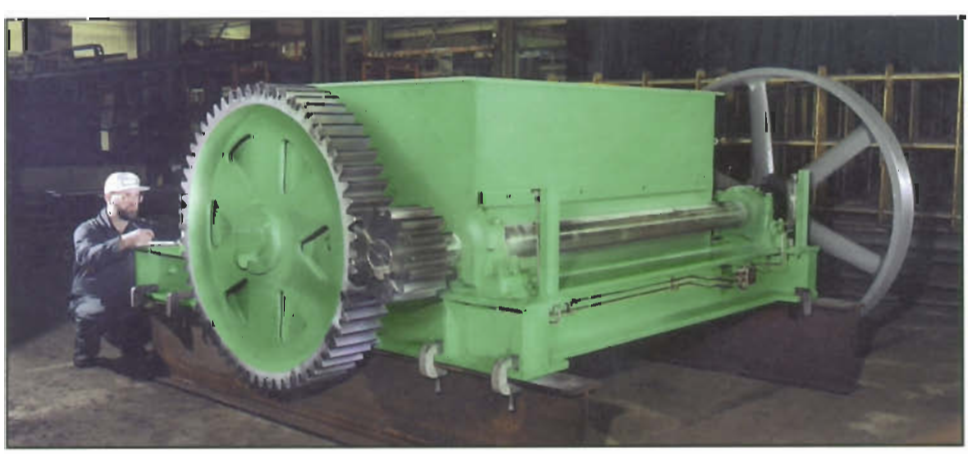
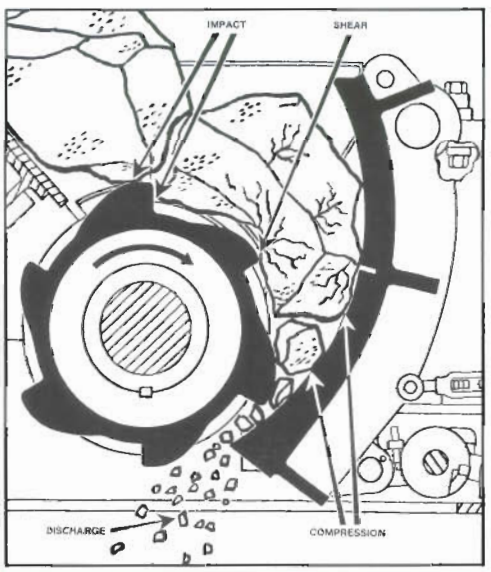
SINGLE ROLL CRUSHERS, HERCULES, ATLAS & TYPE K

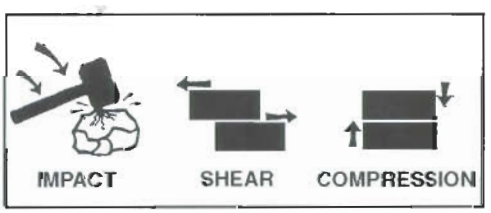
Pennsylvania Crusher®

The Most Choices, The Most Experience



HERCULES, ATLAS & TYPE K SINGLE ROLL CRUSHERS





Pennsylvania builds many models of single roll crushers. This brochure describes only those that are used for somewhat related applications.

Our Type K Single Roll Crusher is suited for the size reduction of materials having a compressive strength of 8,000 p.s.i. or less. Such materials typically include coal, petroleum coke, lignite and other friable substances.

The Type K is also employed as a lump breaker, for potash, chemicals, salts and similar materials.

Our Hercules and Atlas Single Roll Crushers are used as primary or secondary crushers. The Hercules reduces materials of high compressive strength such as aggregate, coal with rock, and limestone, while the Atlas is better suited for materials having moderate compressive strength such as coal and soft limestone.

Please note that we also manufacture numerous other types of crushers, including hammermills, granulators, impactors, Bradford Breakers, rod mills, clinker-grinders, frozen coal crackers and even other single roll models, certain of which may be used to crush the same materials as these models. As we analyze your application, we will give due consideration to whichever models we determine would provide the best service in your application.

