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Technical Meeting on the Selection
of Woodworking Machinery

Vienna, 19-23 November 1973

SANDING AND POLISHING MACHINERY[1/]

by

Heins Elday
Consultant
Vienna, Austria

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Technical Meeting on the Selection
of Woodworking Machinery

Vienna, 19-22 November 1973

SANDING AND POLISHING MACHINERY 1/

by

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SUMMARY

Abrasives should be considered as cutting tools just as are the more commonly considered tools in the woodworking industries, but they differ in several important respects. Although "sandpaper" is more commonly used, the term "coated abrasives" is preferable for the material which is so widely employed for smoothing metal, glass, plastics and, of course, wood.

Abrasive particles or "grits" may be both natural or synthetic. Natural grits are flint, garnet and emery; synthetic abrasives are silicon carbide and aluminium oxide. Silicon carbide is produced by the smelting of silicious sand and coke, and aluminium oxide by the smelting of bauxite.

Backing materials are bonded to the grit with adhesives and various flex patterns are used to produce the required operating flexibility. Besides paper- and cloth-backed abrasives, there are foam sanding tools, woven steel wool, scotch brite and carbide coated tools. The cutting action of coated abrasives differs from that of normal steel cutting tools since, although each grit should produce a miniature chip, a furrow will be generated rather than a rectangular trough. This must be smoothed or levelled by other grits and so naturally affects the choice of speeds, related feeds, depth of cut and applied pressure.

Recommended coated abrasives are listed for sanding solid hard maple, birch, oak, walnut and mahogany and for sanding veneers of maple, cherry, oak and gum.

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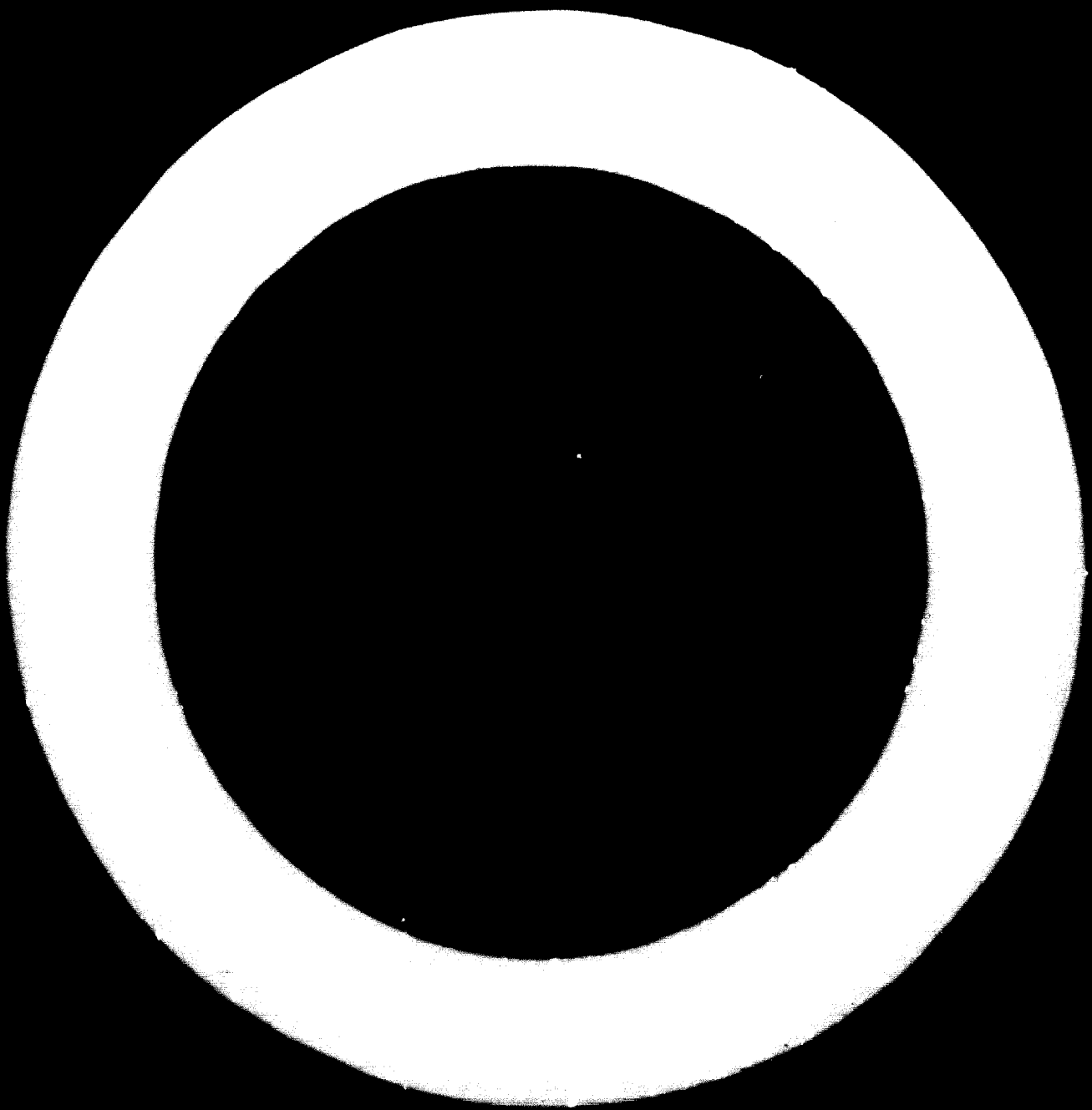

Sanding machines may be of the belt, drum, disc or pad type and use belts, sheets or discs of coated abrasives.

Drum sanders usually have 2, 3 or 4 drums (but for 2-side sanding of plywood may have 8 drums); the abrasives are hard to change and pressure control is not specific enough for finish sanding.

Spindle sanders are used for sanding special mouldings or contours and often are combined in one machine with a disc sander.

Belt sanders now exist in a wide range. The most common is the stroke sander with a sliding table. These are normally used for flat work, such as table tops, panels or drawers. Wide belt sanders are usually wider than 300 mm and are designed to release the stroke sander for production finishing and polishing. A new development is the vacuum mould sander, in which the abrasive belt back is sucked against mould pads allowing the stock to pass by automatically.

Disc sanders perform end sanding, miter sanding, beveling and chamfering operations.

Many portable sanders exist with numerous interchangeable attachments for sanding, rubbing and polishing. Special sanders for single uses such as sanding turned profiles, fancy shapes, moulds or carvings or for "tumble sanding" of small objects have also been developed.

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Organisation des Nations Unies pour le développement industriel

Réunion technique sur le choix des machines dans l'industrie du bois

Vienne, 19-23 novembre 1973

RESUME

MACHINES A PONCER ET A POLIR[1/]

par
M. Heinz Hidag, Consultant
Vienne (Autriche)

Les abrasifs devraient être considérés comme des outils de coupe au même titre que les autres outils utilisés dans l'industrie du bois. Ils s'en distinguent cependant par plusieurs caractéristiques importantes. Bien que l'on utilise couramment le terme "papier de verre", il est préférable de désigner par le terme d'"abrasifs sur support" les matériaux couramment utilisés pour polir les métaux, le verre, les matières plastiques et naturellement le bois.

