

# VERNON

PIPE CUTTING MACHINES

*YOUR PARTNER IN SUCCESS THROUGH INNOVATION*

# Overview

## Vernon's Commitment to Pipe Fabrication

Pipe cutting technology has advanced rapidly since the days of hand-held torches and wraparound paper templates. A single cutting machine can now supply enough pipe to satisfy 5 to 10 fit-up and welding stations. Knowledgeable business owners recognize that a centralized, efficient cutting operation governs all downstream operations. Speed, safety, and quality have become the benchmarks of profitable pipe fabrication, the same qualities that describe Vernon pipe cutting machines. In 1948, Vernon Tool Company acquired the rights to manufacture the Douglas cutting machine, a simple mechanical pantograph for burning straight cuts, simple miters and saddles. The acquisition of the Douglas patents was Vernon's introduction to pipe fabrication. It has lead to a 60-year history spanning three generations and culminating in today's reputation for reliability, longevity, and dedicated customer support.

Investment in design engineering, advanced technology, and experienced staff constitute Vernon's commitment to the fabrication market. Alignment of interests and continuous exchange of information between Vernon and its customers have forged relationships that have existed for more than forty years. Loyalty and respect have bred a common goal of improving productivity and fostering innovation. While many of the basic cutting and material handling concepts are still valid today, Vernon continues to incorporate the newest technology in its machines. Innovations like machine-mounted microprocessors, programmable logic controls, and network-compatible operating systems have reduced costs, improved cut accuracy, and decreased redundant data entry. Vernon recognizes that the key to its future is continuous product improvement and satisfied customers. Vernon Tool is committed to improving your pipe fabrication operations. Eight hundred installations worldwide since 1948 attest to Vernon's success toward this goal. We offer the most advanced equipment and a professional staff of engineers and technicians with over 100 years of combined pipe fabrication experience. Vernon looks forward to sharing its vision, resources, and knowledge to improve your cutting operations.



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# Performance Engineered Products

## Simple Set-up & Accurate Pipe Profiles

Mechanization of cutting improves the speed and repeatability of each contour. A rigidly welded machine bed supports turning rolls that rotate pipe as the cutting torch travels over the pipe. The pipe's weight is evenly distributed over the entire length of the machine bed. Cutting can be performed anywhere on the machine. The pipe is self-centering in the turning rolls. Only the torch needs to be raised and lowered to accommodate different diameters. With excellent operator visibility, a cutting carriage travels on precision machined and hardened ways under a solid rack and pinion gear drive. All cutting operations are controlled by one person from the operator's console. For making common pipe connections and holes, cut data is entered at the operator's console in response to simple questions on the console display. Computer numerical control (CNC) with closed loop encoder feedback insures exact repeatability. No special programming or operating skill is required to obtain precise, repeatable cuts.

*Precision components and simple operation allow Vernon machines to produce fabricated fittings, nozzles, and saddles in minutes.*



## Streamlined Data Flow

Windows-based operating software collects and converts cut data into machine instructions to ensure simple start-up and user-friendly interaction between the operator and the machine. Part programs may be created at the machine console, from a remote PC, or downloaded directly from most popular 3D modeling programs.

