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The purposes of this status report are: (1) to present a very brief background of past metrciation actions outside LBL; (2) to present current LBL Mech. Dept. Policy; (3) to list past Mech. Dept. metric activities; (4) to describe ongoing departmental activities; (5) to reveal future plans and (6) to present the current metrciation status of selected outside organizations and finally (7) to list metrciation abbreviations. No attempt to describe SI units has been made. See ANSI Z210.1 for that.

1. Historical developments outside LBL

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1670</td>
<td>Meter introduced.</td>
<td>USMB 1979 Annual Report</td>
</tr>
<tr>
<td>1795</td>
<td>France uses metric</td>
<td>Pearson</td>
</tr>
<tr>
<td>1821</td>
<td>4 yr. Metrciation study by John Q. Adams</td>
<td>Pearson</td>
</tr>
<tr>
<td>1866</td>
<td>Metric system legalized in U.S.</td>
<td>Act of Congress</td>
</tr>
<tr>
<td>1875</td>
<td>U.S. joins Gen. Conf. on Weights and Measures</td>
<td>Pearson</td>
</tr>
<tr>
<td>1947</td>
<td>ISO technical committee on fasteners formed.</td>
<td>Pearson, P.33</td>
</tr>
<tr>
<td>1960</td>
<td>SI issued by CGPM after 12 year study.</td>
<td>Pearson</td>
</tr>
<tr>
<td>1973</td>
<td>American National Metric Council held first meeting.</td>
<td>Pearson, P.33</td>
</tr>
<tr>
<td>1975</td>
<td>U.S. Metric Conversion Act</td>
<td>Act of Congress</td>
</tr>
<tr>
<td>1975</td>
<td>U. S. Metric Board authorized.</td>
<td></td>
</tr>
<tr>
<td>1975</td>
<td>ASTM publishes STP 574, edited by R. G. Liptai and J. W. Pearson on &quot;Metrication—Managing the Industrial Transition&quot;</td>
<td>ASTM</td>
</tr>
<tr>
<td>1976</td>
<td>ANSI published ANSI Z 210.1, &quot;Metric Practice&quot;.</td>
<td>ANSI</td>
</tr>
</tbody>
</table>
11/1977 After 30 years of meetings, ISO technical committee 2(TC2) agrees on most ISO fastener parameters

1978 Metric O-rings marketed in U.S. per German, British, & Swedish standards (not SI)

1979 ISO fastener standards still incomplete after 32 years of meetings.

1980 ANMC annual meeting and Symposium - San Francisco

Date | Activity Description | Done by | Comments
--- | --- | --- | ---
1972 | ASTM issues E 380-72, "Std. for Metric Practice". | ASTM | Superseded by E380-79

1976 | Metric Fastener Standards, First Ed. Published | IFI | In LBL Library Don't use. To be changed. Differs from ISO.

1976 | Hoke Gyrolok Metric Tube Fittings marketed for 3, 4, 6, 8, 10, and 12 mm tube. | Hoke | ---

1976 | Nylon metric screws marketed per French, German Italian, Japanese, Swedish, or ISO Standards | Weckesser | Don't buy until Chicago ANSI Stds complete

1977 | LBL sets up metrication account 3642-01 | P. Hernandez | ---

1977 | Metric handles, levers, hand wheels marketed in U.S. by KIPP | W. Hartsough | Don't use. Threads not ISO std.

1977 | Metric-English Conversion calculators marketed | --- | T. Lewis has info (Bldg. 90)

1977 | ERDA drafts policy on "Use of Metric System" and transmits to W. D. Hartsough | --- | DOE succeeded ERDA. Current DOE policy unknown.

1978 | AWS issues "Metric Practice Guide for the Welding Industry" AWS A 2.3 - 75 | AWS | Author has a copy. Get Copies from AWS.
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>ANSI adopts hard metric standards: B32.3 Metals and Alloys, B32.4 Rounds, squares, and hex products, B32.5 Tubular products, B4.2 Limits and fits</td>
</tr>
<tr>
<td>1979</td>
<td>Holokrome: Don't use, Not ISO. Not ANSI. May be DIN std.</td>
</tr>
<tr>
<td>1979</td>
<td>Metrication editorial work necessary to modify ASME Boiler Code begun. 1983 Code scheduled to be SI.</td>
</tr>
<tr>
<td>1980</td>
<td>ASTM issues E 380-79, &quot;Std. for Metric Practice&quot;, same as ANSI Z210.1</td>
</tr>
<tr>
<td>1980</td>
<td>First industry voluntary conversion plan approved by ANMC - gasoline sales by liter</td>
</tr>
<tr>
<td>1980</td>
<td>Dept. of Commerce plans to convert by 1985 to SI</td>
</tr>
</tbody>
</table>
2. LBL MECHANICAL DEPARTMENT METRIC POLICY

Section 1.0 General

1.1 End Use. This interim metric conversion policy is for the use of the LBL Mechanical Department only, hereinafter called "the Department".

