

Advances in Machine Shop Practice

Short Synopsis of Papers and Discussion at the Shop Session of the Annual Meeting of A.S.M.E., Showing Some Radical Advances in Machine Shop Practice.

At the session of the annual meeting of the American Society of Mechanical Engineers, New York, December 1 to 4, devoted to machine shop practice, some papers were presented which showed that some radical changes were being brought about in machine shop practice. Not since the presentation of Mr. Fred. W. Taylor's paper on "The Art of Cutting Metals," some years ago, has there been so many interesting shop experiments and experiences presented to the Society. Many of the most important problems confronting machine designers and shop men came up for discussion, including the much discussed question of the lubricating or cooling of cutting tools and the best form of involute gear tooth. A short synopsis of each paper is given below, together with the important discussion:

DESIGN OF MILLING MACHINES AND CUTTERS.

"Efficiency Tests of Milling Machines and Milling Cutters" was a paper by A. L. De Leeuw, Cincinnati Milling Machine Co., Cincinnati, O. This paper points out the desirability of indicating the power of a machine tool by the amount of metal which it is capable of removing rather than by the size of driving pulley and belt. It describes some tests made for the purpose of ascertaining the metal removed and the capacity of several makes and sizes of milling machines. It also shows the results of tests made for the purpose of finding the net horse power required to remove a given amount of metal under various conditions of feed and speed. It further gives the results of tests determining mechanical efficiency of the feed mechanisms of various milling machines, and shows why it is important that this efficiency should be made higher than is usual. It describes the tests determining the mechanical efficiency of the driving mechanism of one make of machine. It further gives results of tests showing that improvements in cutters, more than improvements in machines, may ultimately reduce very materially the power required for removing metal on a milling machine.

In a future issue of the MACHINERY EDITION of THE CANADIAN MANUFACTURER, will appear a fully illustrated abstract of this paper.

EXPERIMENTS WITH MILLING CUTTERS.

"Development of the High Speed Milling Cutter, with Inserted Blades, for High Power Milling Machines" was a paper presented by Wilfred Lewis and Wm. H. Taylor, both of the Tabor Mfg. Co., Philadelphia. This paper told of the development of this high speed milling cutter, and some of the remarkable cuttings made with it were distributed among those present in the convention hall.

The main point in this milling cutter is the use of inserted helical blades of high speed steel, mounted in a steel holder to give a solid

backing for the blades on the driving side, against which they are held by a soft metal filler on the opposite side, thus giving a uniform support for the cutter blade on both sides from end to end.

Another point is the form of groove adopted to give a slight curvature to the blade across its width, and thus favor the realization of a lip angle from the cutting side. Not only are the blades held more securely in position by the method adopted, but they are also more easily removed when damaged, and new blades can be easily inserted.

The cutting power of a milling cutter built up in this way appears to be beyond the capacity of any machine now on the market, and the endurance of the cutters, as far as experiments have been made, is phenomenal.

At a later date an illustrated abstract of this paper will be published in THE MACHINERY EDITION.

LUBRICATING OR COOLING CUTTERS?

The discussion on this paper led to the introduction of the question of lubricants for cutters, and Fred. W. Taylor claimed that the best lubricant for cutters was cold water, with sufficient soda or oil in it to prevent rusting of the machines. His reason for making this claim was that the high pressure with which the cutting edge was held against the work in heavy milling operations there was no possibility of the liquid being carried between the cutting edge of the tool and the material, the natural inference being that the work of the lubricant is the cooling of the cutter, and water is the best cooling agent. Other speakers disagreed with him on this point and referred to the well known fact that cutting tools supplied with lard oil, soda water or other lubricants produce a smoothly finished surface where with the tool operated dry a rough surface is left on the work; the difference in the character of the surface being undoubtedly due to the effect of the liquid as a lubricant rather than as a cooling medium alone. Reference was also made by one speaker to the practice in drawing tubing where with the heavy pressures required in passing through the dies the lubricant used is an important factor in the production of satisfactory work. He stated that the results varied with the nature of the lubricating material and that if a lubricant could be made to follow metal passing through dies under the heavy pressure necessary for this kind of work it would seem reasonable to expect it could be carried by the edge of a cutting tooth into a piece being milled.

Oberlin Smith, in discussing the cooling of tools mentioned some interesting experiments conducted by him several years ago with liquid air as a cooling medium. The results then obtained indicated that very high cutting speeds were possible with ordinary steels when cooled in this manner, but the problem of supplying the liquid air to the tool involved too expensive an equipment to warrant the adoption of this method of cooling tools in general shop operations.

A TOOL TO CUT WITHOUT CLEARANCE.

The paper "Metal Cutting Tools Without Clearance," by James Hartness of Jones & Lamson Machine Co., Springfield, Vt., described a turning tool he had devised which cuts without clearance. This paper is published in full in this issue.

EFFECT OF VARYING PRESSURE ANGLE AND ADDENDUM IN INVOLUTE GEARING.

A very interesting paper was that of Ralph E. Flanders, New York, on "Interchangeable Involute Gear Tooth Systems," which gives diagrams showing the effect of varying the pressure angle and addendum on the various practical qualities of gearing, such as interference, number of teeth in continuous action, side pressure on bearings, strength efficiency, durability, smoothness of action, permanency of form. After comparing typical examples of interchangeable gear systems in these particulars, the author advocated that a new standard for heavy, slow speed gearing was advisable. In this connection it would be interesting to read the article which appeared in THE MACHINERY EDITION of THE CANADIAN MANUFACTURER for October, on the advisability of shortening the addendum and increasing the pressure angle.

There was considerable discussion on this paper, L. D. Burlingame suggesting that the determination of the tooth forms best suited to the needs of the various classes of gears users had best be left to the cutter makers. But other speakers highly commended the paper, and upon the motion of Wilfred Lewis, the council of the Society was asked to appoint a committee to investigate the question and recommend a system of interchangeable involute gearing.

SPUR GEARING ON RAILWAY MOTORS.

The last shop practice paper was that by Norman Litchfield, New York, on Spur Gearing on Heavy Railway Motor Equipments. This paper deals with the breakage of gearing in heavy electric railway service; and a resume is given of the methods employed to overcome the breakage, and the strains in the teeth as calculated by the Lewis formula are shown. Attention is called to the fact that this formula is not entirely applicable on account of the difficulty in maintaining alignment of gear and pinion.

SEARCH FOR THE WORK FOR WHICH YOU ARE BEST FITTED.

While it is often desirable, and sometimes necessary, to take the first work which opportunity offers, it should be the settled ambition of every worker in the field of business to secure that particular class of work in which most interest can be taken, and in connection with which the best work can be done, as in this direction only can actual success ordinarily be expected.

A woman holding an excellent position in the business world, once said: "I would be willing to pay for the privilege of doing the work in which I am engaged if I could get the work in no other way."—Book-Keeper.