

# USA decimalisation and metrication

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Why is it that the USA is the last nation on Earth to change to the metric system? It can't be because the people of the USA are not capable of making this change, as the people of the USA have demonstrated at least their equality, and their outright leadership in so many areas of human endeavour. It's hard to believe that they are not capable of catching up with the rest of the metricated world.

I was pondering this issue when someone brought some (USA) football statistics to my attention. Apparently a quarterback had made 142 yards in 19 plays with an average of 7.474 yards. I was struck by the division of the yards into decimal yards rather than yards, feet, inches, and fractions of inches.

I then began to think that maybe, the success of the USA with decimal measures was one of the more important things holding back their metrication progress. This sounds like an odd argument, so let me explain.

In the USA, it has long been the tradition to divide measuring units decimally. For example, decimal pounds, decimal inches, decimal feet, decimal yards, decimal chains, and decimal miles are all used regularly in the USA.

Here are some examples – I am indebted to several members of the United States Metric Association mailing list for the thoughts behind some of these stories.

- 1 After studying old measures for a day or two, a visitor from Europe to the USA visited a butcher to buy some meat. He asked for eight ounces, but his request caused great discussions and consultation between the counter staff and eventually the manager suggested that the customer restate his order as '*half a pound*'. The manager explained that the scales were calibrated in pounds and decimal fractions of a pound. The European then asked an assistant for '*half a pound*' and was told, '*Why didn't you ask for that in the first place?*' He had, of course, but the assistants (all of them) seemed to be quite unaware that '*eight ounces*' and '*half a pound*' were the same amount. The butcher's staff appeared not to know the number of ounces in a pound.
- 2 I've seen many uses of decimal inches, especially in the engineering trades, and I know that mechanical engineers have great facility in recognising seemingly odd fractions like 0.5625 as 9/16ths of an inch. Mechanical engineers also adopted some of the metric prefixes; for example, the '*thou*' (meaning one thousandth of an inch) has often been referred to as a '*mil*' (meaning a milli-inch, which also means one thousandth of an inch).
- 3 When a friend bought a house in Utah, he had a survey done. The drawings made by the surveyor were all in feet with a resolution of 0.01 feet (about 3 mm). My friend guessed that the surveyor was using a 'survey' foot to measure the land. The USA has two different definitions of a foot. There is the common foot used in schools, and the survey foot that is used for measuring and marking land. The common foot is usually divided into 12 inches but the survey foot is more usually divided into decimal feet for measurements smaller than a survey foot.

- 4 One of the key issues in (USA) football is the idea of how much ground has been gained by each play. This is expressed in yards and the statistics are expressed in decimal yards. The statistics are in yards with a precision to the nearest thousandth of a yard; an example is 7.473 yards. It would only add confusion to describe this as 7 yards 1 foot and  $5 \frac{7}{256}$  inches.
- 5 Surveyors and civil engineers use decimal chains for measuring and marking large areas of land. Their chains are divided into 100 links and so the length of a farm field might be specified as 3.47 chains, which stands for 3 chains and 47 links. With decimal calculations, this can readily be dumbed down to 3 chains 10 yards 1 foot and  $\frac{1}{4}$  inch for the public.
- 6 Every car in the USA has an odometer that reads in decimal miles (to  $\frac{1}{10}$ th of a mile). Perhaps because car odometers read tenths of miles, roadside markers are frequently marked in tenths of miles. As an example, they might give the distance to the next exit as something like 0.3 mi. Some modern cars may now have an option to set the odometer to two decimal places, i.e., to hundredths of a mile.
- 7 Odometers on bicycles are also calibrated decimally. A friend had a dual odometer that could be switched from miles to kilometres. When he switched to kilometres, he was delighted to find that the decimal numbers now meant something. He could suddenly understand that when the decimal reading showed 0.08 kilometres it meant that he had travelled 80 metres. Before he switched, when it read 0.08 miles he knew it was a small fraction of a mile, but he had no idea that this was approximately 22 chains 8 yards 2 feet  $4 \frac{13}{16}$ ths inches).
- 8 In addition to the examples given above, it is common in the USA, to see decimal ounces, decimal pounds, decimal fluid ounces, decimal pints, decimal quarts, and decimal gallons on consumer packages. Containers can also come in 100, 200, and 300 fluid ounce sizes. I suppose that since these are smaller than 1 gallon (128 fluid ounces), 2 gallons (256 fluid ounces), and 3 gallons (384 fluid ounces) containers, it might simply be a way to give consumers less of the product.

As an example of the use of similar decimal divisions in the metric system, I remember seeing a South African metric training film where two men with a small truck full of fencing materials were using the truck's odometer to throw posts on to the ground at the correct spacing to build a farm fence. I suppose that they had an odometer calibrated to 0.01 kilometres, which would give them a 10 metre spacing.

I was able to use a similar idea with a farmer to measure a property that he was thinking of buying. It was rectangular so we drove along two fence lines (length and width) and then multiplied the results to get hectares (One hectare can be considered as a square 100 metres by 100 metres). It was the cheapest surveying job that I have ever seen, and it gave us a reasonable guide to check the surveyor's figures. In any case, the farmer felt better because he had '*measured it himself*'. (By the way, the agent had overstated the size of the land, in acres, by about 20 % in the full knowledge that few, if any, would ever check its size.)

However, neither of these tricks works with old pre-metric measures. They work in metric because the metric system was specifically designed to make these types of calculations simple and understandable using decimal numbers with decimal

measuring units. The odometer of a truck might read in decimal miles but these have no direct meaning to the yards, and feet used for designing the farm fence, and decimal miles have no easy relationship with acres.

So what has this got to do with the USA changing to metric measures? It seems that the USA has been able to enjoy the benefits of using decimal numbers for many years simply by dividing their old units decimally, but although some advantage was gained in calculation in each activity, there was no general advantage gained in coordination between the diverse old units. Unfortunately, this decimalisation by default did not bring with it the coordination and coherence that is readily available within the metric system.

It may even be that this partial decimalisation has removed some of the pressure to adopt the metric system in the USA. In the Commonwealth countries, such as Australia and India, all had similar pressures, but they had lived within the traditions passed to them from England. This tradition included the idea of dividing large units into groups of smaller binary fractional units (halves, quarters, eighths), or dividing them by thirds, twelfths, or twentieths, rather than dividing them decimally.

For example, in pre-metric Australia it was not common to divide things decimally; the more usual practice was to use vulgar fractions of some kind. This caused greater pressure to '*go metric*' because the advantages of the coordinated metric system could be added to the advantages of decimalisation of measurements, at the same time.

Perhaps the USA has not had pressure for metrication to the same extent, because it had already decimalised so many of its common units.

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Metric system consultant, writer, and speaker, Pat Naughtin, has helped thousands of people and hundreds of companies upgrade to the modern metric system smoothly, quickly, and so economically that they now save thousands each year when buying, processing, or selling for their businesses. Pat provides services and resources for many different trades, crafts, and professions for commercial, industrial and government metrication leaders in Asia, Europe, and in the USA. Pat's clients include the Australian Government, Google, NASA, NIST, and the metric associations of Canada, the UK, and the USA. See <http://www.metricationmatters.com/> for more metrication information, contact Pat at [pat.naughtin@metricationmatters.com](mailto:pat.naughtin@metricationmatters.com) or to get the free '*Metrication matters*' newsletter go to: <http://www.metricationmatters.com/newsletter/> to subscribe.