CRUSHING ACTION

Our single roll crushers employ three distinct methods for reducing material: impact, shear and compression. As material enters the crusher through the feed hopper, it is struck sharply by the teeth of the revolving roll. Initial breakage occurs here from impact and the rotation of the roll then guides the material further into the crushing chamber which is encompassed by the breaker plate and the roll itself.

The roll now pinches the material against the stationary breaker plate and, simultaneously, the material is crushed by the shearing action of the roll teeth and by compression. This is how final sizing occurs.

The bottom discharge portion of the crusher is completely open; sized material falls through as quickly as it's crushed. There are no screen bars and, consequently, there is no re-crushing of sized material. This minimizes the production of fines and is the major reason why the power demand of our single roll crushers is so low. Because the toothed rolls revolve at relatively low speeds, they tend to fracture the material along its natural cleavage lines, which further helps to minimize the generation of fines.

All three models have very large mouths, enabling them to accept large slabs. The curvature of their breaker plates ensures that no large slabs of material can simply fall through the chamber without being crushed; all will be retained within the crushing chamber until crushed to the proper output size.

CONTROL OF PRODUCT SIZE

The clearance between the bottom lip of the breaker plate and the rotating roll determines product output size. Adjusting the output size is done from behind the breaker plate by means of a shim arrangement that changes the size of this gap. In all three models, jacking screws are provided to make this task easier and faster.

EASILY FIT INTO TIGHT PLACES

All of our models have a low profile, also referred to as "low headroom", and are relatively compact. This enables them to be installed under dump hoppers and in other areas having limited space.

Foundation requirements for all models are minimal. Since all operate at low speeds, any shock loads transmitted to the foundation are relatively slight. This means that these crushers can be mounted at any level, on suitable concrete or steel structures. *It also means that the supporting structure only need be strong enough to support the weight of the crusher and its contents while operating, plus the weight of accessories such as full hoppers.*

CHOKE-FEEDING OR CONVENTIONAL FEEDING

Once they reach operating speed, all three crushers may be choke-fed from hoppers or they may be fed at continuous, controlled rates from vibratory screens, apron feeders or belts.

For removal of sized material beneath the crusher, belt conveyors are normally used. When selecting the belt, the size of that belt and its speed must be matched to the capacity of the crusher. *In addition, the belt must be sized to handle occasions where an exceptionally large volume of sized input material may simply flow through the crusher at a high rate.*

MAJOR COMPONENTS

BREAKER PLATE ASSEMBLY

This assembly is formed by attaching curved, wear-resistant, steel breaker plates to a rugged frame formed of structural steel shapes. This results in an assembly of immense strength and mass which easily absorbs all crushing shocks and stresses.

To simplify the task of changing these plates as they become worn from normal service, the breaker plates are bolted on, and there is no need to remove the assembly from the crusher for this purpose. Though rarely if ever necessary, the entire assembly *may* be removed through the top of the crusher.

The pattern and type of breaker plate will vary depending upon the application.

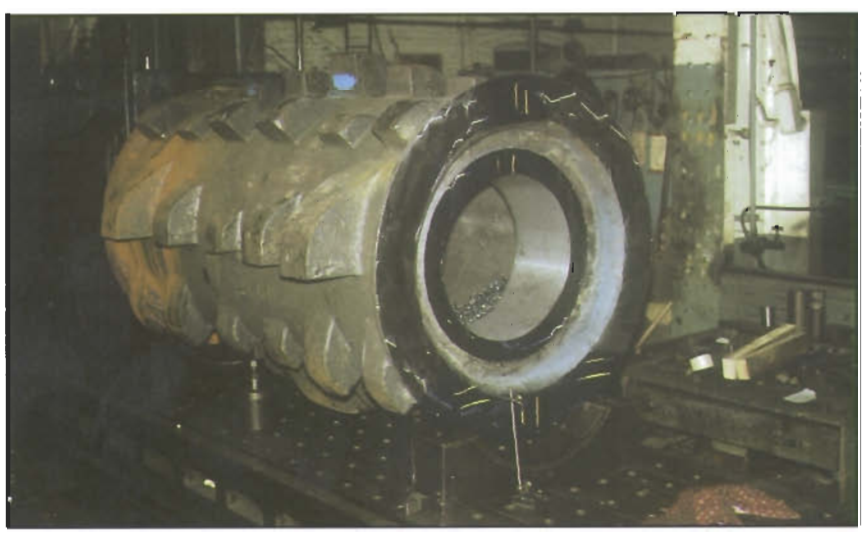
Every component and every subassembly, such as this breaker plate, undergoes numerous inspections.