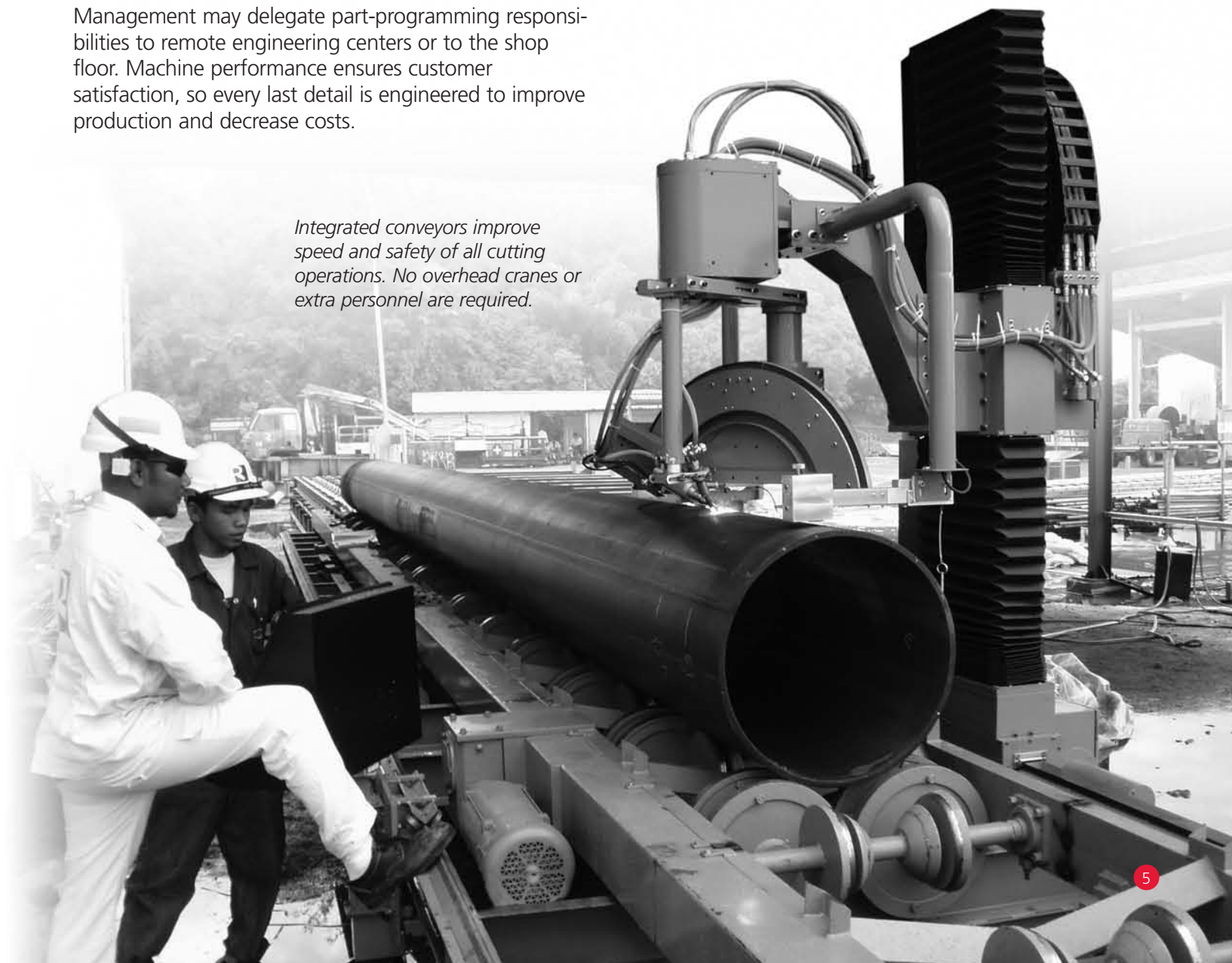
Seamless CAD-CAM communication eliminates redundant data entry with its concurrent human errors and time-consuming conversions. Important data is captured from isometric spool drawings, structural design and analysis models, and pressure vessel fabrication drawings. Operators can verify accuracy of end profiles and midsection holes using customized shop packets and 2D and 3D graphic illustrations on the operator's console.

Management may delegate part-programming responsibilities to remote engineering centers or to the shop floor. Machine performance ensures customer satisfaction, so every last detail is engineered to improve production and decrease costs.

*Integrated conveyors improve speed and safety of all cutting operations. No overhead cranes or extra personnel are required.*

## Safe, Efficient Pipe Handling

In 1965, Vernon Tool integrated powered pipe conveyors into the turning roll machine bed. Pipe is power fed into the cutting area, hydraulically lowered onto the powered turning rolls, cut, hydraulically raised from the turning rolls, then discharged out of the cutting area ... all from the operator's console. Machine setup and material handling times are reduced by up to 80 percent. The operator can concentrate on cutting activities instead of pipe handling. Both the finished piece and the remnant are fully supported, rotated, and moved without the need for additional labor and lifting devices.



# Common Applications



The name "Vernon" has become synonymous with pipe cutting machines in a wide variety of industries. Fabricators specializing in process piping, power generation, mechanical contracting, pressure vessel manufacturing, and structural frames rely on Vernon for high production and precise fit-up.



*Industrial piping features straight runs with simple connections, easy work for Vernon pipe cutting machines.*

## Industrial Piping

Process piping applications include tubular sections through which gas, fluid, or solids pass. Common users include mechanical contractors, petrochemical, paper and pulp mills, power generation plant constructors, HVAC fabricators, shipbuilders, and oil and gas pipeline companies.

Typically this type of fabrication requires smaller diameters and simple connections. Pipe spools consists of small diameter pipe and welded or forged fittings. Contours are relatively simple and repetitive. Straight lengths of pipe are consecutively processed using the integrated pipe conveyor system and two-torch straight cut-off carriage. Where multiple spools are needed, cutting and beveling operations move in a production line manner from raw storage to finished spool.

End profiles and holes are produced by coordinating several axes of motion. Mechanical pantograph models employ adjustable cams and levers, while CNC models rely on closed-loop encoder drives.



