other electrical articles.

These improvements to test systems will facilitate quality and performance improvement in many articles.

These organizational, scientific, economic, educational, and other measures have already resulted in the production of about 2500 new types of article during the first half of the five-year plan, of which 189 of these represent articles never previously made in any part of the Soviet Union.

The number of articles manufactured in the republic that have received the State Award of Quality has now reached 1966, which are produced by 149 organizations and 7 fish-farming bodies. The proportion of these products in the total output in the republic was 13.5% from the first half of 1978.

However, there are still many shortcomings in the metrological support to production in the republic; not all the ministries and other organizations have undertaken proper up-dating and reequipment of their test facilities, including metrological support. In particular, progress is very slow in introducing the latest measuring and test systems, and inadequate use is made of specialized nonstandard equipment that provides not only improved labor productivity but also high and guaranteed product quality. Elimination of these shortcomings is a prime task for party organizations and directors of organizations and subordinate bodies.

THE ROLE OF TESTS IN IMPROVING PRODUCT QUALITY (THE "METROLOGY AND MEASUREMENT TECHNIQUES-78" EXHIBITION)

L. M. Zaks and E. K. Tomberg

Many of the tests and checks performed in modern production processes involve a variety of measurements, where accuracy specifications are constantly being tightened. Such tests are a very important link in quality control, since they are essentially concerned with comparing the physical characteristics that govern quality with the values laid down in the standardization documentation, which frequently involves appropriate corrective action during design, production, and use.

Reliable evaluation of product quality in such tests is possible only if one measures physical and physicochemical characteristics under appropriate test conditions; the effort consumed by such tests can constitute a considerable fraction of the total production effort, and the volume of such tests tends to increase rapidly with the complexity of the article itself.

For this reason, the "Metrology and Measurement Techniques-78" Exhibition had a special section on metrological support to product testing, in which demonstrations were given of the role of tests as the basis for objective product quality evaluation at all stages from the commissioning of routine production (tests on initial specimens) through routine production (acceptance tests), grading of articles into quality categories, acceptance testing of raw materials and intermediate products, process stability monitoring (including the formulation and maintenance of standards), and international certification of certain articles.

The introduction to this section emphasized that a major task of metrological support is to ensure unified testing as a basic condition for acceptance of test results by the consumer in this country or abroad. Unless tests are standardized, one cannot be sure that the monitoring has been effective, nor can international certification be guaranteed. Here by unified testing one implies reproducibility of results within acceptance limits laid down by the standard documentation. A necessary and sufficient condition for such unified testing.
is that the specifications for metrological support are met, i.e., that standardized and certified test methods are employed that are consistent as regards accuracy with the tolerances laid down in the standardization documentation [1].

The methods of performing tests form the basis of a major practical document that lays down the methods and means of measurement to be employed, the actual tests themselves, any analyses to be performed, the sequence in which these are to be executed, the processing of the results, and the evaluation of the actual errors in determining product parameters, under real conditions. The exhibition presented major aspects of the systems used to support unified tests, i.e., physical standards, organizational measures, and material support.

The physical standards are provided by the All-Union State Standards (GOST) and industry-wide standards. The State Standards Commission of the USSR collaborates with the ministries and other bodies, and at the present time it is actively concerned with defining technical standardization documents that govern the main aspects of support to unified tests; these documents also cover the specifications for metrological support to development work, manufacture, and operation, including supervision of instrument accuracy; further, specifications are being drawn up for test methods, definition and certification of measurement methods, and the division of functions between the GOST and industry-wide test centers.

The organizational aspects of metrological support are provided by the All-Union state and departmental metrological services, together with the principal and base organizations concerned with standardization and metrology, the All-Union state and industry test centers, test laboratories, subsections in industrial organizations, and so on. The corresponding section of the exhibition dealt with major studies in this area concerned with unified testing [2].

The material support to metrological aspects of tests is provided by means of measurement and analysis for physical and physicochemical characteristics, such as general apparatus, specialized testbeds, and equipment for reproducing working conditions, in addition to machines and systems for determining component reliability.

The All-Union State Standards Commission also collaborates with the ministries and other bodies in implementing a joint program in which a special part is played by the definition of tests that have a major influence on product quality. This program includes a series of state and industry-wide standards designed to unify tests, as well as plans that envisage standardization of methods and means for test operations, tests to be applied to means of measurement, and consumer goods falling within the province of regional sections of the State Standards Commission. This program also provides for organizing the supply of test facilities, and also extension of the network of state and industry-wide test centers, which will require improved training in many areas.

Examples of metrological support to testing may be drawn from the section concerned with climatic and corrosion tests; the latter are particularly important because of the very considerable losses from corrosion (up to 10% of the national income). A basic condition for reducing corrosion loss is standardization of corrosion-test methods with full metrological support; these aspects are being handled by the All-Union Metrological Facilities Research Institute (Tbilisi), which is developing precision methods and means of measurement for electrochemical corrosion studies, climatic tests, and quality control on protective coatings. In particular, the institute has set up a center for climatic testing, where subtropical conditions are simulated for testing materials. The exhibition presented some metrological aspects of the work of this institute in this area, including a system for checking means of measuring corrosion potentials (a prototype standard for electrode potential) and standard specimens for coatings.

A new area in testing is that of the determination of states of stress and strain in materials and structures by acoustic emission; this method has been extensively researched in the Khabarovsk branch of the All-Union Scientific-Research Institute for Technical Physics and Electronics, particularly with the object of monitoring stresses in components directly under working conditions, which enables one to predict the probability of failure and the actual working safety margin.

The exhibition also presented some new test instruments and systems that employ acoustic emission.