Les particules abrasives ou poudres à polir peuvent être d'origine naturelle ou synthétique. On peut citer comme abrasifs naturels le silex, le grenat et l'émeri; comme abrasifs synthétiques le carbure de silicium et l'alumine. On obtient le carbure de silicium en faisant fondre du sable siliceux additionné de coke et l'alumine par fusion de la bauxite.

1/ Les opinions exprimées dans le présent document sont celles de l'auteur et ne reflètent pas nécessairement les vues du Secrétariat de l'ONUDI.

Au moyen d'adhésifs, on fixe les particules abrasives à un support plus ou moins souple, suivant que l'utilisation requiert une flexibilité plus ou moins grande. Outre les abrasifs à support de papier ou de tissu, on utilise des abrasifs sur mousse, du tissu abrasif en laine d'acier, du "scotch brite" ou des outils à revêtement de carbure. On n'obtient pas avec les abrasifs sur support le même effet d'enlèvement de matière qu'avec les outils de coupe ordinaires en acier. En effet, chaque particule abrasive enlève un très petit copeau, mais on obtient plutôt une rainure qu'un profil creux rectangulaire. Cette rainure doit être adoucie ou aplanie par d'autres particules, ce qui influe sur le choix de la vitesse, de l'avance, de la profondeur de passe et de la pression.

L'auteur énumère divers types d'abrasifs sur support recommandés pour poncer l'érable dur, le bouleau, le chêne, le noyer et l'acajou, ainsi que les placages d'érable, de cerisier, de chêne et d'eucalyptus.

On peut utiliser des ponceuses à bande, à cylindres ou à disque ou des ponceuses-vibreuses et des bandes, des feuilles ou des disques d'abrasifs sur support.

Les ponceuses à cylindres sont généralement munies de deux, trois ou quatre cylindres (jusqu'à huit cylindres pour le ponçage du contreplaqué sur deux faces); il est difficile de changer les surfaces abrasives et le contrôle de la pression n'est pas assez précis pour effectuer un ponçage de finition.

Pour poncer des pièces moulurées ou des profils spéciaux, on utilise des toupies à poncer souvent associées à une ponceuse à disque dans une même machine.

Il existe actuellement de nombreux types de ponceuses à bande. La plus courante est la ponceuse à course rectiligne et à table coulissante. Elle sert normalement à poncer des surfaces planes, telles que des dessus de tables, des panneaux ou des tiroirs. Les ponceuses à large bande ont en général une bande de plus de 300 mm de large et sont conçues de façon à libérer la ponceuse à course rectiligne pour les

opérations de finition et de polissage. On a mis récemment au point une machine à poncer les moulures sous vide, dans laquelle le dos de la bande abrasive est plaqué par aspiration contre des coussinets épousant la forme de la moulure tandis que la pièce à poncer défile automatiquement.

Les ponceuses à disque sont utilisées pour le ponçage final, le ponçage d'onglets, ainsi que pour biseauter et chanfreiner.

Il existe de nombreuses ponceuses portatives munies de nombreux accessoires interchangeables permettant de poncer et de polir. On a également mis au point des ponceuses spéciales pour poncer des pièces courbes ou de forme inhabituelle, moulurées ou sculptées, ainsi que des dispositifs pour le "ponçage au tonneau" de petites pièces.

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Organización de las Naciones Unidas para el Desarrollo Industrial

Reunión técnica sobre selección de maquinaria para trabajar la madera
Viena, 19 - 23 noviembre 1973

MAQUINARIA DE LIJADO Y PULIDO[1/]

por
Heinz Hidag
Consultor
Viena (Austria)

RESUMEN

Los abrasivos deben considerarse como herramientas cortantes al igual que otras más comúnmente usadas en las industrias del trabajo de la madera, aunque difieren en varios e importantes aspectos. Si bien el "papel de lija" es lo más usado, el término preferido para los materiales hoy más ampliamente empleados para el lijado y pulimento de metales, vidrio, plásticos y, naturalmente, la madera es el de materiales de "recubrimiento abrasivo".

Las partículas abrasivas o "granos" pueden ser naturales o sintéticas. Son abrasivos naturales el sílex, el granate y el esmeril; sintéticos, el carburo de silicio y el óxido de aluminio. El primero se produce mezclando en estado de fusión arena silícea y coque; el óxido de aluminio, mediante el fundido de bauxita.

Los gránulos abrasivos se adhieren al material de soporte por medio de diversas sustancias adherentes, utilizándose diversos diseños de distribución de las líneas de flexión para conseguir la deseada flexibilidad de operación. Además de los abrasivos sobre soportes de papel o tejido, existen otros tales como las espumas abrasivas (partículas abrasivas incrustadas en plásticos alveolares), las lijas de filamentos de acero entretejidos, el "scotch brite" y las herramientas para raspado con recubrimiento de carburo. El efecto cortante de los instrumentos con recubrimiento abrasivo se

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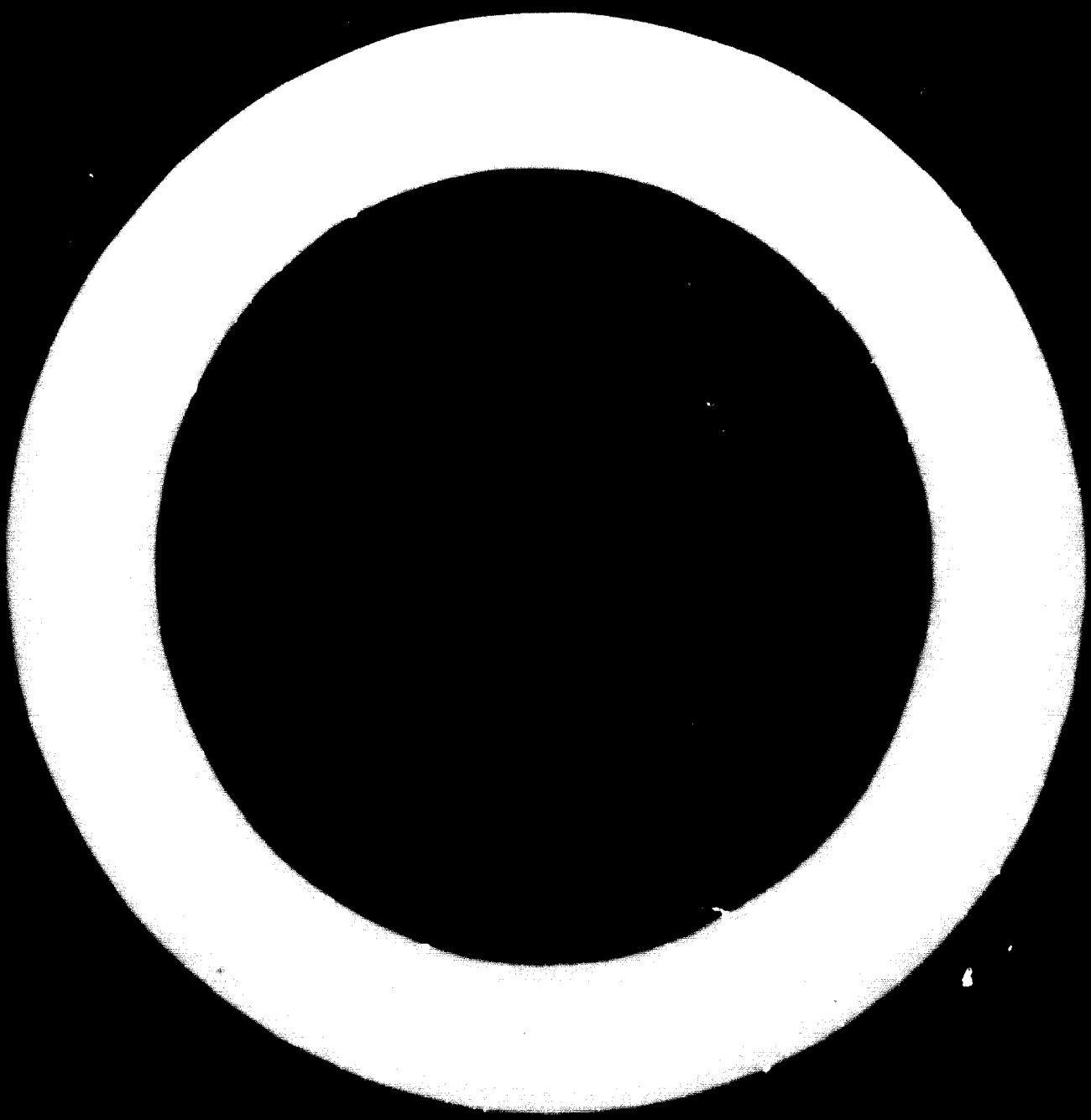