*Structural support piping requires proper fit-up of brace members. Weld preparation angles made to stringent AWS specifications enhance structural integrity and reduce grinding and filling labor.*

## Structural Support Piping

Fabricators of offshore jackets, bridges, architectural space frames, and lifting cranes employ pipe as load-bearing framework of welded structures. Compound, overlapping joints with centerline and axial offsets are common yet complex. The cost of field erection and rework dictates that clean, tight fit-ups are the rule not the exception.

Vernon computerized machines eliminate virtually all manual lofting, measuring, and marking operations. By producing accurate, high quality cuts, Vernon machines convert pipe fitters into pipe welders who can concentrate on producing high quality connections instead of "dressing" unsatisfactory profiles. Complex cuts are computer precise, while the material handling system loads pipe quickly and safely.



*Pressure vessel shells with multiple off-centerline hole penetrations, as well as the corresponding inlet and outlet nozzles, can be programmed and burned with minimal manual intervention.*

## Pressure Vessel Fabrication

Where pipe serves for containment, pressure vessel fabricators employ Vernon machines to manufacture heat exchangers, compressors, separators, pumps, boilers, and turbines. Manual measuring, marking, and grinding are virtually eliminated using Vernon computerized cutting machines.

On-line or off-line software generates and transfers part programs to the machine control. Relieved of programming responsibility, the operator concentrates on maximizing production. Part programs produce vessel shells and nozzles with precise distance and axial location between each cut.

# Machine Configuration

## Custom is Standard at Vernon

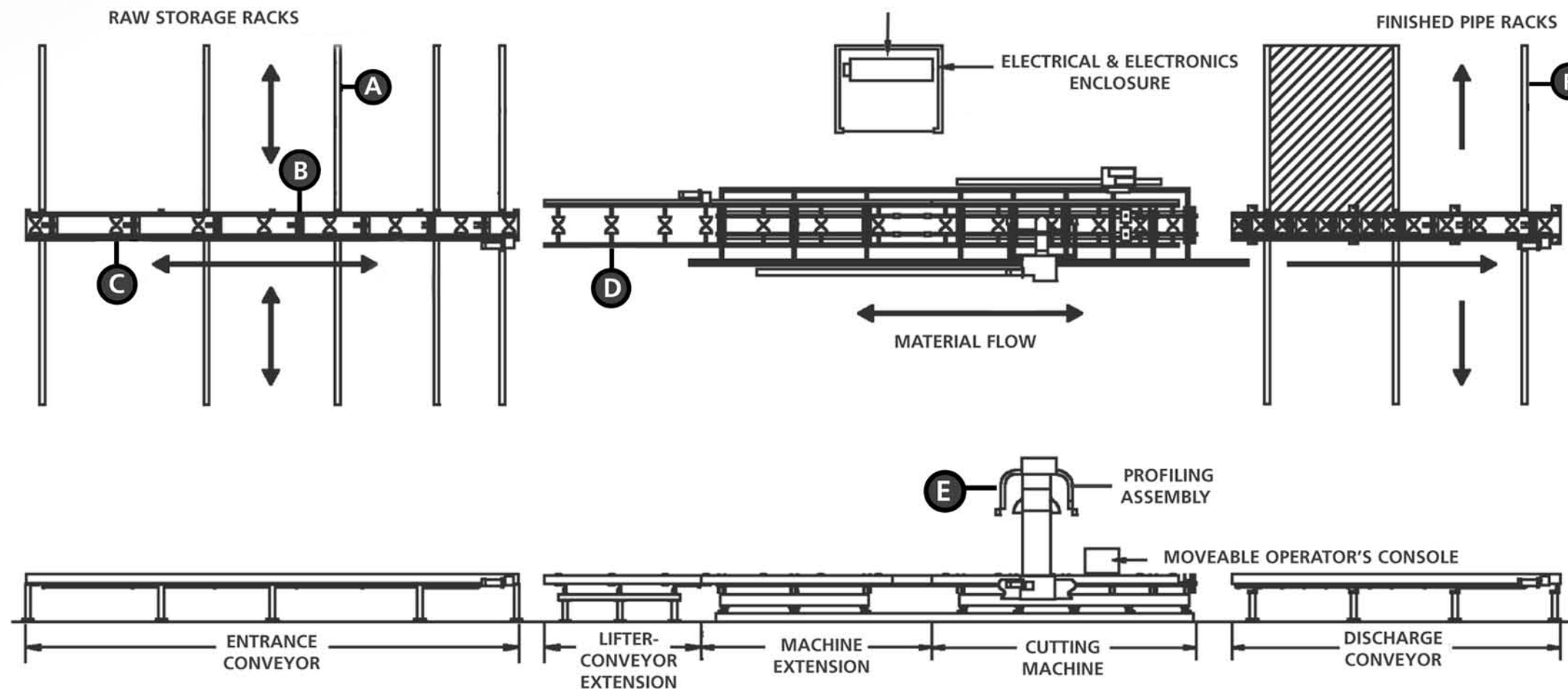
Over 60 years and 800 installations have taught us that no two customers are alike. Each installation is designed for specific pipe sizes and lengths. Multi-axis computer controls match the intended application. Construction begins only after material flow and footprint have been approved by you, the customer. Each installation processes pipe in the following sequence.

