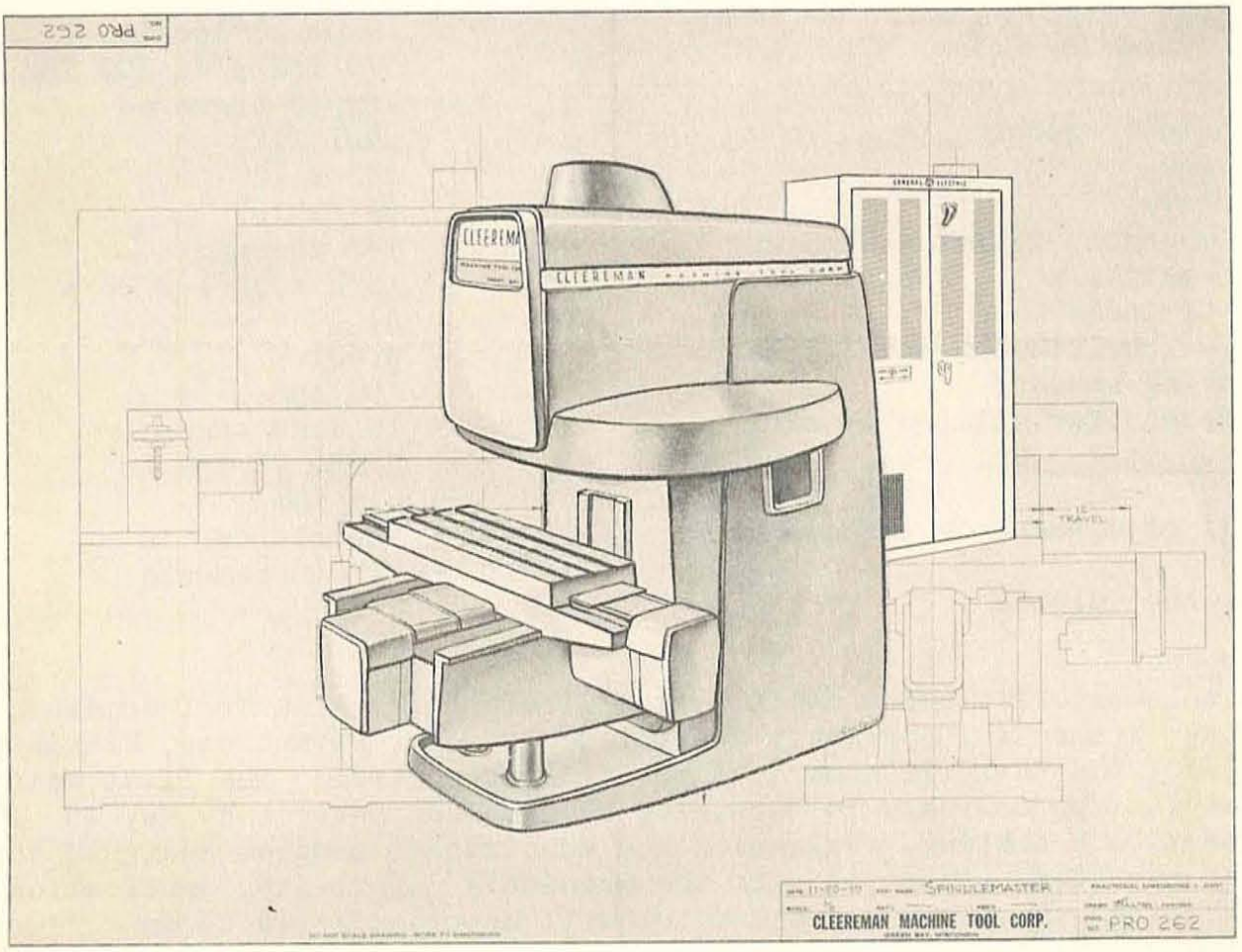
General Elec

SPINDLEMASTER



The Spindlemaster is a new concept in low cost "flexible automation." This tape controlled machine, a Manufacturing Engineering Service development, should find wide application in the General Electric Company. The project was undertaken by Advanced Manufacturing Engineering Service in an effort to create new sources for advanced equipment designs that would most effectively meet the needs of General Electric Operating Departments.

