

## MODERN AUTOMATIC CUTTING-OFF MACHINES

Drd. eng. Florin SAMER Prof. Dr. eng. Constantin D. STĂNESCU

Polytechnica University of Bucharest

e-mail: [florin.samer@yahoo.com](mailto:florin.samer@yahoo.com)

e-mail: [prof\\_cstanescu@yahoo.com](mailto:prof_cstanescu@yahoo.com)

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**Abstract** Modern Lathe-Type Automatic Cutting-Off Machines are operated by air cylinders actuated by limit switches and solenoid valves. The machines are equipped with live feed rolls that feed stock through the spindle to an adjustable stop. When lengths of stock are loaded between the feed rolls, the machine cycles automatically. Maximum rigidity is achieved by attaching all moving parts to a heavy cast iron body which is bolted solidly to a structural steel base. The broad range of spindle speeds, combined with heavy duty cross slides, rigid design and cutting close to the collet, permit using higher surface cutting speeds and tool feeds, which results in higher production. Carbide or cast alloy tooling can also be used, where applicable, for increased productivity.

### 1. INTRODUCTION

Modern Cutting-Off Machines are single-spindle, lathe-type machines designed for production cutting-to-length of round tubing, pipe and solid bar stock. Stock is fed through the spindle to a stop which gages the cut length, then held by a collet and rotated while being cut off with tools mounted on cross slides. Parts have square cut ends with minimum burr. Multiple cross slides permit deburring or chamfering the O.D. of both ends while cutting off. Any type of material that can be turned with standard tooling can be cut off.

### 2. PRINCIPAL ELEMENTS

Modern Lathe-Type Automatic Cutting-Off Machines are operated by air cylinders actuated by limit switches and solenoid valves. The machines are equipped with live feed rolls that feed stock through the spindle to an adjustable stop. When lengths of stock are loaded between the feed rolls, the machine cycles automatically. Maximum rigidity is achieved by attaching all moving parts to a heavy cast iron body which is bolted solidly to a structural steel base. The broad range of spindle speeds, combined with heavy duty cross slides, rigid design and cutting close to the collet, permit using higher surface cutting speeds and tool feeds, which results in higher production. Carbide or cast alloy tooling can also be used, where applicable, for increased productivity. Use of standard lathe-type cut-off blades produces square cut ends, accurate lengths and minimum burr. As machines are equipped with multiple cross slides, the O.D. of both ends can be deburred or chamfered while cutting off. Machines can also be equipped to cut off with roller cutters for cutting lighter wall. Ease of set up and quick changeover provides for efficiency on short runs as well as long run. Tools can

be replaced or changed without disturbing the setup tubing where square end finish is not required. of other tools. Special tooling, slides, or attachments are available for turning, forming or grooving the O.D. at the ends, or the deburring, chamfering, boring or grooving the I.D. of one end of tubing. In fig.1 present General view of the Machine