ROLL ASSEMBLY

The roll is fabricated as a single piece, with the teeth being integral. This is far superior to designs where the teeth are mechanically attached because our method eliminates any chance of the teeth coming loose from the roll and causing damage within the crushing chamber.

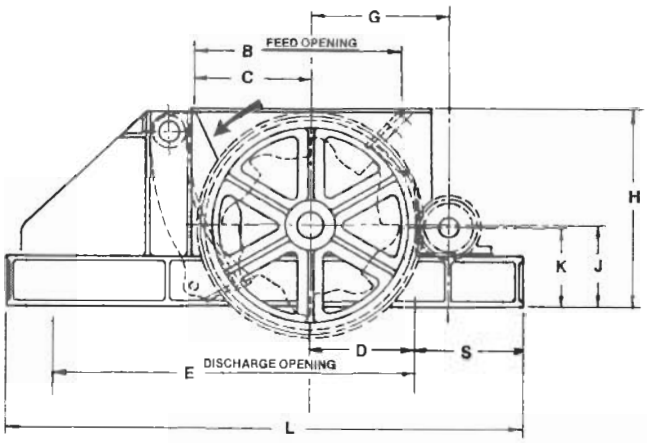
The pattern of teeth varies with the application. In most cases, there will be teeth of two different sizes with the longer teeth taking about twice as much bite as the shorter teeth. This enables them to grab the larger pieces of feed and pull them into the crushing zone. Without this pattern, the large feed shapes could otherwise simply bounce around on top of the roll.

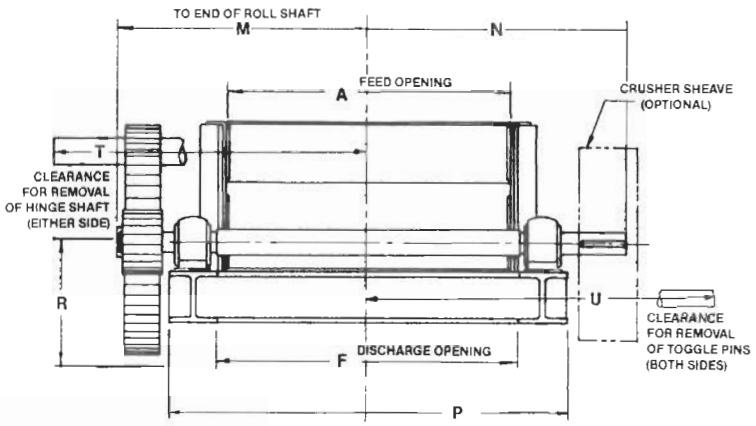
continued on p. 6



Pennsylvania can custom design the configuration of the roll shell to satisfy your application requirements.

TYPE K SINGLE ROLL CRUSHER





DIMENSIONS & WEIGHTS:

TYPE K

SIZE	WEIGHT (lbs)	A	B	C	D	E	F	G	H	J	K
24 X 30	8,150	2' 7¼"	3' 0"	21¾"	2' 1"	5' 7½"	2' 9¼"	2' 1"	2' 11⅜"	16⅝"	14⅝"
24 X 40	9,400	3' 5¼"	3' 0"	21¾"	2' 1"	5' 7½"	3' 7¼"	2' 1"	2' 11⅜"	16⅝"	14⅝"
24 X 50	10,500	4' 3¼"	3' 0"	21¾"	2' 1"	5' 7½"	4' 5¼"	2' 1"	2' 11⅜"	16⅝"	16⅝"
24 X 60	11,500	5' 1¼"	3' 0"	21¾"	2' 1"	5' 7½"	5' 3¼"	2' 1"	2' 11⅜"	16⅝"	16⅝"
30 X 50	16,400	4' 3¼"	3' 10½"	2' 1½"	2' 7⅜"	7' 2⅜"	4' 6"	2' 6"	3' 7½"	17⅞"	17⅞"
30 X 60	17,600	5' 1¼"	3' 10½"	2' 1½"	2' 7⅜"	7' 2⅜"	5' 4"	2' 6"	3' 7½"	17⅞"	17⅞"
30 X 72	18,800	6' 1¼"	3' 10½"	2' 1½"	2' 7⅜"	7' 2⅜"	6' 4"	2' 6"	3' 7½"	17⅞"	17⅞"
30 X 100	27,000	8' 5¼"	3' 10½"	2' 1½"	21"	6' 2"	8' 8"	2' 9⅛"	3' 9½"	19¾"	17⅞"

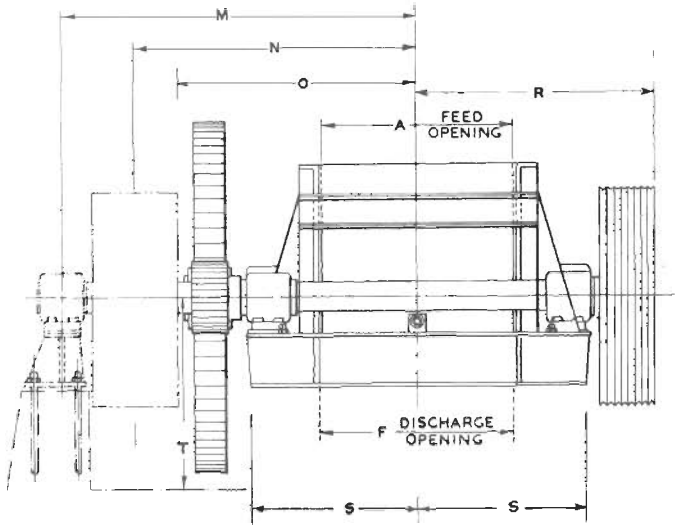
ATLAS

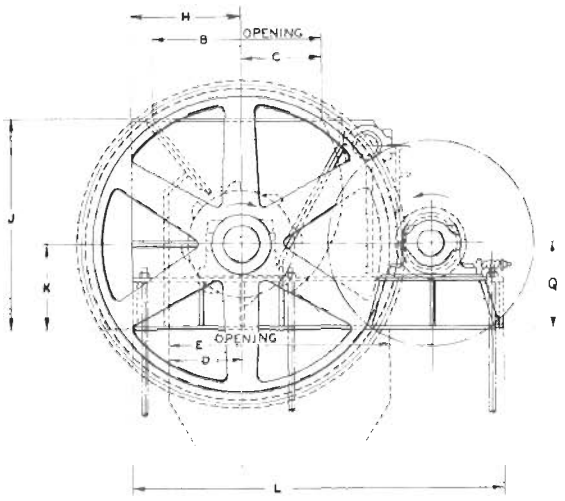
SIZE	WEIGHT (lbs)	A	B	C	D	E	F	G	H	J
18 X 30	7,500	2' 6¾"	2' 1¼"	14"	13¼"	3' 7"	2' 8"	2' 8"	16¾"	3' 1¾"
18 X 40	10,500	3' 4¾"	2' 1¼"	14"	13¼"	3' 7"	3' 6"	2' 8"	16¾"	3' 1¾"
24 X 40	12,000	3' 5"	2' 9"	18¾"	16⅝"	5' 0⅞"	3' 5"	3' 4"	20⅜"	3' 11"
24 X 50	15,000	4' 3"	2' 9"	18¾"	16⅝"	5' 0⅞"	4' 3"	3' 4"	20⅜"	3' 11"
24 X 60	17,500	5' 1"	2' 9"	18¾"	16⅝"	5' 0⅞"	5' 1"	3' 4"	20⅜"	3' 11"
30 X 50	27,000	4' 3½"	3' 8"	2' 0"	21½"	5' 3½"	4' 4½"	4' 6"	2' 2⅝"	4' 10½"
30 X 60	30,000	5' 1½"	3' 8"	2' 0"	21½"	5' 3½"	5' 2½"	4' 6"	2' 1⅝"	4' 10½"

