having populations of not less than 56,500 nor more than 59,000, according to the federal decennial census, domino games shall be lawful in billiard rooms or other rooms in which billiard tables are located.

A United States federal law makes it illegal to issue a fake Weather Bureau forecast.

In Los Angeles, It is not legal to bathe two babies at the same time in the same tub.

In Zion, Illinois it is illegal for anyone to give cats, dogs, or other domesticated animals a lighted cigar.

It is not legal for a Nebraska tavern owner to serve beer unless a nice kettle of soup is also brewing.

It is illegal in Oklahoma to have a sleeping donkey in your bathtub after 7pm.

In West Virginia, it is illegal to taunt someone for not accepting a challenge for a duel.

Throughout Wisconsin, the serving of colored oleomargarine or margarine at a public eating place as a substitute for table butter is prohibited unless it is ordered by the customer.



THAT MEASURE'S A LITTLE OFF

Over the years, humorists have used (or fabricated) units of measure for one quantifiable reason. To make people laugh.

■ **SHEPPEY** A measure of distance equal to about 7/8 of a mile (1.4 km), defined as the closest distance at which sheep remain picturesque. It's the creation of Douglas Adams and John Lloyd, included in *The Meaning of Liff*, their dictionary of meanings for words that are actually just place names, and modeled after Sheppey, England.

■ **SMOOT** The smoot is a unit of length, defined as the height of Oliver R. Smoot — who, fittingly, was later the president of the ISO. The unit is used to measure the length of the Harvard Bridge. Canonically, and originally, in 1958 when Smoot was a Lambda Chi Alpha pledge at MIT (class of 1962), the bridge was measured to be 364.4 smoots, plus or minus one ear, using Mr. Smoot himself as a ruler. At the time, Smoot was 5 feet, 7 inches, or 170 cm, tall.

■ **BARN, SHED, OUTHOUSE** A barn is a serious unit of area used by nuclear physicists to quantify the scattering or absorption cross-section of very small particles, such as atomic nuclei. One barn is equal to 1.0×10^{-28} m². The name derives from the folk expression, "Couldn't hit the broad side of a barn," used by particle accelerator physicists to refer to the difficulty of achieving a collision between particles. The outhouse (1.0×10^{-6} barns) and shed (1.0×10^{-24} barns) are derived by analogy.

■ **DONKEYPOWER** This facetious engineering unit is defined as 250 watts — about a third of a horsepower.

■ **TATUM** The tatum is the "lowest regular pulse train a listener intuitively infers from the timing of perceived musical events." It is named after the legendary jazz pianist Art Tatum.

■ **FRIEDMAN** The Friedman is approximately six months, specifically six months in the future, and named after columnist Thomas Friedman who repeatedly used the span in reference to when a determination of Iraq's future could be surmised.

■ **HELEN** Helen of Troy is widely known as "the face that launched a thousand ships." Thus, one milli-Helen is the amount of beauty needed to launch a single ship.

■ **WARHOL** This is a unit of fame or hype, derived from Andy Warhol's dictum "everyone will be world-famous for fifteen minutes" — it represents, naturally, fifteen minutes of fame. Some multiples are:

1 kilowarhol — famous for 15,000 minutes, or 10.42 days. A sort of metric "nine day wonder."

1 megawarhol — famous for 15 million minutes, or 28.5 years.



Shale, Shale, the gang's all here.

Speaking of gas, the industry is abuzz with talks of Marcellus Shale. Geographically located in the heart of the region, Geotechnics' Pittsburgh office is uniquely positioned to help firms with testing needs, whether in the lab or in the field. Let us know how we can help you make the most of your project. Just contact Randy O'Rourke at (412) 823-7600.



Our two facilities serve projects across the country.

Pittsburgh — 544 Braddock Avenue • East Pittsburgh, PA 15112 • Phone (412) 823-7600 • dbackstrom@geotechnics.net or jpkline@geotechnics.net

Raleigh — 2200 Westinghouse Boulevard • Raleigh, NC 27604 • Phone (919) 876-0405 • msmith@geotechnics.net