

Association of Chief Operating Engineers

Foreword

By definition a stationary engineer is "one who operates and maintains all of the different kinds of equipment used to generate steam and/or power, and to heat, ventilate, refrigerate, and air condition large buildings, factories, and other structures."

The craft of stationary engineering was created in the eighteenth century the moment practical boilers and steam engines began to operate. The craft, from the beginning, required considerable skill and knowledge, combining as it did theoretical harnessing with the actual operation and maintenance of boilers, steam engines and their appurtenances.

Early in the development of these engines, and the power assemblies which followed their development, practically all types of power equipment were custom-made for the particular job; seldom were two alike. Standardization of design was virtually unheard of and there were no such things as interchangeable parts. It became necessary, therefore, for the operating engineer to study his equipment closely, to operate it to the best of his ability, to learn its strengths and weaknesses and when breakdown occurred, to dismantle, repair and reassemble the entire assembly. Some of the maintenance problems diminished as equipment became more standardized but advancing technology created an even greater number in their place. The need for both operating and theoretical skills remained unchanged, although both became more sophisticated.

The knowledge requirements are indicated by a 1904 summary of the qualifications of the all-around stationary engineer.

"The man whom I would consider a practical engineer is one who has served his time as a machinist and with an engine builder; he should have seen service in the fire room; he should understand every moving part of any make of steam engine and be able to repair any portion needing to be renewed or repaired; he should have a technical knowledge of ice machines, dynamos, elevator machines, compressors, pneumatic machines and gas engines. He should be able to work his plant with the highest efficiency and be capable to seeing improvements advantageous of his plant."

With the advent of the automatic stoker and the increasing use of oil and gas as fuels, the operating job of the stationary engineer became largely one of regulating fuel, air, and water flow for the greatest efficiency and economy; watching and recording gage readings; adjusting head and back pressure and, perhaps most importantly, recognizing potential trouble before it occurred and preventing it. The power developed by the steam was economically essential to the commercial or industrial operations it served and, in addition, carelessness could lead a serious explosion with consequent injury, property damage and loss of life. As the systems operated by the engineer became increasingly complex, his operating and theoretical knowledge of the interdependence of the many components of the systems in his charge became his most important maintenance asset; one absolutely necessary to continued economy and safety of operation.

This trend has continued on an ever-steepening rise until today, with the proliferating of controls and instrumentation in the boiler room, as well as in heating, air-conditioning and refrigeration systems, the operating and maintenance functions of the stationary engineer are virtually merged. True, in some larger installations, the maintenance load is so great that many engineers work at it full time, but without operating experience and the consequent structural understanding of the systems involved, their value would be much diminished.

Job content has changed and increased in scope. Much of the equipment in today's modern plant was unheard of a few short years ago. Steam is still one of the most important power sources but electricity, gas and diesel engines, gas turbines and now nuclear energy are also part of the picture. Tomorrow the fuel-cell and magneto-hydrodynamic systems will be with us. Suffice it to say that the most comprehensive training we can give new entrants to the trade will be little enough. Extensive theoretical

knowledge is a must but job experience is indispensable. Without it the theoretical knowledge is of little practical value.

For this and other reasons, the emphasis in these standards is on work experience. The necessary related training is indicated but only in broad outline. Eventually, it is hoped, both phases of the program can be more closely integrated and the entire course made available in the form of workbooks and job assignment sheets. Also, at least as much effort must be put into making vitally needed training available on journeymen, some of whom are finding it difficult to keep up with the increasingly demanding jobs. The basic apprentice program is really only a beginning step but it unquestionably the keystone of the broader training effort which must come.

The standards prepared here have been carefully drawn to be inclusive, yet flexible. Almost all existing programs can, with little modification, be fitted into this broad framework.