1. Pipe is loaded on to storage racks **A** located on each side of the entrance conveyor.
2. Selector gates **B** on the entrance conveyor are raised flush with the storage rack level. Raw pipe is rolled from either side of the rack until the desired piece is positioned on the conveyor.
3. The work piece is hydraulically lowered onto the powered, hour-glass conveyor rolls **C**.
4. The conveyor system **D** transfers the piece into the cutting area and hydraulically lowers the pipe onto the turning rolls.
5. The desired cuts are produced by the profiling assembly **E**. Straight cuts are made using the two-torch straight cut-off assembly located on the operator's side of the machine.
6. The lifter-conveyor assembly raises the pipe from the turning rolls and moves it onto the discharge conveyor.
7. Finished pipe is raised by the selector gates and discharged left or right onto adjoining pipe racks **F**. The remnant piece is either positioned in the cutting area for repeat cuts or returned to the raw storage racks.

## Shop Layout Recommendations

Cutting pipe is a critical operation in any fabrication shop. Efficient cutting operations set the pace for all downstream operations. Speed, quality and dimensional accuracy contribute to lower project labor costs. The cutting operation should be the focal point of a productivity analysis. A well-conceived cutting system will incorporate the following concepts:

- Organize raw material by diameter and material to minimize set-up changes.
- Centralize cutting operations in a single area for improved organization, cleanliness, and supervision.
- Consolidate "cutting to length" and "contouring" into a single operation to eliminate redundant handling and setup.
- Material flows in both directions to improve system flexibility.
- Conveyors and automatic feed systems move materials instead of overhead lifting devices for speed and safety.
- Buffer areas and storage racks accommodate different cycle times, production run interruptions, downstream bottlenecks and scheduling changes.
- Non-cutting operations located where they do not interfere with burning and conveying operations.



# Pipe Handling Equipment

Fast, smooth, and safe material handling relies on automated pipe conveyors integrated with rugged pipe rotating beds. Rigid structural steel frames contain precision components to ensure predictable operation and unmatched longevity dating back to the early 1950s.

## Turning Roll & Conveyor Assembly

Vernon machines consist of a rigid structural steel frame on which two parallel shafts with turning rolls are mounted. The shafts are driven by a variable-speed DC motor through two minimum backlash worm gearboxes. Heavy-duty roller and thrust bearings ensure smooth rotation of the main shafts and pipe. The pipe is self-centering and fully supported by turning rolls located along the entire length of the machine bed. Various models accommodate a wide range of pipe diameters, so only the cutting torch is raised or lowered to accommodate different diameters.

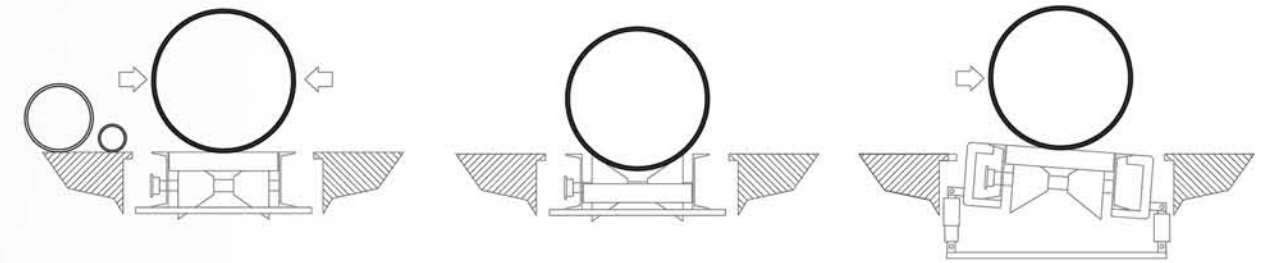
The standard machine is capable of conveying and rotating a single random (20-22 foot) length of pipe. An optional machine extension provides full rotation and support for double random lengths up to 44' long. Extensions are identical in construction to the standard machine bed and connect to the main drive shafts, lifter-conveyor frame, and straight cut-off carriage track of the base machine.

The lifter-conveyor assembly, consisting of hour-glass shaped rollers on a welded frame, uses hydraulic power to lower and raise pipe out of the rotation rollers. Sealed ballbearing flanged units on the roller shafts and DC drives ensure smooth, trouble-free lateral movement of the pipe.