distingue del de las herramientas de acero corriente en que aunque cada partícula abrasiva produce una esquirla microscópica el resultado en la superficie trabajada es un surco y no un entalle rectangular. Dicho surco o raya es luego alisado y nivelado por otras partículas, este proceso exige, naturalmente, la aplicación de parámetros variables: velocidad, uso de materiales auxiliares, profundidad de corte y presión ejercida.

La memoria contiene una lista de los recubrimientos abrasivos recomendados para el lijado de: piezas sólidas de madera de meple (arce), abedul, roble, nogal y caoba, así como para el de chapas de meple, cerezo, roble y variedades de gomeros.

Las máquinas lijadoras pueden ser de correa, de tambor, de disco o de almohadilla según la forma del elemento que haya de producir el efecto abrasivo.

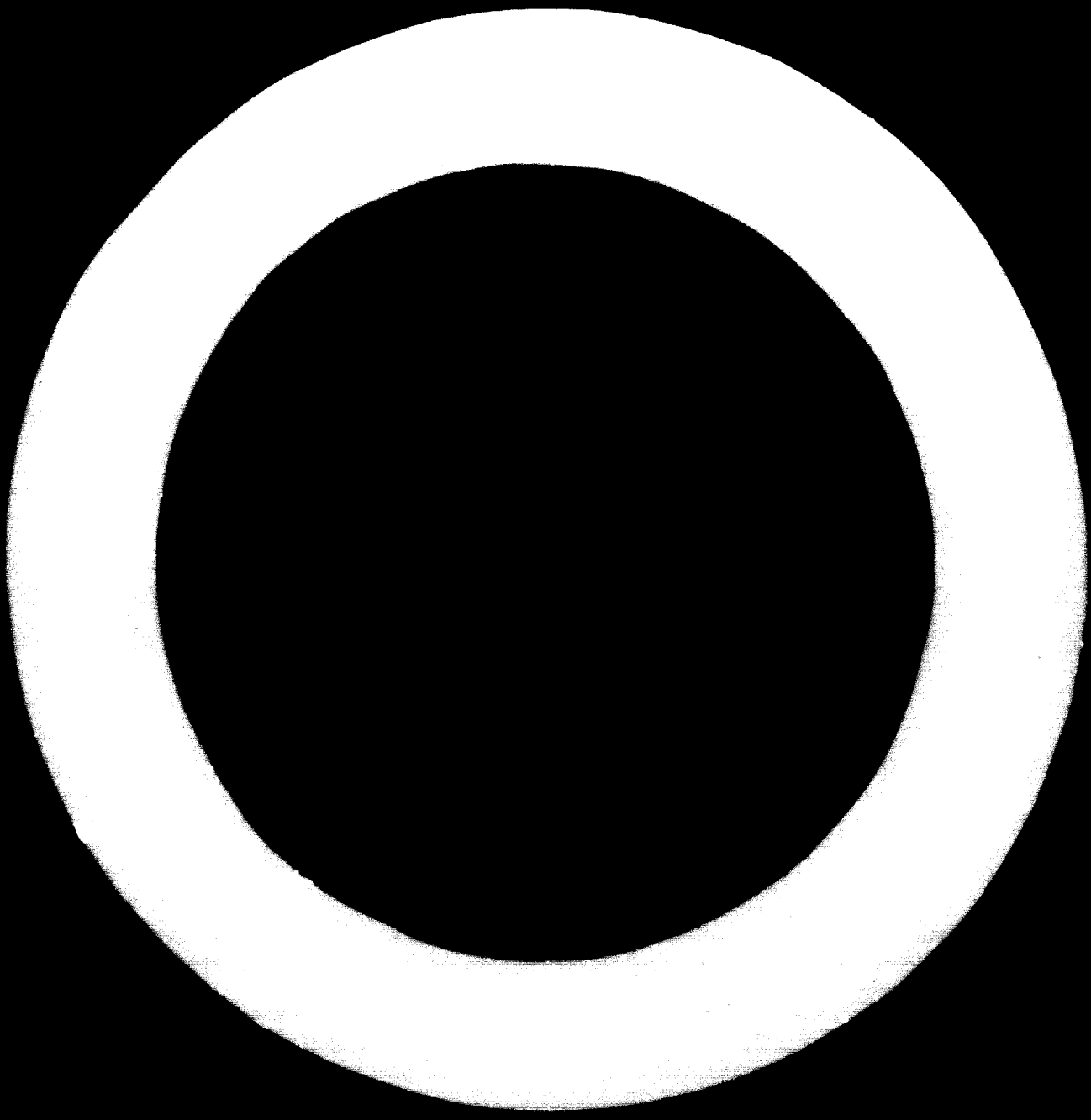
Las lijadoras de tambor tienen por lo común 2, 3 ó 4 tambores (aunque para el lijado simultáneo de ambas superficies de la madera chapeada pueden tener 8 tambores); en estas máquinas, los elementos abrasivos son difíciles de cambiar y el control de presión no puede regularse suficientemente para ser empleadas para pulimentos de acabado.

Las lijadoras de ocho se utilizan para molduras y perfiles especiales y se encuentran a menudo combinadas en una misma máquina con lijadoras de disco.

Las lijadoras de correa existen hoy en una gama muy variada. La más común es la lijadora acoplada a una mesa deslizante (sobremesa), la cual se usa principalmente para superficies planas, tales como tableros de mesa, paneles y cajones. Las lijadoras de correa ancha tienen por lo general más de 300 mm de anchura y hacen posible el uso de la máquina para operaciones de acabado y pulido. Una máquina más reciente es la lijadora pneumática en la que el revés de la correa abrasiva se adhiere por succión a una almohadilla lo que permite que la pieza trabajada circule automáticamente.

Las lijadoras de disco se usan para el lijado de extremos de pieza cortados a escuadra, de ingletes, biselados, acanalados, etc.

