

From the News Service  
Mass. Institute of Technology  
Cambridge 39, Massachusetts

For Release in MORNING Papers  
of THURSDAY, April 12, 1956

Soviet  
educational  
system

The Soviet educational system has trained a small but elite corps of aeronautical scientists who are second to none, according to a pioneering Massachusetts Institute of Technology study of Soviet education in aeronautics, which was released last night.

"These top scientists," says the M.I.T. report, which was prepared by Dr. Leon Trilling, assistant professor of aeronautical engineering at M.I.T., "acting as small flexible task forces, have solved a number of theoretical questions...selected to keep Soviet aeronautical science abreast of any competitor."

But, adds the M.I.T. report, the Russian technical leaders are perched on a shaky engineering base.

"The full cross section of engineers in the Soviet Union," says Dr. Trilling, "have apparently not yet acquired that degree of engineering 'feeling' which only broad familiarity with machinery can bring. They work by the book and require detailed direction.

"For this reason, excellent designs must frequently be adapted to inferior execution, and tooling or high-grade workmanship is reserved for only key parts of the assembly."

The M.I.T. report also gives special emphasis to the Soviet doctrine that education trains skilled technical personnel for

(more)

the service of the state.

"The constant subordination of the individual to the national plan," says Dr. Trilling, "is an important psychological influence on professional people in the Soviet Union."

Dr. Trilling also notes that aeronautical engineering receives special attention in the Soviet and quite possibly illustrates their best efforts. Nonetheless, he adds, many of the strengths and weaknesses of Soviet aeronautical education are probably representative of other areas.

The Trilling study was prepared by M.I.T.'s Center for International Studies and is part of a broad examination of the qualitative aspects of Soviet technical education being conducted by the Center under a government contract and a grant from the Carnegie Corporation of New York.

The M.I.T. project on Soviet education is under the general direction of Alexander G. Korol, who was born in Russia and who was in the midst of securing an engineering education there when the Revolution broke out. The Trilling study is the first major part of the project to be completed.

This first report is based on official and technical Soviet publications and on the testimony of witnesses, both Westerners who have visited Russia for various lengths of time and former Soviet citizens who have either studied or taught in the Soviet Union within the last ten years.

"On the basis of the evidence," says Dr. Trilling, "it is our conclusion that there exists in the Soviet Union a group of talented people with drive and ambition who are generally permitted to reach

(more)

Study of Soviet Aeronautics - M.I.T.

3.

the top, sometimes quite rapidly, and that their number has increased as a direct result of Soviet educational policy.

"But there are still only a few men who carry the Soviet engineering apparatus on their shoulders, being simultaneously teachers, scientists, and designers.

"There can be little doubt that the ability and knowledge of this key nucleus is on a par with that of the best men in similar positions anywhere, but that at the present time these men do not have adequate support," that is, the technical support of a well-balanced body of engineers and technicians.

\*\*\*        \*\*\*        \*\*\*

The Trilling study is the first to examine in close detail the qualitative aspects of a single segment of Soviet technical training. It is the first to base its conclusions on the pattern of "vertical integration" which is typical of technical training in Russia.

Vertical integration means that in general the segments of Soviet professional programs are defined by the industrial monopolies.

This is the opposite of the familiar "horizontal" pattern of subject matter divisions found in the United States.

In this country, for instance, a man trained as an electrical engineer has a wide range of employment opportunities.

He may seek a job with a firm manufacturing electric appliances, or with a telephone company to improve the efficiency of communication networks, or with an aircraft builder to design automatic control or radio equipment.

(more)

## Study of Soviet Aeronautics - M.I.T.

4.

This is the horizontal approach to engineering education. It stresses versatility and fundamentals. This horizontal approach requires institutions which are independent of productive facilities.

In the Soviet Union the situation is altogether different. Responsibility for the productive activity of the nation is divided among a small number of powerful ministries, each of which has full charge of a definite segment of the industrial economy.

Each ministry is responsible for many services and much auxiliary equipment needed in its main task: housing in newly developed areas, factory construction, light and specialized tooling, control equipment, safety equipment.