*For superior visibility the profiling assembly moves on a carriage track mounted on the machine opposite the operator. The operator console and the two-torch straight cutoff assembly move along a track running the entire length of the cutting machine.*



*Controlled from the operator's console, pipe is fed smoothly and safely into the machine. End loading and unloading eliminates the need for overhead lifting and extra personnel, thereby improving the safety and speed of the cutting process.*



*With gates UP, raw pipe can be rolled side to side.*

*With gates DOWN, pipe is cradled in conveyor rolls for transport into the cutting machine.*

*With gates UP and either tilt cylinder extended, pipe is discharged to finished pipe racks.*

## Entrance Conveyor

Similar in design to the machine's lifter-conveyor assembly, entrance conveyors load pipe into and out of the cutting machine bed. Structural steel frames secure a series of hour-glass rollers on shafts in flanged ball bearings. Linked together by chain & sprocket assemblies, the conveyor rollers are controlled by a variable speed, reversible DC drive motor.

Hydraulically-actuated selector gates raise and lower pipe onto and out of the rollers to the height of the adjacent pipe racks. In the full UP position, the selector gates are flush with the pipe storage rack so that pipe can be rolled from side to side. When the correct pipe is located over the conveyor, the selector gates are lowered and the pipe is cradled by the conveyor rollers.

*The entrance conveyor permits the operator to select pipe from raw storage racks and load it safely and smoothly into the cutting area. Remnant pieces can be returned to raw storage.*

## Discharge Conveyor

After all cutting operations are completed, finished pipe is power fed onto the discharge conveyor where it is raised out of the hourglass rollers by hydraulic selector gates. Hydraulic cylinders tilt the conveyor in either direction to roll the finished pipe onto storage racks. All conveyor functions, like power feed direction and speed, selector gate UP/DOWN, and hydraulic discharge tilt are controlled from the operator's console.

*Discharge conveyors of various lengths transport pipe to the respective fit-up area. All operations are controlled from the operator's console.*



# Mechanized Cutting Assemblies

Mechanizing the cutting operation results in repeatable, high quality cuts free from human error. Moveable torch carriages allow all diameters to be cut to length without interference anywhere along the machine bed and in full view of the operator.

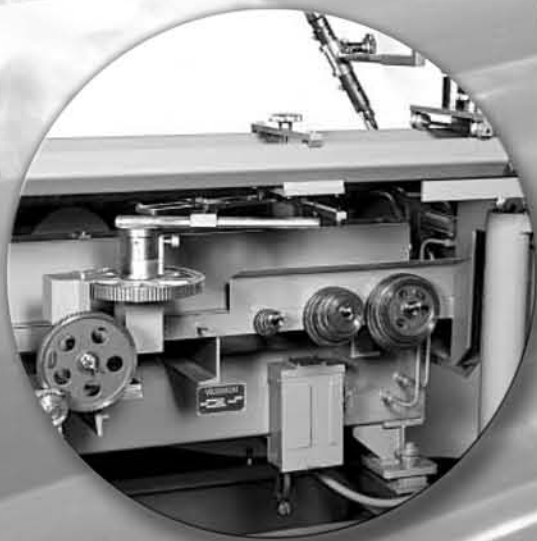
## Two-Torch Straight Cut-off Assembly

The 2-torch straight cut-off assembly produces pipe spools to length with straight and beveled end cuts. Two torches make cuts simultaneously, one on the trailing end of the first piece and one on the leading edge of the second piece. The operator moves the rolling torch carriage to the proper distance on the machine, locks it into positions according to a tape measure mounted on the machine frame, and conveys the pipes against a retractable pipe stop. While cutting is performed, steel wheels mounted next to the torches maintain a constant tip-to-pipe distance.



## Mechanical Pantograph Assembly

First developed in the late 1940's, the semi-automatic pantograph attachment synchronizes longitudinal torch movement with pipe rotation. Most common saddle and miter cuts may be cut with a maximum of three simple settings using adjustable gears and levers.