What Is It!

The Spindlemaster is a multiple tool, vertical spindle machine that can drill, tap, mill and bore. Its completely mechanical tool changer automatically changes tools in less than 8.5 seconds. All three axes, spindle as well as compound table, are automatically positioned by tape commands; spindle speed, spindle feed, table traverse speed, coolant cycle and operation mode (drill, mill, etc.) are also controlled by tape command.

Spindlemaster Specifications

Spindle horsepower	2/1 HP
Spindle travel	9.999 inches
Spindle speeds	18 speed steps from 150 to 3125 rpm
Spindle feeds	10 feed steps from .8 ipm to 20 ipm plus 200 ipm rapid traverse
Maximum tool runout	.001 TIR
Table size	30" x 16"
Table travel	24" x 16"
Part clearance, turret to table	18" maximum
Maximum part size	18"h x 30"1 x 16"w
Number of tools	31
Accuracy (positioning and depth)	±.001
Positioning speed	150 ipm
Table feeds (for milling) X or Y	10 feed steps from .6 ipm to 15 ipm
Vertical adjustment on table knee	9 positions in 1" increments
Maximum tool diameter	4"

Who and When

The Spindlemaster is being built by the Cleereman Machine Tool Company, Green Bay, Wisconsin; Specialty Control Department, Waynesboro, Virginia is building the Mark III numerical positioning control. The first unit is scheduled for delivery to Machining Development Service by May 15, 1960. Subsequent to a testing, evaluation and educational program designed to acquaint operating personnel with the machine's capability, application and operation, the first Spindlemaster will be transferred to an Operating Department.

Price

The Cleereman Machine Tool Company plans to market the Spindlemaster after debugging and evaluation of the first machine has been completed. Future machines will sell for $55,000-$60,000 including controls.

Delivery

Cleereman management has indicated that after June, 1960, they will be able to promise six month delivery from date of order. Present plans call for unveiling the Spindlemaster at the NMTBA Show in September, 1960. All improvements developed during the testing of the first machine will be incorporated in subsequent machines.

Information

For further information regarding Spindlemaster specifications or project progress, please contact H. W. Nidenberg, Advanced Manufacturing Engineering Service, Building #10, Schenectady, New York.

For further information regarding the Spindlemaster evaluation and educational program, please contact Dr. W. W. Gilbert, Machining Development Service, Building #69, Schenectady, New York.

PRODUCT STRUCTURE

The purpose of the product structure study is to (1) determine the relationships of components of the product with each other and (2) develop a method for defining and recording these relationships for use in preparing a unified description of the complete product and its components.

The usual material lists and drawings created by Engineering present model-component, assembly-component, part-material, and part-characteristic relationships for individual models, subassemblies and parts. Manufacturing control procedures may be simplified by a knowledge of how universal these relationships are for all models, assemblies and parts within the product line.

The product structure study begins with an inspection of the relationships implied by an entire product line. It discovers those characteristics of the desired end-product which have a broad effect on the manufacture of parts and the assembly of subassemblies and models. It is expected that in most products a reasonably short list of customer-specified characteristics will be found to control the bulk of the dependent variables in the product. Combinations of independent customer and/or engineering variables, and fixed characteristics can describe any part, subassembly or model in the product line.

When the first objective-determination of relationships - has been met, the problem is then to define, condense and record this information.

Variable characteristics may be assigned code numbers or letters so that the complete description of all variations can be recorded briefly and logically. This condensed description may be used in manufacturing for assembly instructions, scheduling, production records and feedback, etc. Since this description covers factory operations, payroll and cost may be based on this record. The formal record of relationships may be used to simplify engineering design and marketing specifications.

By using the product structure definition of the product as a foundation and adding historical or predicted model production quantities, a complete production history or forecast may be made for items from the least significant part to the most complex assembly.