Existen hoy lijadoras portátiles con numerosos accesorios ajustables para el li ado, frotado y pulimentado. También existen máquinas especiales para determinados usos: lijado de perfiles torneados, de moldurar tallas de formas particulares, y "lijado por volteo" de artículos de pequeño tamaño.



CONTENTS

INTRODUCTION

Machinery described in previous documents operate with tools made of steel or carbides. Abrasives are also wood cutting tools, but of quite a different type, and are largely limited to the smoothing of surfaces by removal of tool marks, grain protrusions and the like, until a smooth satin finish surface results. Abrasive tools also leave tool marks but, by the successive reduction of the abrasive particle size and power techniques, these marks may be so infinitesimally small that they are comparable to the grain texture of the wood.

I TERMINOLOGY

While the general term "sandpaper" is popular in the woodworking industry and will not be readily abandoned, it is incorrect, since natural sand particles are too rounded and have not been used since primitive times. However, the small rough, but sharp, particles used in making what is called sandpaper do resemble sand, and thus the term originally came into use.

The correct term, which is gaining more and more popularity, is "coated abrasives".

Coated abrasives are also used to smooth metal, glass, plastics and similar materials. In this document, operations will be discussed for smoothing wood as an intermediate operation - after machining to final shape and before applying the various protective coatings, varnish, lacquer, paints and other finishes. Some of the finer coated abrasives are used also in connection with these finishing operations and gain more and more importance in the final stages of finishing coated surfaces.

II ABRASIVE TOOLS

A. The Cutting Grit

Abrasive particles termed "grits" are of 2 principal types: natural and synthetic. The latter is smelted in electric furnaces. Natural abrasives are flint, garnet and emery, while synthetic abrasives are silicon carbide and aluminium oxide.

Flint, correctly termed flint quartz, is the common basis of conventional sandpaper.

Garnet crystals, when crushed, are harder and sharper than flint. In wear garnet grits break down into smaller sharp crystals, so that they render an abrasive distinctly superior to flint.

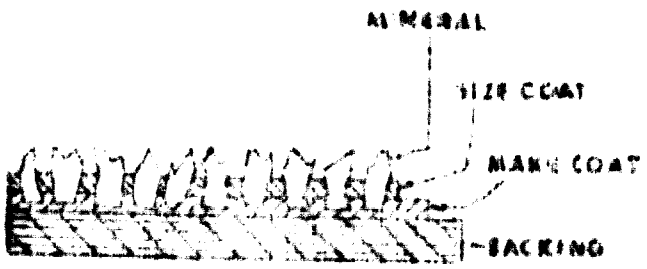
Emery, a natural abrasive, is a mixture of iron oxide and corundum, which is a natural aluminium oxide and imparts the abrasive quality to emery.

Silicon carbide is produced commercially by heating a mixture of sand containing silicon and coke, which supplies the carbon. The metal lumps will be crushed. Carbide grits of this type are very sharp, hard and brittle.

Aluminium oxide is a smelted derivative of bauxite. As an abrasive it has characteristics quite different to those of silicon carbide, since the former is more chunky, while the latter breaks into rather long, thin, sharp crystals.

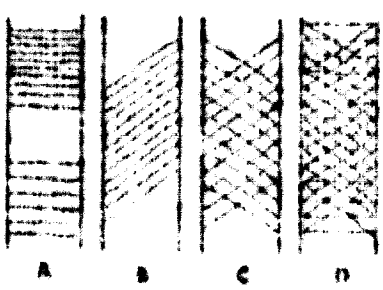
See figure 1.

FIGURE 1



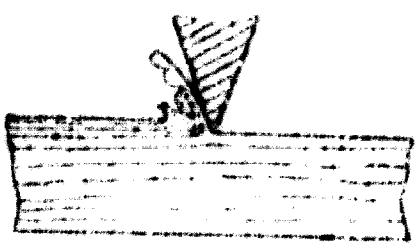
Basic construction of coated abrasives

FIGURE 2



Flexure patterns for coated abrasives. A. Single flex. B. Angle flex. C. Double flex. D. Full flex.

FIGURE 3



Cutting action of an abrasive particle

B. The Backing Material

Coated abrasives for woodworking are usually bonded to the backing by adhesives. Where sanding operations require flexibility, different flexure patterns are applied. (See figure 2).

A particular product will be most flexible if given a full flex pattern with break lines very close together, and least flexible if given a single flex pattern with well spaced break lines.

C. Other Developments of Abrasives

Besides the paper- or cloth-backed abrasives, other abrading tools have been developed, viz:

- Foam sanding tools
- Woven steel wool
- Scotch brite
- Carbide coated tools

The industry is always trying to find better abrasives with different features for special applications.

III HOW ABRASIVES WORK (See figure 3)

A coated abrasive is a tool for operating on machines, but it differs from all the other steel tools now in the woodworking field. In fact, each grit of a coated abrasive in contact with the work acts as a tiny cutting tool. Sanding dust examinations reveal that the chips cut off the workpiece are miniature replicas of the chips formed by any ordinary cutting tool. A steel tool cuts a clean chip which is easily directed away from the work, whereas an abrading grit will often generate a furrow, the edge of which must be leveled by other grits. The basic differences of action between steel tools and coated abrasives make a great difference in their proper selection of speeds, related feeds, depth of cut or applied pressure.

IV RECOMMENDED COATED ABRASIVES

For sanding solid wood following final planing of such species as hard maple, birch, oak, walnut and mahogany, see the instructions given in Table 1.

For sanding veneered boards of maple, walnut, cherry, oak or gum, see Table 2.

V SANDING MACHINES

Sanding machines are of 4 different types:

- Belt sanders
- Drum sanders
- Disc sanders
- Pad sanders

All variations have abrading tools referred to as: belts, sheets or discs.

