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USMC-NASA AND ANMC-IFI - 1985 MEETING/CONFERENCE/SYMPOSIUM

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ENGINEERING NOTE

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METRICATION

TITLE
USMC-NASA AND ANMC-IFI - 1985 MEETING/CONFERENCE/SYMPOSIUM

There are two metrication meetings covered by this report.

I. The United States Metric Association (USMA), co-sponsored by the George C. Marshall Space Flight Center (MSFC) held at Hunstville, Alabama on October 4 & 5, 1985.

II. The American National Metric Council (ANMC) combined with the Industrial Fastener Institute (IFI) Symposium, held in Washington D.C., October 14-16, 1985.

The USMA

Reports from the regional panelists (U.S. is divided in regions - northeast, southeast, midwest, northwest, etc.) were in accord - "metrication is moving in a positive direction, but at a slow pace."

Some highlights:

Government Metric Panel. The federal trade deficit continues to grow, and it is interesting to note that 57.4% of the $47 billion in exports for 1984 were in products that are metric sensitive. Although no figures for previous years were available, it was felt that metric exports are rising.

Department of Defense (DOD). Gary Dillard, DOD Metrication Steering Group, Alexandria, Virginia.

The DOD is the largest single buyer of products in the U.S. DOD has a metrication policy, although no actual date of implementation is now mentioned as once was the case. "Supporting inches in the 21st century is like supporting the vacuum tube system today." However DOD policy shall be, "use metric except where not in the best interests of DOD". Some areas that have contributed to present atmosphere at DOD:

- The interchangeability with foreign equipment is still debated as to merit.
- Failure of people in DOD to recognize the importance of converting to SI.

Those in DOD that are involved with metric point out some positive areas as follows:

- Facilitates joint military operations.

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- o Increase competition of military suppliers.
- o Utilize inventories world wide.
- o Potential sales to foreign markets for U.S. military goods.

NASA Marshall Space Flight Center (MSFC). James Kingsbury, Director, Science and Engineering.

MSFC makes propulsion systems for the space shuttle program and is involved in the development of the future Space Station. The first flight is scheduled in 1990-94 and is designed for a 15-year life. The Space Station program ($8 billion) will have international involvement that may influence a decision to go metric. The MSFC design group uses a CAD-CAM system that would allow easy conversion to SI; however, their shops are not tooled in metric, and they also hope to re-use some existing equipment that is not SI in future flights. These opposing factors, together with the additional cost required to make the conversion, seems to dampen any immediate plans to convert. Other NASA flight projects are approximately 10% in SI.

While no decision has been made as yet, it is felt by NASA-MSFC, "if the Space Station is not metric, so goes the rest of the nation".

Canada. Robert A. Steel, Metric Office, Ontario, Canada.

The present Canadian government is committed to SI conversion, but favors a "reasonable, voluntary" program. They consider conversion a generations (plural) effort. In Canada today:

- o All gasoline is sold in liters.
- o Most construction materials, except some panel products, are converted to SI (some materials require large orders).
- o Much of Canadian agrobusiness is packaged and sold in SI units; while tobacco, hogs, and cattle remain mostly in inch-pound units due largely to trade with U.S.

Lockheed Corporation. Edwin M. Belles, Jr., Panelist, Lockheed Missiles and Space Company Incorporated (LMSC), Sunnyvale, California.

Lockheed has a drafting guide, handbook on welding/brazing, and other bulletins on SI usage, as well as an employment form that asks metric capabilities of future employees. (Lockheed may be the first company to do so.) However, they still have a "stumbling block" toward conversion. A recent survey of older engineers revealed responses such as, "they will retire first", while the younger engineers say," when will you get with it". LMSC is not metric and feel the "next generation will do it".

Summary:

The "voluntary conversion" is the generally accepted approach to metrication today and will continue so for the near future. Without a federal mandate (ref. pg. 9 letter from President Reagan) it will be economics in specific areas that will move industry to convert.