1.2 Scope. This policy defines the method of implementation of metric conversion in the LBL Mechanical Department.

1.3 Units, Definition. The metric system means the SI units established by the General Conference of Weights and Measures in 1960 as interpreted or modified for the U.S. by the Secretary of Commerce.

1.4 Practice. The SI units and practice to be followed are in ASTM E-380-76.

1.5 Policy. It is Department policy to use the metric system in all activities consistent with operational, economic, technical, and safety considerations and to pursue an orderly and coordinated transition thereto by following an internally developed action plan.

Section 2.0 APPLICABLE DOCUMENTS

2.1 Metric Conversion Act of 1975, P.L. 94-1968. (Declares national policy of coordinating increasing use of the metric system in the U.S.)

2.2 ASTM E-380-76 (also numbers ANSI Z210.1 and IEEE Standard 268-75), "Standard for metric practice."

2.3 NBS Special Publication 330, 1974 ed., The International System of Units (SI).

Section 3.0 STANDARDS ORGANIZATIONS AND STANDARDS

It is recognized and acknowledged that (1) there are over 2000 organizations promulgating standards in the U.S.; (2) there are three types of standards organizations namely industrial, national, and international (3) these organizations have their differences; (4) some standards are metric, most are not; (5) as long as there is a need for these standards (many years) they will continue to exist, to be recognized, and to be used; (6) most are in a state of flux; (7) very few national metric standards exist; and (8) the Mechanical Department metric coordinator will be responsible for the coordinating and maintaining the metric program on a permanent basis.

Section 4.0 AVAILABILITY OF METRIC MATERIALS, HARDWARE, AND STANDARDS

It is recognized that the current (1978) availability of metric materials, hardware, and standards is extremely limited and very seriously hampers current metrication efforts.
Section 5.0  The Department shall appoint a Metric Committee with representatives from Design, Fabrication Shops, and Technician Sections. They shall hold meetings, report to the Department Head, maintain liaison with the Library and the Metric Design Data Book project, development Departmental metrification plans, track mechanical metric standards, and disseminate metric information within the Department.

Section 7.0  The Department shall convert machinery and equipment to metric or dual (metric/English) within the limitations imposed by funding.

Section 8.0  The Department shall advise the Stores Department concerning stocking appropriate metric items thru the two existing channels, namely the Mechanical User Group Committee and the Interlab Preferred Parts Committee. The Department Metric Committee will also interact with the Stores Department to recommend metric drafting needs such as scales, templates and paper.

Section 9.0  Departmental participation in the Interlab Preferred Parts Committee meetings shall continue.

Section 10.0  Metrification costs shall be estimated and reported to higher authorities. Funding shall be sought where appropriate.

Section 11.0  The Department will make available metric scales and templates to Department employees on a one-time basis as needed.

Section 12.0  The Department will make metric-grid drafting paper available.

Section 13.0  Schedule. Metrification will proceed at a pace determined and limited by a number of factors to include (but not be limited to) availability of standards, materials, hardware, equipment and funds. The Department will not, for example, recommend the design of metric fasteners into equipment until (1) the appropriate standards are adopted and disseminated and (2) said fasteners are commercially available.

Section 14.0  The Department will inform vendors and the Purchasing Department of metrification actions affecting them by explaining the units and standards to them. A brief explanatory flyer will be prepared and distributed to vendors along with metric RFQ's.

Section 15.0  The Department will coordinate Mechanical Department metrification with LBL as a whole.

Section 16.0  Drafting Standards will follow ANSI practice. ANSI orthographic projection shall be used.

Section 17.0  The Metric Committee will develop an Action Plan including a Metrification Schedule and publish it for comment.
3. PAST LBL METRICATION ACTIVITIES.

74  LLL issues Metric Drafting Policy. MEL-74-001247 LLL
(Not applicable nor appropriate for LBL.)
76  Interlab Preferred Parts Committee issue Report on Metric Raw Stock
    LLL (R. Robitaille)
77  PEP project designs some parts in metric
    R. T. Avery
77  LBL mech shops buy metric inspection equip.
    T. Lewis,
    D. Stallings
77-80 LBL shops retrofit some machinery to dual readouts (English/SI)
    D. Stallings
77  First metrication budget established
    H. P. Hernandez
78  Metric Committee formed. N. Parrish, R.
    Reimers, Don Bliss, J. Kroll, P. Bean, C. Haines.
79-80 Dept. Design Data Book Metrication underway
    J. Turner, R. Avery
    R. Reimers
80  LBL Mech. Dept. adopts metrication plan
    H. P. Hernandez
79-80 LBL joins ANMC, receives biweekly bulletin.
    LBL Library
80  LBL rep. attends annual ANMC Conference in S.F.
    R. Reimers
80  Metric drills to 30 mm ordered into LBL Stores
    R. Medel
81  Non-SI metric taps and dies deleted from LBL Stores
    R. Medel
81  Jim Davey replaces N. Parrish on Committee