TABLE 1

Type of Operation	Type Mineral and Technical Grades	Product Form (Rolls, Discs, etc.)	Special Remarks Concerning Usage
	Machine Room		
Multiple-Drum Sanding	60-E (½) Resin over glue Aluminum Oxide Paper	Rolls	For 1/32" stock removal prior to hand block or stroke sanding.
	80-E (0) Resin/Glue Aluminum Oxide Paper	Rolls	
	100-E (2/0) Closed coat Aluminum Oxide Paper	Rolls	
Turning Sanding	100-E (2/0) thru 220-E (6/0) Closed Coat Garnet Paper	Scored Rolls	¼" scoring-roll 4" wide sanding headed turnings
Wide-Belt Sanding	100-E (2/0) Closed Coat Aluminum Oxide Paper	Belts	Wide single belt sander for roughing. Finer grits for finishing.
	or		
	100-X Resin/Glue Aluminum Oxide Cloth	Belts	
	Sanding Room		
Stroke Sanding	120-E (3/0) Closed Coat Aluminum Oxide Paper	Belts	After cut-down and size operation on drum sander; final grit 100 (2/0). The average (solid) Maple plant will polish panels with 120 (3/0).
Edge Sanding	60-X Resin/Glue Aluminum Oxide Cloth through 100-X Resin/Glue Aluminum Oxide Cloth	Edge Sanding Belts	Belt joints must be carefully constructed to reduce bumping when work piece is presented to graphited canvas covered platen.
Mold Sanding	100-J (2/0) & 120-J (3/0) Resin/Glue Open Coat Garnet Cloth	Belts	J-weight or Jeans cloth for flexibility to contour to shaped moldings. Singleflex to hold line after shaping belt.
	120 (3/0) Garnet Finishing Cloth (Singleflex)		
Spool and Flutter Sanding	120-J (3/0) Open Coat Garnet Cloth	Delappe Discs	Sand carvings, intricate areas and contours. 8 wing disc—flutter sand. 16 wing disc—spool sand.
Pneumatic-Drum Sanding	90-J through 150-J Resin/Glue Open Coat Garnet Cloth	Belts	Doubleflex cloth when run over drums of varying degrees of inflation. To allow conformation of belt to workpiece by virtue of flexing.
	Cabinet Room		
Drawer Sanding	40-X (1½) or 50-X (1) or 60-X (½) Closed Coat Garnet Cloth	Drawer Sanding Belts	Sanding dovetails—on lip type machine. Usually Oak sides most severe test for belt joint.
Portable Belt	80-X (0) or 100-X (2/0) Closed Coat Aluminum Oxide Cloth	Belts	Portable belt machine—take sander to assembled case to flush—square backs, tops of drawer fronts—general touch-up fitting.
Hand Sanding	100-C (2/0) or 120-C (3/0) or 150-C (4/0) Closed Coat Garnet Cabinet Paper	Sheets	Breaking edges using sheets and felt blocks touch-up.
Vibrator Sanding (Oscillating)	120-A (3/0) or 150-A (4/0) Open Coat Garnet Finishing Paper	Sheets	Final inspection station—white wood, jitterbug sanding. Tops—final touch-up before top coat applications.
	Finishing Room		
Hand Sanding (Sealer)	220-A or 240-A Silicon Carbide Finishing Paper—Sterate Coated	Sheets	Hand sanding operation—Light scuff for wash coat—to over-all sealer sanding to rid surface of raised grain, dust and prepare surface for next coat.
Rubbing	360-A, 400-A, 500-A Waterproof Silicon Carbide Paper (Treated)	Sheets	Rubbing top coats—usually lacquer for satin finish. Waterproof paper, lubricant and rubbing machine.
Final Rub	Very Fine-Ultra Fine Garnet (Non-Woven Synthetic Fiber)	Rolls	Pad—hand rub with rubbing lubricant and pumice.