American National Metric Council (ANMC)
Industrial Fastener Institute IFI)
Joint Meeting/Symposium

In Brief:

The meeting and symposium were well attended (over 150), the presentations more than filled the scheduled time, covering a vast amount of material, resulting in long but well planned sessions. They gave a good overview of the current trend of metrication in the U.S. today by private and public sectors alike. That trend can be stated simply as: "it will happen"--"not sure when".

ANMC

ANMC's position is not to create any new policy, but rather work within the existing policies of industry and government in a supportive role. They are currently operating with a staff of 6 people, down from 27 two years ago.

Federal Report - moderated by G.T. Underwood, Director, Office of Metric Programs, Office of Productivity, Technology, and Innovation, Department of Commerce, with panelists from the International Trade Administration DOC, Standardization and Acquisition Director from D.O.D., and Engineering Standards and Practices Manager from NASA. In addition, international panelists from private industry such as Owens-Corning, Alcan Rolled Products and a minister from the Embassy of Japan.

These reports were brief, general in nature, political type presentations. A few quotes:

- "Greatest impetus for metrication will come from international trade".
- "U.S. products may be superior but may still be unwelcome in foreign markets like China" (China is expected to be totally metric by 1990.)
- "When the Metric Act was made voluntary, the public did not volunteer".
- "One Japanese trade barrier--goods must be labeled in metric. Dual marketing is OK in Japan but not accepted in all countries".
- "European Economic Countries (EEC) will accept only metric products after 1989".
- "The voluntary approach has been re-affirmed by the administration" (ref.- pg. 8 letter from President Reagan).

INDUSTRIAL FASTENER INSTITUTE (IFI) Symposium.

The symposium task group was guided by C.J. Wilson, Director of Engineering, I.F.I., and J.B. Levy, Vice President/Chairman, ASME Standards Committee B18 American Society of Mechanical Engineers.

The IFI represents 57 industries in the United States and Canada, plus several associated memberships. The reports gave a comprehensive look at an industry that plays an important role in U.S. economy and one that will be strongly impacted by SI conversion. One important goal of the fastener industry is to arrive at an international standard (ISO) for all metric fasteners.

Some brief notes on reports

- There are over 200 billion fasteners produced in the U.S. each year.
- 15% of the fasteners used in the U.S. are metric and for the most part are imported.
- The new (1982) standards are not complete and will take several years to accomplish.
- Employment in the fastener industry is 50% of what it was a decade ago, due in part to importing over 1.5 billion pounds of fasteners.
- Industry will continue to use inch fasteners till the end of this century, with some conversion earlier due to economics.
- The major concentrations of metric fastener use in the U.S. is in the auto, heavy equipment, electronics and machinery industries.
- 63% of machinery purchased today is imported and metric.

The fastener industry, the IFI, and users have a tedious chore in defining and sorting out the many standards and specifications that are currently in force.

THE INTERNATIONAL/NATIONAL STANDARDS THAT ARE IN FORCE TODAY

ISO: International Standards (International/Organization for Standardization).

DIN: German National Standards (German Institute of Standardization).

NF: French National Standards (French Association for Standardization, AFNOR).

ANSI: American National Standards (American National Standards Institute).

CSA: Canadian National Standards (Canadian Standards Association) (ANSI Counter Part).

DOD: United States Department of Defense.

IFI: Industrial Fasteners Institute (U.S.).

JIS: Japanese Industrial Standards.

There are differences in the new Standards (1982) vs. the old standards while they are functionally interchangeable. Some examples of differences and/or changes follow:

Hex Screws -- Some tolerances differ between ANSI/CSA and ISO/DIN/AFNOR a change in head thickness and new width across flats (WAF) for M10, M12, M14 sizes.

Hex Nuts Change -- New WAF for M10, M12, M14, for M5 and larger, thickness is increased (Deere Co. had stripping problem with old DIN nuts).

Hex Flange Screws Changes -- will take until 1988 to change standard.

Round Head Square Neck Bolts (carriage). Differences -- ANSI B18.5.2.2M has smaller head diameter and shorter neck than DIN/ISO.