In particular, each ministry trains in its own institutes the skilled personnel--engineers, economists, and others--necessary for its operations. This is vertical integration.

Dr. Trilling analyzes this vertical integration in his study of Soviet education in aeronautics.

He discusses the undergraduate training of engineers generally and of aeronautical engineers in particular. He considers graduate training and research in aeronautics. He analyzes the contributions of research in basic science to the development of aeronautics in the Soviet Union.

Dr. Trilling finds that one of the chief weaknesses of the Soviet system is its inevitable duplication.

A mechanical engineer of the Ministry of Aircraft Production, for example, may be trained to design the same valves and piping as one in the Oil Production Ministry without any interchange of information between the two.

(more)

Yet the system also permits a flexible use of top technical people within any given ministry. Key men carry a variety of responsibilities. They lecture at the university, supervise research at the aeronautical institute, serve as consultants to the industry itself.

This "multiple hat" system, as Dr. Trilling calls it, works with apparent effectiveness. The system also permits concentrated and integrated attack on any given problem. It has had its obvious successes.

"Recent press reports," Dr. Trilling notes as an example, "have indicated that the Soviet aircraft industry has produced turbojet engines appreciably more powerful than those in mass production in the United States at the present time.

"While know-how and ideas from German and other sources have helped in this Soviet accomplishment," he adds, "they would not have been absorbed and put to effective use so rapidly if native groups had not mastered the fundamentals of the problem independently and prepared a sufficient number of engineers to extend and improve good borrowed ideas in an original and skillful manner."

In spite of the Soviet strength in science and applied science, says Dr. Trilling, their situation appears less favorable in engineering.

"In the sciences," he notes, "there existed a solid pre-Revolution base which required only to be broadened. In engineering the Soviet system started almost from scratch.

"Moreover, the Soviet regime undertook the task of training a large engineering force while at the same time enormously expand-

(more)

Study of Soviet Aeronautics - M.I.T.

6.

ing the national industrial machine. Appreciable progress has been made in both directions, but much remains to be done to create a technical base comparable in engineering instinct to the American or German base."

The number of graduate students at Soviet technical schools is also uniformly low, ranging from two per cent of the student body at Bauman Technical School in Moscow down to zero at many of the outlying institutions. This contrasts to thirty-eight per cent at the Massachusetts Institute of Technology, and an average of twelve per cent in American technical schools generally.

"The Soviet situation," says Dr. Trilling, "may be the result of a deliberate policy which aims to get engineers into the industrial stream as quickly as possible and to enable the senior professors to educate the best graduates as carefully and thoroughly as possible."

But it also appears, he adds, that insufficient contact with mature creative teaching personnel and a strong emphasis on factual knowledge useful for immediate applications in design and manufacture have limited the number of young people who give promise of originality and show an interest in research by taking an advanced degree.

This has resulted, says Dr. Trilling, in the present emphasis on graduate correspondence courses, the financial rewards offered for an advanced degree, and the fact that the scientist is now praised as the prime builder of the Soviet state--a trend that is likely to become stronger.

(more)

## Study of Soviet Aeronautics - M.I.T.

7.

"Although a long-range Soviet policy of industrial expansion in the future and the training of additional teachers should provide an increasing supply of engineers," concludes the M.I.T. study, "it is doubtful whether they will generate sufficient self-reliance in technical matters without extensive changes in the entire Soviet approach to the problem of education."

\*\*\*        \*\*\*        \*\*\*

Dr. Leon Trilling, author of the M.I.T. Center's study, is assistant professor of aeronautical engineering at M.I.T.

Born in Poland of Russian-speaking parents, Dr. Trilling received his secondary school education in France. After emigrating to the United States in 1940, he entered the California Institute of Technology where he received the degrees of bachelor of science (1944), master of science (1946), aeronautical engineer (1947), and doctor of philosophy (1948).

Dr. Trilling was a Fulbright Fellow in France in 1950 and was appointed a research associate at M.I.T. in 1951. He has been assistant professor of aeronautical engineering at M.I.T. since 1954.

Professor Trilling's chief fields of study and interest are aerodynamics and fluid mechanics.