MechNEWS

Jan./Feb. 2004

Welcome

Welcome to the Jan./Feb. edition of Mech*NEWS*™, a service provided by MechSigma Consulting, Inc. We hope you had a great holiday and are back in the swing of things. For those of you who have been watching closely, you've noticed that it's been challenging for us to produce a monthly newsletter in a timely fashion. Because of this, we are changing to a bimonthly newsletter.

In this issue, we discuss the terminology associated with datums. These terms can sometimes become confusing, but if we break them down into *theory* versus *practice*, we can understand why we need them.

We hope you enjoy this issue of Mech*NEWS*™ and continue to tell your colleagues about it.

Datum Application in Theory and Practice

As you know, one key element that separates a "GD&T drawing/model" from a "non-GD&T drawing/model" is the use of datums. In general, we place two requirements on the establishment of datums.

- They must establish *origins* for measuring features on a part, and
- they must be *repeatable*.

Generally, it's fairly easy to establish origins. We do this all the time on "non-GD&T" drawings. The challenge lies in making the origins repeatable for everyone who measures features on the part.

The reason this is challenging is because we don't make perfect surfaces on the part from which to measure. Therefore, we need a "datum system" that will take repeatable measurements from imperfect features on a part. ASME Y14.5M-1994 does this by establishing a perfect *counterpart* to the imperfect feature. Unfortunately, this counterpart is theoretical and is not practical. Therefore, Y14.5 relates theory to the real world by *simulating* the perfect counterpart with precise tooling.

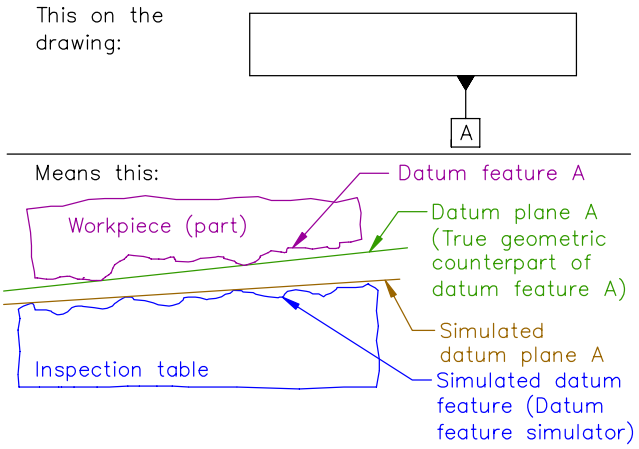

Figure 1

Figure 4-10 of ASME Y14.5M-1994 and Figure 1 identify a *datum feature*, a *datum*, a *simulated datum feature*, and a *simulated datum*. At first glance, these differing "datums" may seem

(Continued)

1. Figure 5-52 from Dimensioning and Tolerancing Handbook (McGraw-Hill ISBN 0-07-018131-4). Figure by Walt Stites.

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	GD&T	MTSS
Orlando, FL	Mar. 29-31	Apr. 1-2
San Diego, CA	Apr. 26-28	Apr. 29-30
Chicago, IL	May. 17-19	May. 20-21
Las Vegas, NV	Sept. 13-15	Sept. 16-17
Dallas, TX	Oct. 25-27	Oct. 28-29

Please contact us for more information or to sign up.

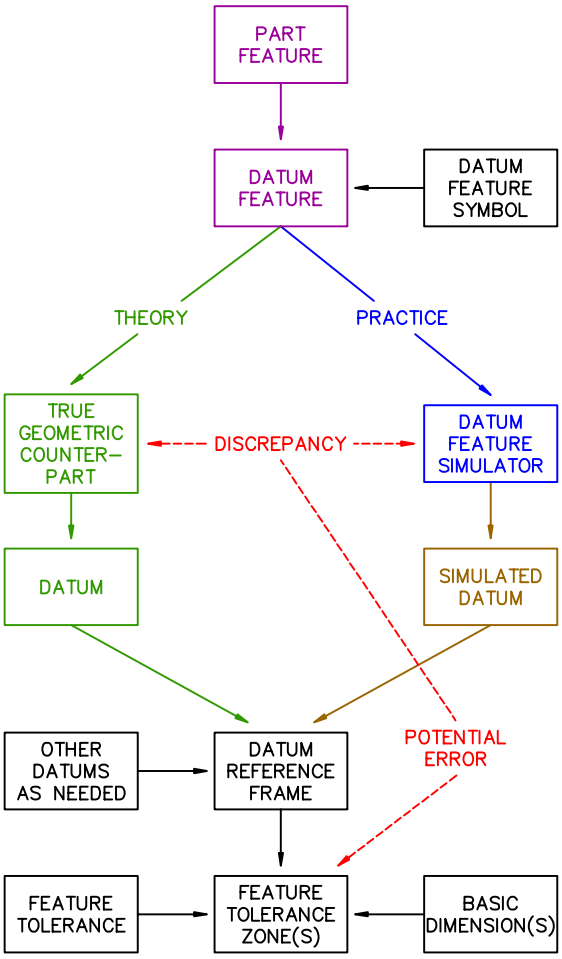

Figure 2

overwhelming. Figure 2 helps to sort out the confusion[1].

For a planar feature, Y14.5 defines the following in section 1.3.

> The *datum* is "... a plane derived from the true geometric counterpart of the datum feature."
>
> The *true geometric counterpart* is the "... best fit (tangent) plane of a specified datum feature."
>
> The *datum feature* is "... an actual feature of the part that is used to establish the datum."

Additionally paragraph 1.3.3 states that "A *datum* is the origin from which the location or geometric characteristics of features of a part are established." Ideally, we would like to measure from a true geometric counterpart (TGC).

Since we cannot measure from the TGC (because it's theoretical), Y14.5 defines the *simulated datum feature* as " a surface of adequately precise form (such as a surface plate ...) contacting the datum feature and used to establish the simulated datum." Y14.5 goes on to define the plane established by the high points of the surface plate as the *simulated datum*.

Summary

Because of manufacturing variability, we cannot fabricate perfect features. Therefore, we need a repeatable method to measure from these imperfect datum features. We do this by establishing true geometric counterparts for the imperfect feature. Ideally, we would prefer to measure from the true geometric counterpart. Since this is impractical, we measure from a surface plate (for our Figure 1) and we name this the simulated datum feature (also referred to as the datum feature simulator). Figure 2 shows that if the datum feature simulator is of "poor" quality, there will be a discrepancy between the theoretical TGC and the datum feature simulator. As the datum feature simulator approaches perfection, this discrepancy becomes very small. A

Joke of the Bi-Month

Four surgeons were taking a coffee break. The first surgeon said, "Accountants are the best to operate on because when you open them up, everything inside is numbered."

The second surgeon said, "Nah, librarians are the best. Everything inside them is in alphabetical order."

The third surgeon responded, "Try electricians, man! Everything inside them is color coded."

To which the fourth surgeon, who had been quietly listening to the conversation, replied, "I like engineers. They always understand when you have a few parts left over at the end."

Engineering Services

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Events:

The next GD&T committee meeting is May 2-7 in St. Louis, MO. These meetings are open to the public. For more information, contact ASME or visit their website at:

http://cstools.asme.org/wbpms/CommitteePages.cfm?Committee=C64041000

ASME Continuing Education

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Please contact ASME to sign up.

Mar. 22-23, 2004 Houston, TX