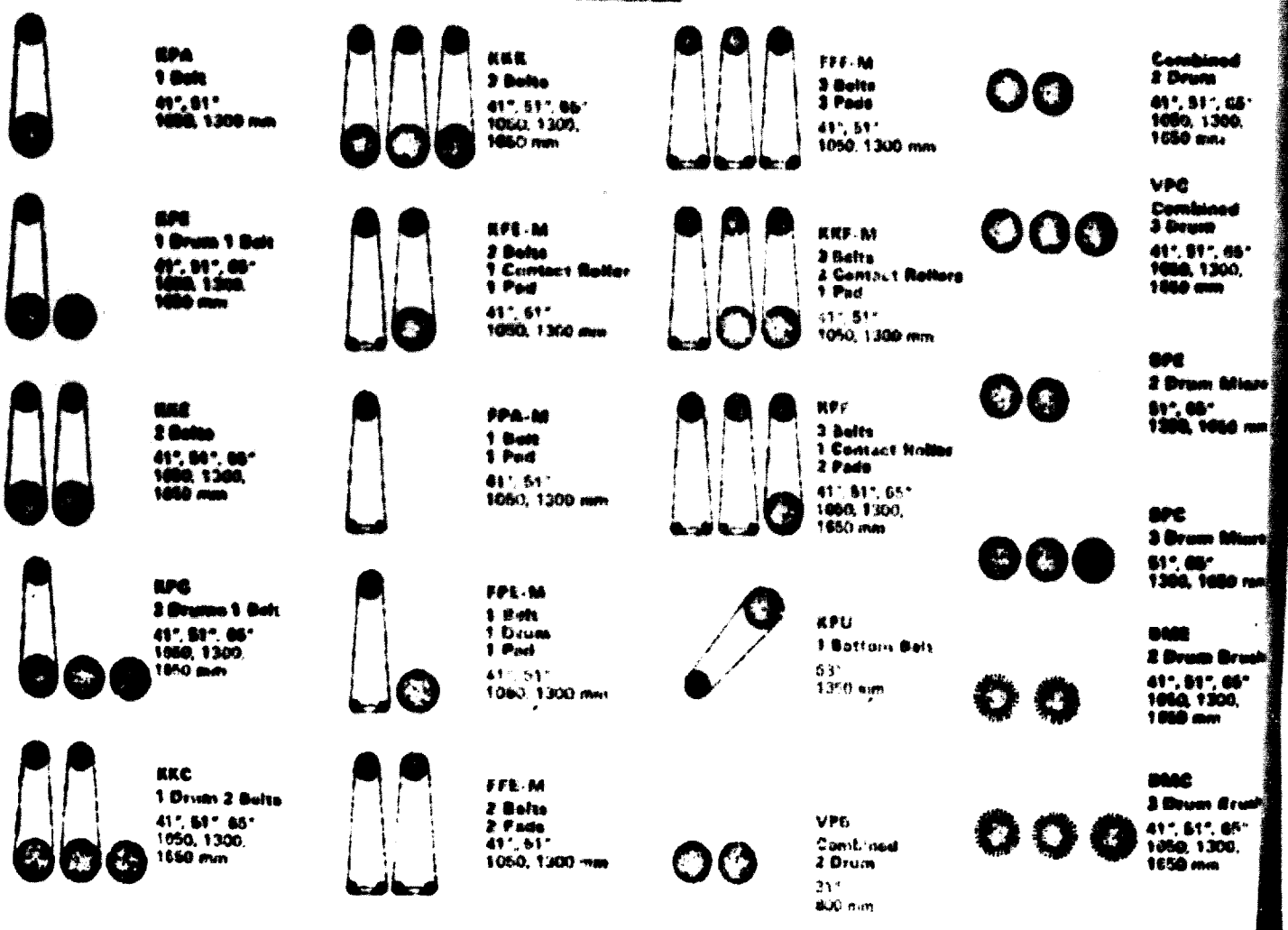
TABLE 2

(1) Type of Operation	(2) Type Mineral and Technical Grades	(3) Product Form (rolls, discs, etc.)	(4) Materials To Be Sanded	(5) Special Remarks Concerning Usage
Machine Room				
Multiple Drum (3)	60-E (½) Resin/Glue Closed Coat Al. Ox. Paper	Rolls	Squares, Rails, Frames, Veneer Back of Drawer Fronts, Drawer Parts.	Cut down and size all flat stock (Solid). Stock removed after planing.
	80-E (0) Resin/Glue Closed Coat Al. Ox. Paper	Rolls		
	120-E (3/0) Glue/Glue Closed Coat Al. Ox. Paper	Rolls		
Turning Sander	100-E (2/0) Glue/Glue Closed Coat Garnet Paper	Rolls	All Turnings, Beaded, Tapers.	Beaded turning sander with ½" sleeved 4" wide rolls. Tapers sanded with unsleeved paper rolls.
	120-E (3/0) (same)	Rolls		
	150-E (4/0) (same)	Rolls		
	180-E (5/0) (same)	Rolls		
Sanding Room				
Stroke Sanders, Double Belt	100-E (2/0) Glue/Glue Closed Coat Al. Oxide Paper	Belts	Veneer Tape Removal.	2/0 belt also used for rough cut.
	120-E (3/0) Glue/Glue Closed Coat Al. Oxide Paper	Belts	Cut Down or Rough Polishing of Veneer.	Depending on finish required or desired 2/0 or 3/0 belt used.
	180-E (5/0) Glue/Glue Closed Coat Al. Oxide Paper	Belts	Final Polishing on Veneer.	4/0 or 5/0 belt used final polish.
Edge Sanding	100-X Resin/Glue Al. Ox. Cloth	Belts	Flush-Squaring Solid Edges.	Grits 60X thru 120X used depending on desired finish. Paper
	100-X Glue/Glue Closed Coat Garnet Cloth	Belts	Sanding Veneer Edge Banding.	belts used also.
Mold Sanding	100-J (2/0) Resin/Glue Open Coat Garnet Cloth Singleflex	Belts	Mold Sanding, Hold Down Shaped Blocks, Shaped Hand Blocks, Stationary Blocks.	Singleflex or 90° flex and open coat material—in order that belt will keep a straight line after belt crowning to match particular molding.
	120-J (3/0) Resin/Glue Open Coat Garnet Cloth Singleflex	Belts		
Spool Sanding	100-J (2/0) Glue/Glue Open Coat Garnet Cloth	Delappe Discs—16-24-32 Slots	Routed or Carved Posts, Rails, etc.	Delappe disc wrapped around felt —gum latex—sponge spool. Spool shaped to fit curved area. Belts run over shaped contact wheel (spool) and idler pulley.
	120 (3/0) Glue/Glue Open Coat Garnet Finishing Cloth	Delappe Discs—16-24-32 Slots		
	120-J (3/0) Glue/Glue Open Coat Garnet Cloth 90° Flex	Belt		
Flutter Sand	120-J (3/0) Glue/Glue Open Coat Garnet Cloth 90° Flex	Delappe Disc—8 Slots	Clean up Carved Posts, etc.	Delappe disc mounted on spindle-shaped 8 point star.
Brush Sand	120-X (3/0) Glue/Glue Open Coat Garnet Cloth 4" Scored	Vonnegut Loadings	Clean-up Sanding of Intricate.	Loadings assembled on brush type wheel. Material extended and intricate parts held against wheel.
Pneumatic Drum Sanding	100-J (2/0) Resin/Glue Closed Coat Garnet Cloth	Belts	Sanding Contoured Parts.	Various degrees of inflation for conformation to contours.
	120-J (3/0) Resin/Glue Open Coat Garnet Cloth	Belts		
Wide Belt Sanding	80-E (0) thru 180-E (5/0) Glue/Glue Closed Coat Al. Oxide Paper	Wide Belts	Frames, Veneer, Solid Stock Rails, etc.	Wide belt sanding where desired. Finishes in white wood can be obtained.

TABLE 2 (cont'd)

(1)	(2)	(3)	(4)	(5)
Cabinet Room				
Vertical Belt Sanding (Miter)	60-X [illegible] Glue/Glue Closed Coat Garnet Cloth	Belt	Flushing, Fitting Drawers, Parts of Case.	Assembly line fitting and flushing-squaring operation.
Portable Belt	80-X (0) Glue/Glue Closed Coat A. Ox. Cloth	Belt	Flushing Squaring Part on Case.	Taking sander to assembled unit.
	100-X Resin Glue/Al. Oxide Cloth	Belt		
Drawer Sanding	60-X (1) Glue/Glue Closed Coat Garnet Cloth	Belt	Cleaning, Dovetails, Fiber and Glue.	Belt run over lip approx. 90° angle for effective dovetail clean-up on assembled drawers.
Vibrator Sanding	120-A (3/0) thru 180-A (5/0) Glue/Glue Garnet Finishing Paper	Sheets	Veneer Tops.	Slicking operation on case tops—inspection station.
Hand Sanding	80-D (0), 100-C (2/0), 120-C (3/0), 150-C (4/0) Glue/Glue Closed Coat Garnet Cabinet Paper	Sheets	Touch-up, Repair, Breaking Edge.	Final inspection—assembled cases before finishing operation—wood and felt blocks.
Finishing Room				
Washcoat Sanding	280-A (8/0) Stearate Coated Garnet Finishing Paper	Sheets	Scuff Sanding by Hand.	Low solids coating—8/0 paper used to prevent cut through on case edges.
Sealer Sanding	240-A Silicon Carbide Finishing Paper-Stearate Coated	Sheets	Sealer Sanding by Hand and Vibrator.	Prepare surface for final top coat application.
Rubbing	360-A, 400-A, 500-A Waterproof Silicon Carbide Paper (Treated)	Sheets	Final Top Coat.	Grits used determined by finish desired and degree of cut.
Final Rub	Very Fine-Ultra Fine Garnet (Non-Woven Synthetic Fiber)	Rolls	After Rubbing Procedure for Satin Finish.	Pad formed to fit hand—used with rubbing lubricant and pumice.

FIGURE 4



A. Drum Sanders

Drum sanders are normally built with 2, 3 or 4 drums which are driven by individual motors with an oscillating motion. Large 6-drum, double deck 2 side sanders have been applied to sand plywood panels. The feed mechanism consists of power driven smooth rolls or of a rubber-padded endless bed. The abrasives are difficult to change and pressure control is not specific enough for finish sanding. Spiral-wound drums are preferred for heavy cutting operations.

B. Spindle Sanders

These are built on the same principle as the spindle shapers. The sanding cylinders are made of wood, rubber, metal, or pneumatic drums. These machines are used for sanding special mouldings or contours. Spindle and disc sanders are often combined in one machine.

C. Belt Sanders

Belt sanders basically consist of an endless sanding belt running over 2 or more pulleys. The range of various belt sanders is today available in a very large number of varieties for specialized purposes.

The most common machine is the stroke sander with a sliding table which is mounted under the belt so that an operator with the aid of the block can bring the belt into contact with the wood surface to be sanded. This type of sander and all the variations with two belts or endless feed belt is primarily used for flat work such as table tops, panels or drawers, but straight mouldings and concave surfaces can also be sanded.

The open belt sander is used much like the open drum sander, but is better suited for contour sanding, such as rounding edges. The most common arrangement has two vertical abrasive belts side by side to permit cutting down and finish sanding or polishing to be done at a single pass

The belts of wide belt sanders are usually wider than 300mm and are designed to release the stroke sander for production finishing and polishing. These machines use contact drums or platers to back up the belt during the sanding operation. Wide belt sanders are often used in tandem for single or double surfacing.

All variations exist between drums and belts (both narrow and wide), and also between the contact drums or pads used with wide belts. (See figure 4).

Edge sanders have the belt in a vertical position. They are usually equipped for oscillation to avoid frictional heat.

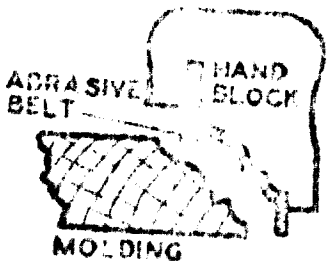
Moulding sanders can be of the belt or disc type. The belt sanders are equipped with formed hand blocks. (See figure 5). The discs have to be pre-shaped before covering with coated abrasives.