HERCULES

SIZE	WEIGHT (lbs)	A	B	C	D	E	F	G	H	J
24 X 50	22,600	4' 3"	3' 4½"	19¾"	16¼"	4' 1¾"	4' 4½"	3' 6⅞"	2' 2"	3' 10¾"
24 X 60	25,500	5' 1"	3' 4½"	19¾"	16¼"	4' 1¾"	5' 2½"	3' 6⅞"	2' 2"	3' 10¾"
30 X 50	40,700	4' 3"	4' 1½"	2' 0"	21"	5' 3"	4' 4"	54"	2' 7"	4' 11"
30 X 60	45,700	5' 1"	4' 1½"	2' 0"	21"	5' 3"	5' 2"	54"	2' 7"	4' 11"
36 X 60	66,000	5' 1"	5' 0½"	2' 5"	2' 1"	6' 4"	5' 2"	4' 11⅜"	3' 2"	5' 8"
36 X 72	71,000	6' 1"	5' 0½"	2' 5"	2' 1"	6' 4"	6' 2"	4' 11⅜"	3' 2"	5' 8"
36 X 84	82,000	7' 1"	5' 0½"	2' 5"	2' 1"	6' 4"	7' 2"	4' 11⅜"	3' 2"	5' 8"

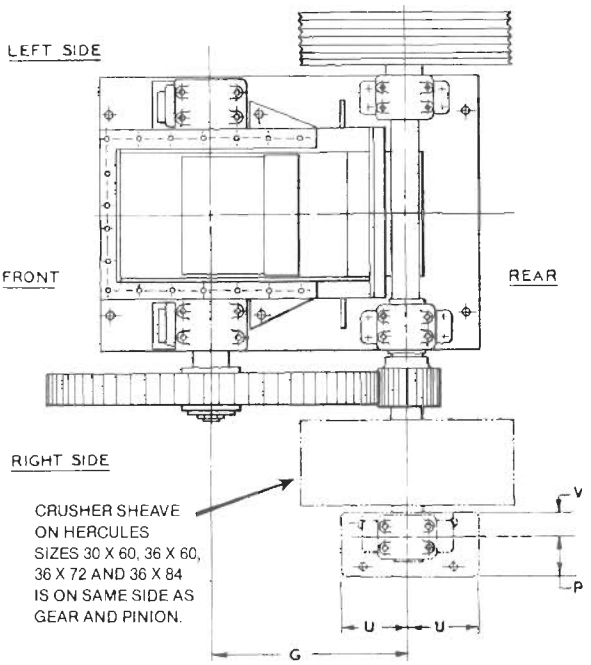
ATLAS & HERCULES SINGLE ROLL CRUSHERS





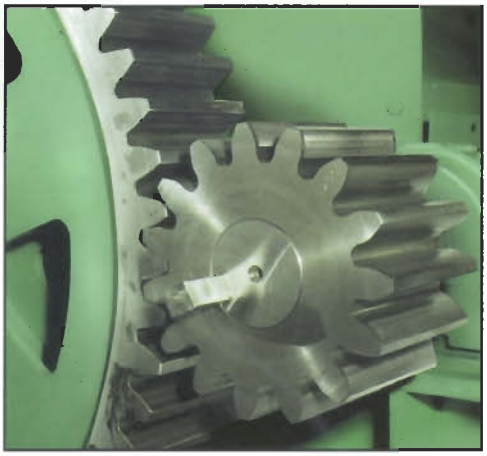
L	M	N	P	R	S	T	U
7' 4"	3' 1½"	2' 10⅜"	4' 1¼"	3' 0"	1' 0½"	5' 1"	3' 1"
7' 4"	3' 4"	3' 3"	4' 11¼"	3' 0"	1' 0½"	6' 3"	3' 6"
7' 4"	3' 11"	3' 8"	5' 9¼"	3' 0"	1' 0½"	7' 6"	3' 11"
7' 4"	4' 4"	4' 4"	6' 7¼"	3' 0"	1' 0½"	8' 9"	4' 4"
9' 4"	4' 1"	3' 4¼"	6' 2¾"	2' 2"	1' 2⅝"	7' 9"	4' 7"
9' 4"	4' 6"	4' 7¾"	7' 0¾"	2' 2"	1' 2⅝"	9' 0"	5' 0"