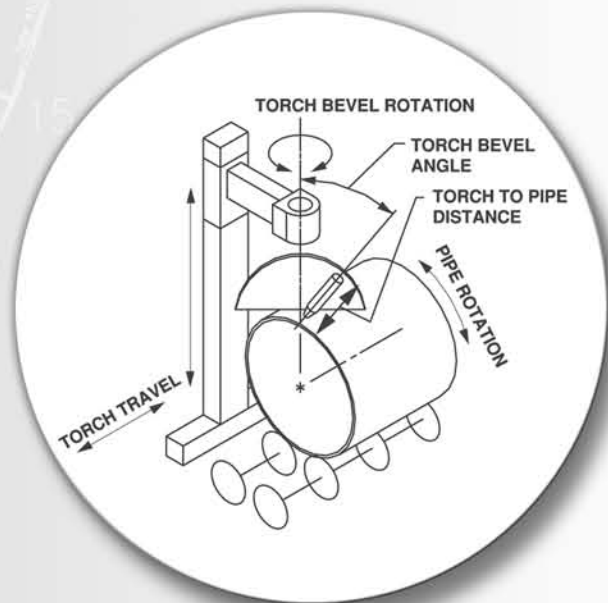
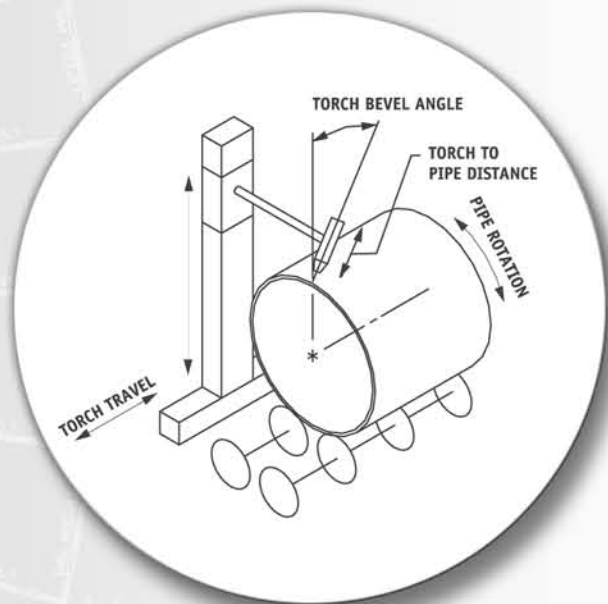
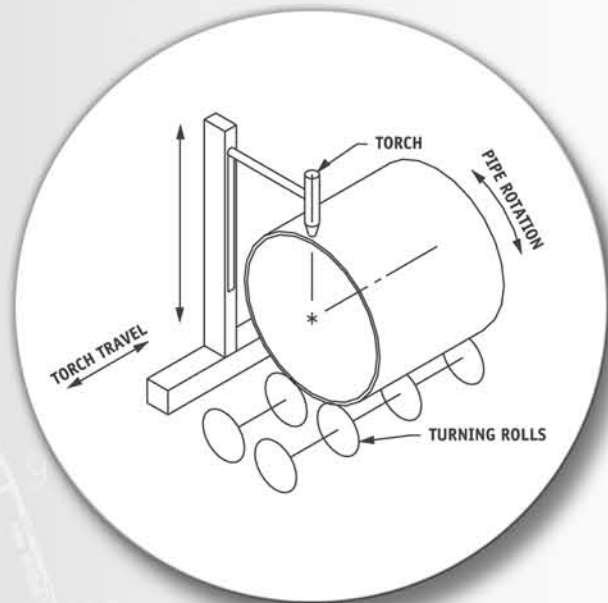
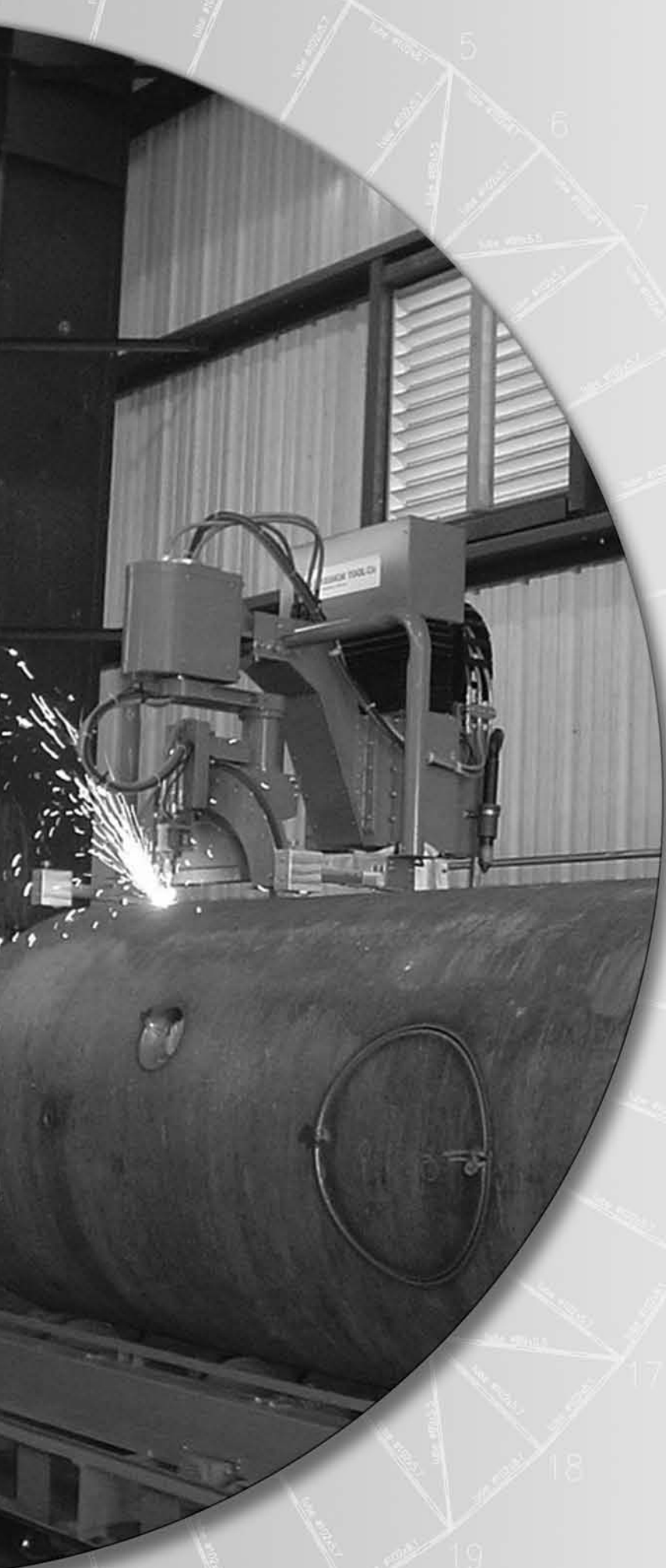
## Computerized Profiling Assemblies