A new development is the vacuum mould sander. The abrasive belt back is sucked against the mold pads, so that the stock can pass by automatically.

D. Disc Sanders

Most of these machines consist of motor-driven discs faced with coated abrasives. Sanding operations performed on this machine include sanding end-wood square to the sides, sanding segments, miters, compound miters, bevels and chamfers.

FIGURE 5



Sanding block for moldings

FIGURE 6

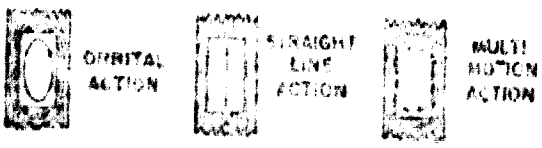
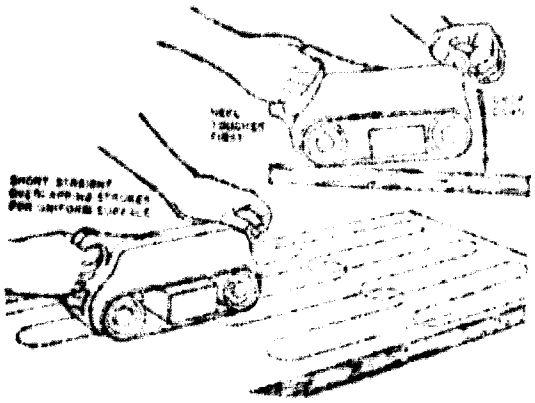
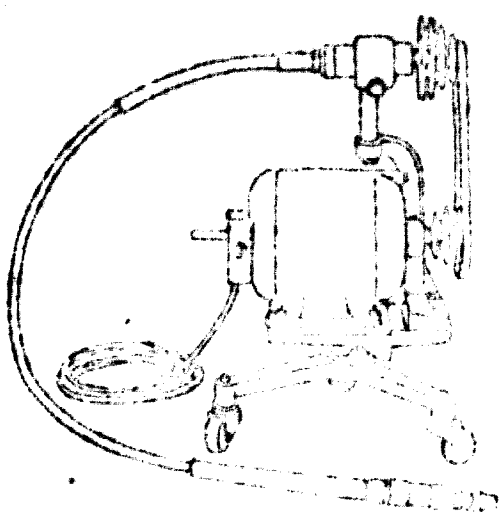


FIGURE 7a



Correct method of using a portable belt sander.

FIGURE 7b



Flexible shaft machine.

E. Portable Sanders

Power-driven machines for sanding, rubbing and polishing are widely used for wood surface finishing. Many electric and pneumatic sanders are available, viz. the singe or double pad sander with straight line, orbital or multi-motion action. (See figure 6). All these machines can be equipped with numerous interchangeable attachments for almost all sanding and rubbing operations.

Portable sanders are being used successfully today in final white sanding, washcoat sanding, padding filler, sealer sanding and rubbing the final finish. These operations follow after narrow or wide belt sanding operations.

Portable belt sanders, rotary sanders or flexible shaft sanders are used for many operations in workshops and industry. (See figures 7a and 7b).

F. Automated Sanders

For higher production capacities, automated machinery is available. One of the latest developments is the multi-spindle copying sander with a twin sanding unit, which is shown in figure 8. The sanding units are controlled by copying rollers.

To eliminate manual operations, sanding lines are designed for continuous multi-stage operations and have a capacity of 240 - 480 pieces per hour. See figure 9.

A double-end sander with several sanding units has been designed for linking with automatic belt sanding machines. The next step will probably be to combine both machines into one unit, so that panel stock can be sanded automatically in one pass.

G. Special Sanding Machines

This field covers machines which can be used for single purposes only, viz:

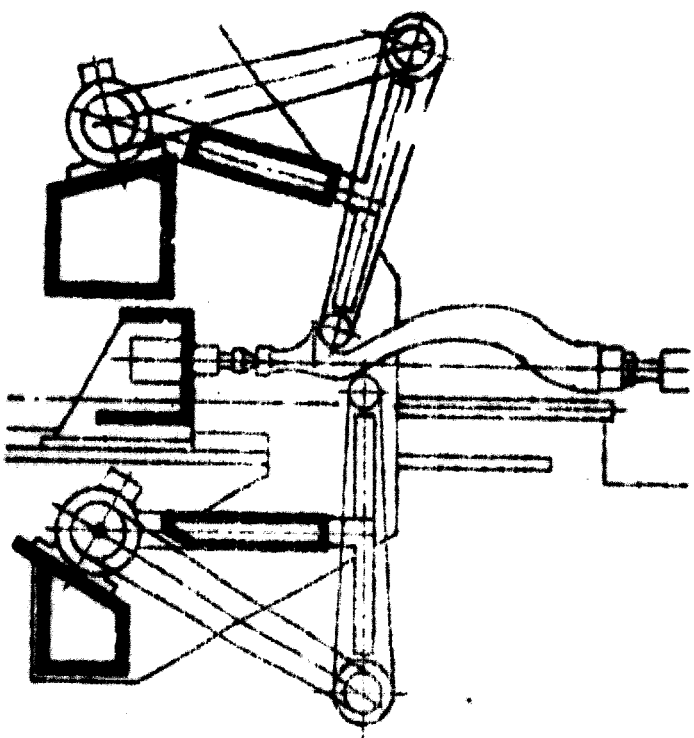
- Turning sander, used for sanding turned profiles
- Contour sander, used for sanding fancy shapes, moulds or carvings
- Tumbling sander, used for polishing small wooden toys by a tumbling action of a drum. The wooden parts and the polishing powder are mixed together. During the tumbling operation the gravity friction of all parts polish the surfaces.

VI HOW TO SELECT THE RIGHT SANDER

The grade of surface quality determines the machine and the sanding tool to be used. To achieve a high-grade surface quality on a manually controlled sanding machine requires a skilled operator. The type of operation determines the different machines built for the special purpose, viz:

- Surface sanding
- Edge sanding
- Contour sanding
- Mould sanding
- Turning sanding
- Polishing operations
- Rubbing operations