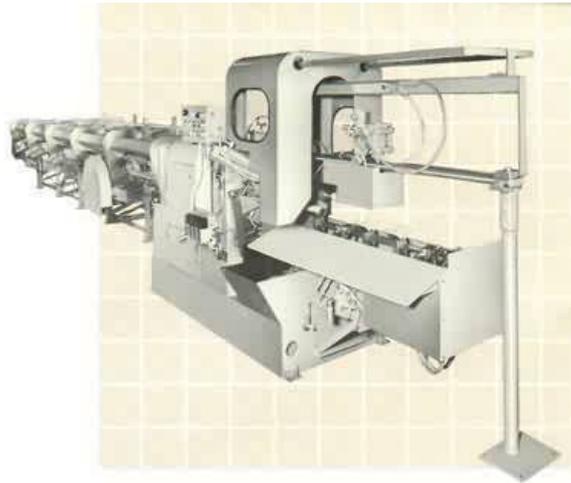


Fig.1 General View of the Machine

### 3. CHARACTERISTICS OF MACHINES

Model	2LD	3LD	4LD	6LD	8LD
CAPACITY	1/4" - 2-1/8" OD	1/4" - 3-1/8" OD	1/2" - 4-3/4" OD	3/4" - 7" OD	3/4" - 8" OD
(Maximum Wall 1 1/2". Maximum Solid Bar 3".)					
MAIN DRIVE MOTORS	10 HP, 1800 RPM	10 HP, 1200 RPM	10 HP, 1200 RPM	10 HP, 1200 RPM	10 HP, 1200 RPM
16 SPINDLE SPEEDS	196-3027	130-2012	94-1410	61-932	61-932
FEED & COOLANT PUMP MOTORS	1/2 HP, 1200 RPM	1/2 HP, 1200 RPM	3/4 HP, 1200 RPM	1 HP, 1200 RPM	1 HP, 1200 RPM
MACHINE BASE	32" x 82 1/2"	32" x 82 1/2"	32" x 82 1/2"	32" x 82 1/2"	32" x 82 1/2"
WEIGHT (Approx.)	3520 lbs.	3520 lbs.	4475 lbs.	4725 lbs.	4775 lbs

### 4. OUTSTANDING FEATURES

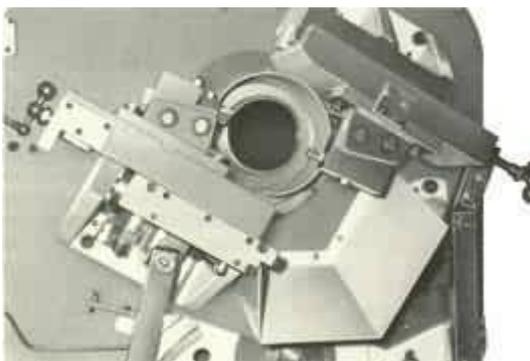
- SIMPLE DESIGN - all moving parts are attached directly to a heavy main body casting which is bolted solidly to the fabricated steel base.
- ONE SECOND INDEX TIME for cut-off lengths up to 6 inches.
- FAST SET-UP - change from one diameter to another in 15-20 minutes - length only 2-3 minutes.
- VERY LOW PRODUCTION COSTS

- 16 SPINDLE SPEEDS - in geometric ratios.
- CIRCULATING OIL SYSTEM - lubricates all spindle bearings.
- CROSS SLIDE ADJUSTMENTS - all cams and working parts are outside for quick and easy adjustment.
- AMPLE SPEED AND RIGIDITY for carbide tooling.
- TOOL CHANGE - any tool can be changed without disturbing set-up of other tools.
- FEED ROLLS HANDLE ALL SIZE STOCK within machine capacities.
- CHIP PAN REMOVAL - slides out for easy cleaning.
- NO THRUST ON MAIN SPINDLE BEARINGS - ball thrust bearings take all collet thrust - there is no thrust on main taper roller bearings.
- ACCURATE CUT-OFF LENGTHS with micrometer adjustable stop for cut-off tolerance  $\pm .005$ ".
- UPDATED CONTROLS - including programmable controllers and machine diagnostics.

### 5. STANDARD EQUIPAMENT

In Fig. 2 presents Cross Slides

Machines are equipped with two cross slides bolted solidly to the main body casting. Normally one cross slide is used to cut off and the other cross slide is used to deburr, chamfer, or plunge turn the O.D. while cutting off. The cross slides are fed by cams mounted on a rocker arm actuated by an air-hydraulic cylinder. When cutting heavy wall tubing or solid bar stock using high speed tools, both cross slides can be used for cutting off for the advantage of two tools cutting. (When using carbide tools, there is no advantage to cutting with two tools.)