Microprocessor technology puts production-line productivity at your fingertips to quickly and accurately process all types of pipe profiles and holes. Computer-controls synchronize torch movement, burning and pipe handling functions, and maintenance diagnostics. PLC technology coordinates auxiliary machines functions like torch on-off and automatic out-of-round compensation.

Rugged construction using minimum-backlash worm drives, machined & hardened ways and precision rack & pinion drives ensure repeatability and longevity. Mechanized movement is controlled by DC servo motors with encoder feedback.

A state-of-the-art, industrial computer offers tachless multi-axis motion controls, rapid processing speeds, large data storage memory, and internal software specifically designed for pipe profiling operations. Windows-based programming ensures network compatibility to generate, transfer, and archive pipe programs. Programs may be created at the machine console or downloaded from remote file servers. Microprocessor machines are ideal for both one-off and long run production jobs.





## Controls to Match Different Needs

**MPM-2** The 2-axis control, Model MPM-2, employs a simple processor to coordinate pipe rotation with longitudinal torch movement. The torch remains at a fixed bevel angle so the included weld preparation angle between members varies throughout the connection.

Profile cutting is performed on the front end of the machine bed. Height adjustment is controlled from the operator's console.

**MPM-4** The 4-axis control, Model MPM-4, incorporates four axes of motion to orient the torch to the proper weld preparation angle and to maintain the proper torch-tip-to-pipe distance. This produces a constant included weld prep angle between the adjoining pieces. The computer control compensates length measurement regardless of weld prep angle. Automatic out-of-round compensation is accomplished by analog proximity sensors on an independent closed-loop servo circuit. The cutting carriage and operator's console travel the full length of the machine.

**MPM-5** The 5-axis control, Model MPM-5, adds an additional axis of motion to rotate the torch bevel angle so that it remains normal to the contour cut path. To produce a constant weld prep angle, the machine can burn any desired bevel angle at any location on the pipe.

The principal benefits of this assembly are slightly faster cutting speeds and very accurate weld preparation angles common in offshore construction and pressure vessel fabrication.

## Optional Accessories



### Plasma Cutting & Rotating Grounds

All Vernon machines are readily adaptable to plasma power supplies for cutting carbon and stainless steel, alloy materials and aluminum. Plasma cutting yields a smaller heat-affected zone with less material distortion. Three to five times faster cutting speeds and no preheat delay reduce cutting times and clean-up labor.



When using plasma arc with the Vernon machine, the rotating ground directs the plasma current back to the power source to avoid damage to the machine's moving parts and electrical components. The rotating ground is attached to a collapsible spider clamp, which is inserted into the pipe and travels with the pipe as it is conveyed on the machine.

### Preheat Torch

5-axis computerized models can be fitted with a preheat torch to improve the speed and quality of the cut on large wall thickness. Traveling ahead of the cutting torch, the preheat torch operates under program or manual control. Automatic ignition, solenoids, valves, regulators, and hoses are included with this option.