Prevailing Torque All Metal Hex Nuts Changes -- New WAF for M10, M12, M14. (Need to watch the wrench size.)

Weld Nuts have DIN and DOD standards -- No ISO available; will be long time.

Set Screws -- No changes to existing standards.

Slotted Hex Nuts -- No ISO standards. Problem in agreement with European (ISO) standards. Do you add material or slot standard sizes?

Slotted Spring Pins No ISO -- Difference in diameter, and slot is larger. Parts interlock.

Split Lock Washers -- No U.S. standard as yet. Problem: DIN washer is open and will interlock (serious problem for assembly industry).

Retaining Rings -- No ISO standard. The DIN standard ring is thicker and narrower than ANSI. (World-wide debate.)

Cotter Pins -- DIN standard calls for bend test at 90° -- 3 times -- while U.S. standard is to bend back on itself.

Plastic Fasteners -- No standard as yet.

Color Coding -- (Of metric fasteners to identify inventories.) The industry has been moving away from color coding as some torquing problems and screw driver slot interference problems have come to light.

The above examples are but a few to represent the amount of effort put forth, and effort still required of the standards people, in preparing for the ultimate changeover to metric.

The agencies such as IFI, ANSI, ISO, etc., are diligently at work and will accomplish the task.

Note -- A caveat at this time, is to make no assumptions about specifications being interchangeable.

In the interim, during any transition period some user guidelines are important.

1. Understand the Standards. (No one standard is complete. Keep abreast of changes and differences. A good complete library is essential.)

2. Commit to ISO fasteners (choosing the time to convert with least effort and cost is case by case decision).

3. Allow adequate lead time. (This is important particularly during transition period.)

4. Contact more than one supplier (another consideration during transition as suppliers are not complete in inventories).

5. Be reasonable with deviations (flexibility in design is required).

6. Inspect incoming material (this can add to cost, in receiving, inspection, and stockroom discipline, but necessary during changeover).

7. Minimize varieties (can reduce cost in assembly and keep inventory down).

8. Metricate quickly (once decision is made, make it a total commitment).

9. Work with SAE, ASTM, ANSI and ISO. (These agencies can answer most questions and can share past specific problems and solutions.)

While these guidelines are aimed at fastener products, they can be expanded to accommodate metric changeover in general.

Summary

Metric conversion will occur as the United States, one of the last four holdouts in the world, bends to the economic pressure. (Burma, Brunei, and South Yemen are the other three.) We must recognize that the rest of the world does not understand our inch-pound system. We must also recognize that even in cases where U.S. products are superior, there is reluctance on foreign markets to purchase because repair or service can be delayed and costly due to lack of parts or fasteners. The alternative being dual inventories.

Metric at LBL

While there has been metric conversion progress in specific areas in the U.S., it appears proper to repeat a summary note given in a previous metric report.

Any LBL metric conversion effort will bear close and careful planning. Unlike many private industries, LBL does not have an end product with a definite unit cost to compare with conversion costs. Moving into conversion too early, before suppliers of material and hardware items have inventories, can be costly in time and money. (LBL stocks over 25,000 items.)

THE WHITE HOUSE

WASHINGTON

October 4, 1985

I am pleased to send greetings to everyone taking part in the Eleventh Annual Conference of the American National Metric Council.

The United States has played a critical role since World War II in ensuring and promoting an open international trading system. An ever-growing voluntary use of metric measurement has been a key ingredient in commerce between nations during this time. American firms, in order to be competitive, have adjusted to its requirements.

While metric measurement enhances our ability to compete in the world marketplace, its use does not guarantee free trade. That comes about only when nations eliminate other barriers standing in the way of open exchange of goods and services. We will continue to press for an international trading system in which everyone abides by the rules.

The application of metric measurements in new weapons systems designs is also helping our Armed Forces become more compatible with those of our NATO allies, ensuring a stronger international defense posture.

My Administration will continue to support the private sector's efforts toward metric transition in its own economic interest and as a means of achieving greater and freer world trade.

I wish you continued success and a highly productive meeting.

Ronald Reagan

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