5. ONGOING ACTIVITIES - 1981

1. Conversion of mech. Shops Equipment
    C. Haines, J. Kroll
2. Finding standards status.
    R. Reimers
3. Studying issues of ANMC "Reports"
    R. Reimers
4. Development of metric drafting policy
    P. Bean
5. Start Metrication Section in Eng. Library
    Reimers
6. Maintain Liaison with ANMC, LLL.
    Reimers
7. Inform Mech Dept of Status
    Reimers
    Committee
    Reimers
5. FUTURE PLANS

See the plan on LBL dwg.20H1586. Involves Stores, Purchasing, technicians, shops, etc. No fixed schedule or mandatory conversion is either stated or implied by the Conversion Act of 1975. No schedule has been adopted at this time. Metrization will seep into LBL in a manner consistent with our surroundings.

6. STATUS OF OTHER ORGANIZATIONS' CONVERSIONS

<table>
<thead>
<tr>
<th>Organization</th>
<th>Start</th>
<th>Complete</th>
<th>Date When 99% Complete</th>
<th>Ref.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Caterpillar Tractor</td>
<td>74</td>
<td>78-20%</td>
<td>2029</td>
<td>(e)</td>
</tr>
<tr>
<td>B. GM (Autos only)</td>
<td>72</td>
<td>79-75%</td>
<td>1985</td>
<td>(e)</td>
</tr>
<tr>
<td>C. GM (locomotives)</td>
<td>80-0%</td>
<td>2020</td>
<td></td>
<td>(e)</td>
</tr>
<tr>
<td>D. Ford</td>
<td>79-33%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Chrysler</td>
<td>79-20%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. Otis Elevator</td>
<td>79-0%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. Inland Steel</td>
<td>74</td>
<td>79-6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H. LBL</td>
<td>1929</td>
<td>80-2%</td>
<td>2010</td>
<td>(e)</td>
</tr>
<tr>
<td>I. U.S. Wine Industry</td>
<td>~1978</td>
<td>80-100%</td>
<td>1980</td>
<td>(e)</td>
</tr>
<tr>
<td>J. Sale of Gasoline-Calif.</td>
<td>1979</td>
<td>80-15%</td>
<td>1981</td>
<td>(e)</td>
</tr>
<tr>
<td>K. Microscopes</td>
<td>1900</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L. Canada</td>
<td>1975</td>
<td>~25%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M. Gt. Britain</td>
<td>1970</td>
<td>&gt;50%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(e) = estimates
5. METRICATION ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANMC</td>
<td>American National Metric Council (Private Industry Organization)</td>
</tr>
<tr>
<td>ANSI</td>
<td>American National Standards Institute</td>
</tr>
<tr>
<td>ASME</td>
<td>American Society of Mechanical Engineers</td>
</tr>
<tr>
<td>ASTM</td>
<td>American Society for Testing and Materials</td>
</tr>
<tr>
<td>AWS</td>
<td>American Welding Society</td>
</tr>
<tr>
<td>CGPM</td>
<td>Gen. Conf. on Weights and Measures</td>
</tr>
<tr>
<td>DIN</td>
<td>German Industrial Standard</td>
</tr>
<tr>
<td>ERDA</td>
<td>Energy Research and Development Administration</td>
</tr>
<tr>
<td>IFI</td>
<td>Industrial Fasteners Institute (Private Enterprise)</td>
</tr>
<tr>
<td>ISO</td>
<td>International Standards Organization</td>
</tr>
<tr>
<td>SI</td>
<td>Système Internationale</td>
</tr>
<tr>
<td>USMB</td>
<td>United States Metric Board (Gov't Organization)</td>
</tr>
</tbody>
</table>
8. References


7. "Metric Reporter", ANMC.


Status of Metrication in LBL Mech. Dept.-Initial Distribution

cc: T. Beales
P. Bean
R. Bell, SLAC
Don Eagling
E. Edwards
T. Elioff
F. Goulding
H. Grunder
C. Haines
W. Hartsough
E. Hartwig
R. Hinckley
R. Hootman
LBL All Mech. Engrs.
LBL All Mech. Shop Supervisors
LBL All Mech. Tech Supv.
T. Lewis
J. Mark, SLAC
R. Medel
J. Meneghetti
J. Rees, SLAC
D. Stallings
J. Kroll
J. Davey
LBL Library -B50, B90
M. Chambers
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