# Dedicated Software

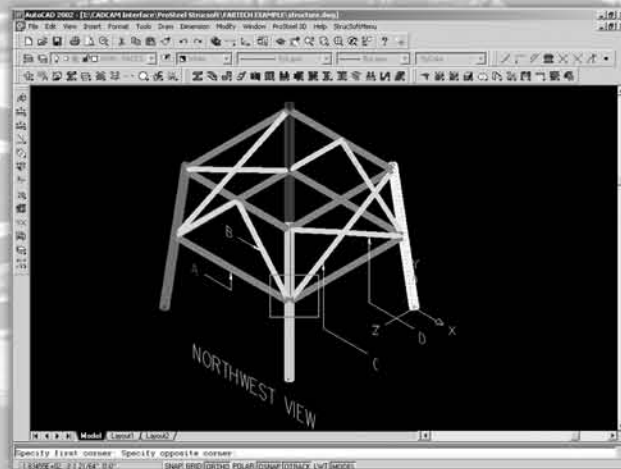
## On-line Operating System

The Windows-based operating software ensures simple start-up and maintenance. Synchronizing simple graphical user interface with complex geometric algorithms, a series of simple questions leads the operator to enter cut data. Each part program contains front and rear end profiles and almost unlimited numbers of circular and rectangular holes with exact distances and axial angles. All layout and burning operations are consolidated into a single operation.

To simplify operation and maintenance, the console includes a touch-screen monitor. The Windows-based program provides interactive error messages, labeled illustrations, brilliant color graphics, and an on-line instruction manual. Compatible with imperial and metric dimensions, all data is easily entered. Console graphics display the finished piece with verifiable dimensions in 3D and 2D format.

The WinMPM operating system is common to all Vernon machines and ensures reliability, user familiarity, and maintenance continuity. Within the limits of computer memory and speed, all users can be upgraded to a standard, proven version of software.

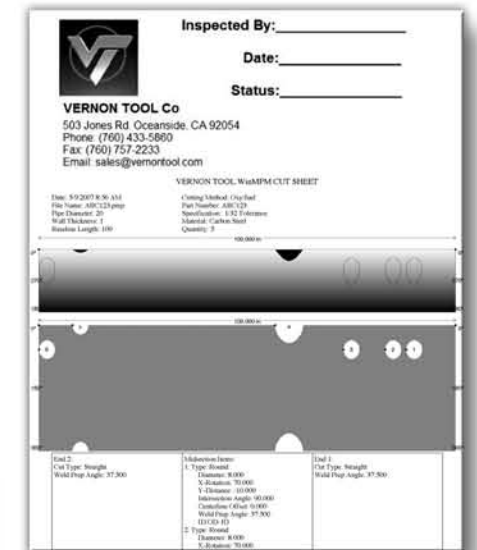
End profile shapes include standard straight cuts with bevels, multiple intersection T-, K-, and Y-type saddles, centerline offsets, I.D.-O.D. transition saddles, elbow supports, gusset slots, and pipe-to-cone shapes. Hole shapes include circular and rectangular shapes, reinforcing rings, and overlapping "boat bumper" holes. All centerline and axial offset dimensions are computer controlled. Layout and burning operations are consolidated into a single operation. All cuts conform to applicable AWS Welding Codes for tubular structures.



## Off-line Software

Network compatibility gives management the ability to delegate part-programming responsibilities to the shop floor, to remote engineering centers, or direct CAD-CAM downloads from most popular 3D modeling programs. Isometric, structural, and pressure vessel design programs generate data files easily received and converted into machine-readable formats. Redundant data entry and human errors are eliminated.

Customized cut sheets containing intersection data, 3D and 2D dimensioned images, materials, quantities and customer or project identification may be generated for distribution to the shop floor. The operator simply recalls the file name and begins to cut.



## Internet-based Factory Service

The Vernon on-line diagnostic service, Ve-Assist, connects factory technicians to your machine by secure, dedicated high speed internet link. On-site operators and technicians communicate in real-time with factory experts who supervise, demonstrate, and troubleshoot software and hardware problems. Data files review, machine set-up parameters, and operating system upgrades are performed in seconds. The on-line dialogue and "whiteboard" illustrator facilitate step-by-step instruction. Internet technology puts factory technicians virtually side-by-side your staff to perform and monitor the machine operations.



## Complimentary Products

### Vernon Mastertube Plasma Profiler

Plasma cut tube products like handrails, structural frames, and nozzles with production line speed.

User-friendly control generates straight cuts, T, K, & Y shapes, centerline offsets, slots and holes in round and rectangular shapes.



### Vernon Abrasive Saw

Cut, bevel and groove all diameters and material with extraordinary speed and uncontaminated, machine-like quality. Abrasive wheels cut materials ranging from carbon and stainless steel, alloy, ductile iron, ceramic, plastic, and cement-lined pipe.



Vernon machines provide the lowest total cost of ownership through a comprehensive program that begins when you place the order and extends decades beyond delivery. We sell solutions to the most difficult fabrication challenges. Your success is our reward.



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