FIGURE 8



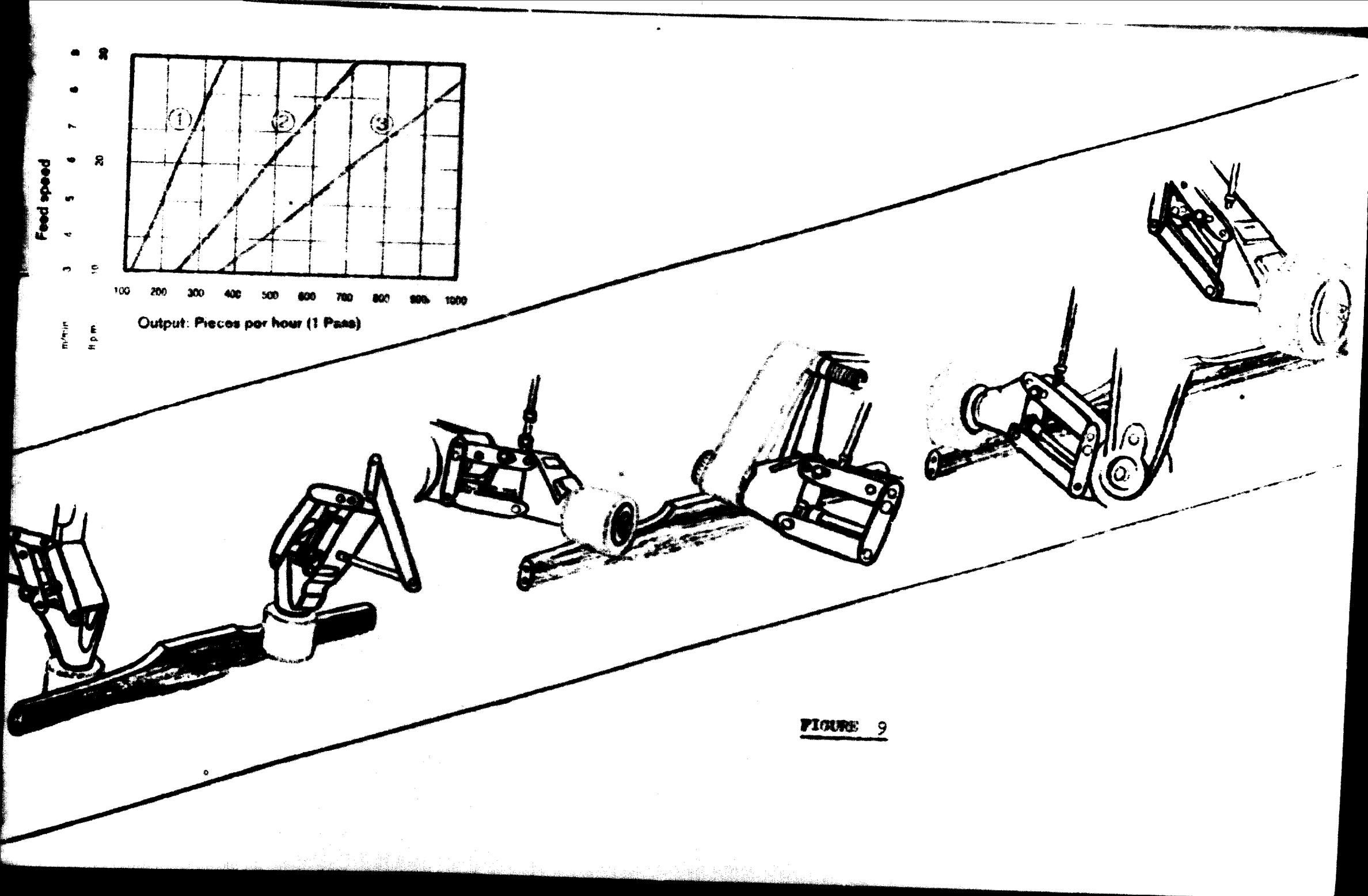
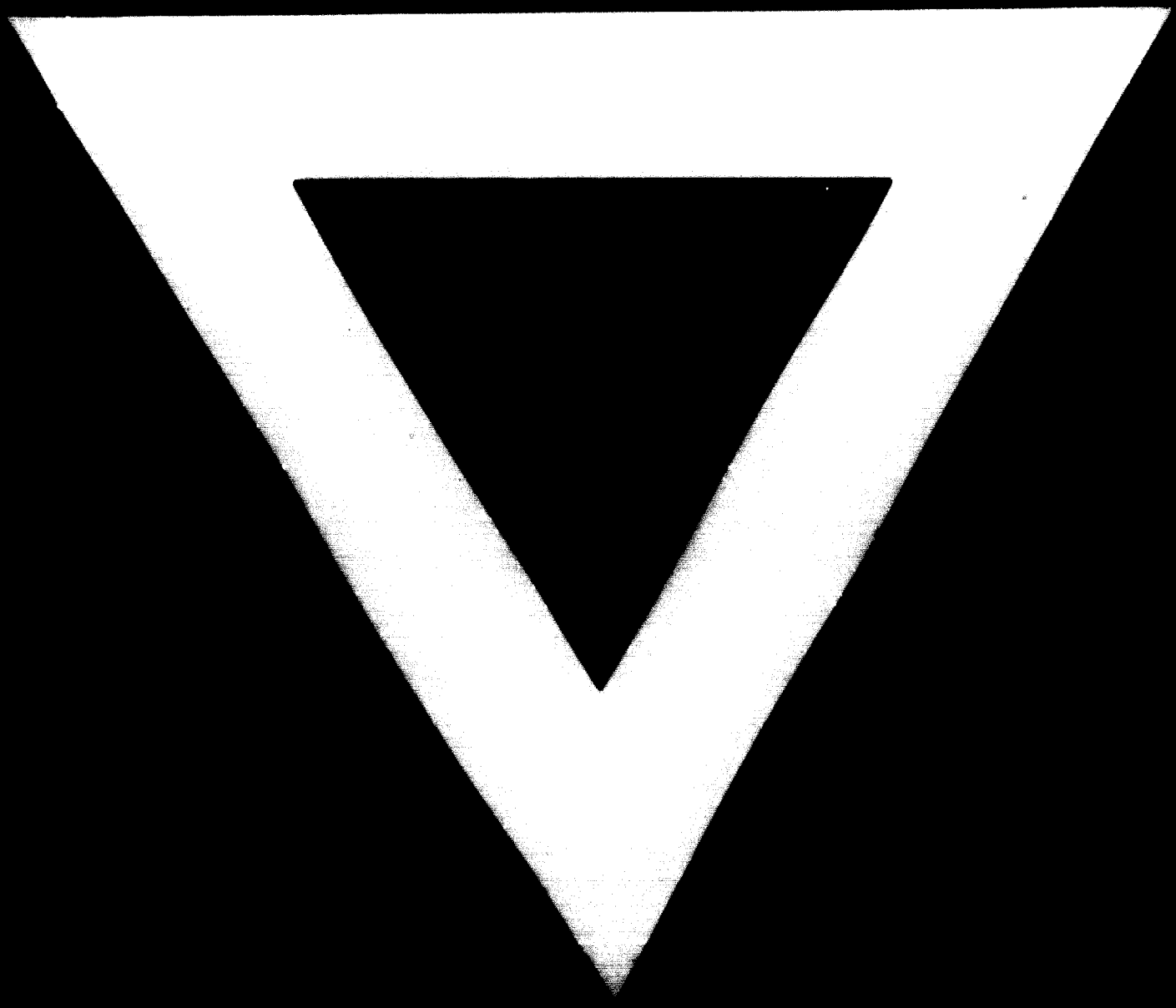

Feed speed
m/min
ft p m
3 4 5 6 7 8
10 20
1 2 3
100 200 300 400 500 600 700 800 900 1000
Output: Pieces per hour (1 Pass)

FIGURE 9

CONCLUSION

Sanding operations are final operations. Coated abrasives are not cheap tools. Thus the final machine room operations have to be selected, bearing in mind the sanding operations that follow. Thus keep in mind the old craftsman saying: "Well machined surfaces are semi-sanded surfaces". This means the better the surface quality of the final machining operation, the easier it is to finish the work by sanding.



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