**Fig.2 Cross Slides**



**Fig.3 Double Air- Hydraulic Cylinder**

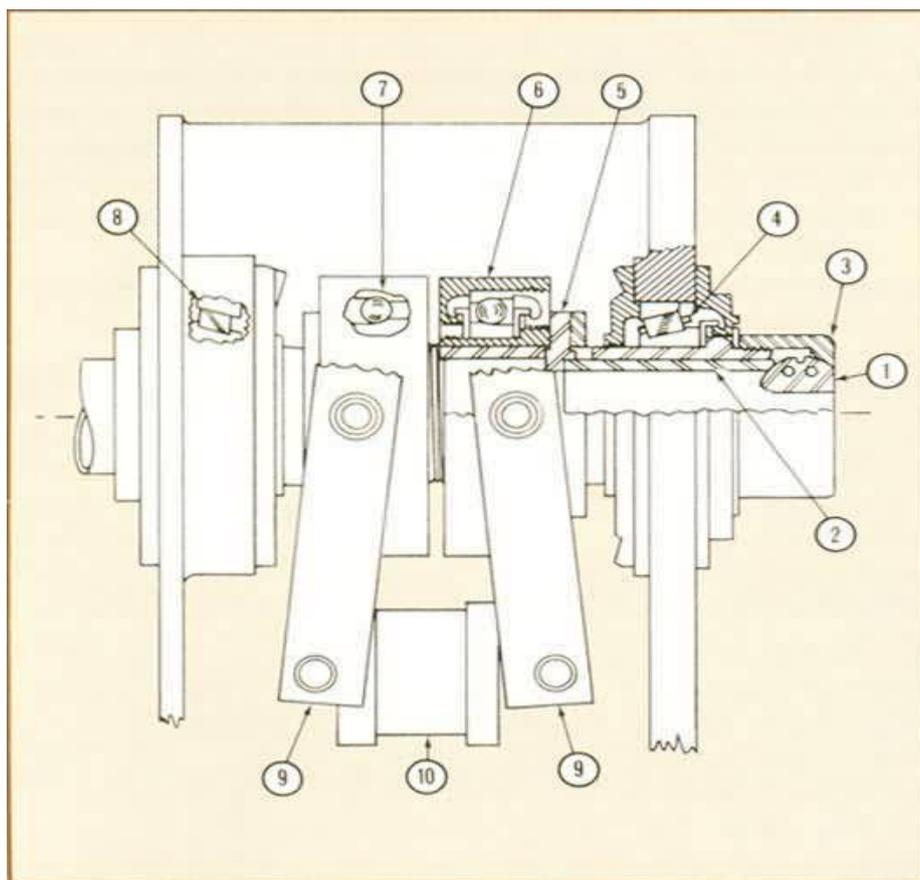
In Fig.3 presents Double Air- Hydraulic Cylinder

A double air-hydraulic cylinder operates the cutting cycle of the machine. The lower, or working cylinder, feeds the cross slides, and the upper or storage cylinder returns the cross slides. Each cylinder has air on one side of the piston and hydraulic oil on the other side. The cylinders are mounted on a common head which controls the speed of the cylinders by a check valve and a regulating needle valve. These controls provide for fast feed to the stock and

adjustable controlled feed through the needle valve for cutting off. The cross slides are returned by the storage cylinder with the oil flowing through the check valve for quick return.

In Fig. 4 presents Spindle and collet mechanism

The Spindle is made of seamless steel tubing ground on the O.D. It is mounted on roller bearings in the main body casting. The collet closing mechanism consists of two housings with ball thrust bearings mounted on the spindle. The rear housing is threaded on the spindle to permit adjustment of the collet opening. The front housing slides on the spindle actuating the hardened inner tube that closes the collet. The front housing is actuated by an air cylinder attached to arms mounted on the two housings. The pressure for closing the collet and holding stock is transmitted through the ball thrust bearings and not through the roller bearings on which the spindle rotates.



**Fig.4 Spindle and collet mechanism** (1)Collet. (2) Inner tube. (3) Collet holder. (4) Front taper roller bearing. (5) Thrust pin. (6) Front outer ball bearing housing assembly, with bearing and front thrust ring. (7) Rear outer ball bearing housing assembly. (8) Rear taper roller bearing. (9) Collet cylinder arms. (10) Collet operating cylinder.

The collet used in automatic machines is a double-tapered segmented collet. As the collet holder and inner tube have matching tapers, the collet closes straight down, gripping the stock by the full width of the collet. The closing assembly can be adjusted so the collet will open approximately  $7/32$ " over the stock size to allow distorted or burred ends to feed through. The collet closes approximately  $5/64$ " under the stock size to grip undersize stock and compensate for collet wear. We recommend a collet for each stock size. Guide tubes are mounted inside the spindle to guide the stock through the spindle and into the collet. One collet and one guide tube is furnished with the machine.