9' 4"	5' 2"	5' 1¾"	8' 0¾"	2' 2"	1' 2⅝"	10' 6"	5' 6"
9' 9"	6' 4"	6' 5½"	10' 4¾"	3' 4"	2' 6"	14' 0"	8' 6"

K	L	O	Q	R	S	T
16¾"	5' 0"	3' 1⅞₆"	16¾"	3' 1"	1' 11½"	2' 7"
16¾"	5' 0"	3' 6⅞₆"	16¾"	3' 6"	2' 4½"	2' 7"
19"	5' 11¼"	3' 9⅛"	18⅜"	3' 6"	2' 5⅝"	3' 2"
19"	5' 11¼"	4' 2⅛"	18⅜"	3' 11"	2' 10⅝"	3' 2"
19"	5' 11¼"	4' 8½"	19"	4' 8½"	3' 6"	3' 2"
23½"	7' 10⅝"	4' 11¾"	23½"	4' 3¾"	3' 1¼"	4' 4"
23½"	7' 10⅝"	5' 4¾"	23½"	4' 8¾"	3' 9¼"	4' 4"

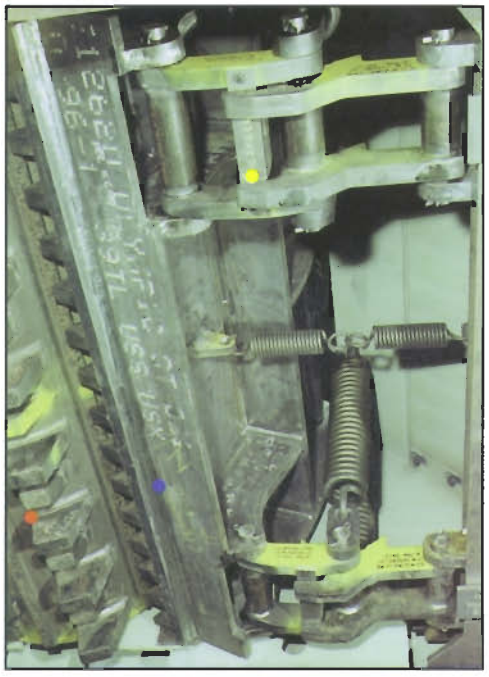


All dimensions are approximate. Certified drawings will be furnished for installation. Installation supervision is available.

K	L	M	N	O	P	R	S	T	U	V
18¾"	7' 2"	—	—	4'-3¼"	—	4' 6¼"	3' 4½"	3' 10"	—	—
18¾"	7' 2"	—	—	4'-8¼"	—	4' 11¼"	3' 9½"	3' 10"	—	—
2' 0"	8' 9"	—	—	5'-1½"	—	4' 10½"	3' 9"	4' 4"	—	—
2' 0"	8' 9"	8' 7½"	6' 10"	5'-8"	10½"	—	4' 2"	4' 4"	19"	6½"
2' 2"	10' 2"	9' 3"	7' 4"	6'-0½"	12"	—	4' 6"	5' 6"	23"	8"
2' 2"	10' 2"	9' 9"	7' 10"	6'-6½"	12"	—	5' 0"	5' 6"	23"	8"
2' 2"	10' 2"	10' 3"	8' 4"	7'-0½"	12"	—	5' 6"	5' 6"	23"	8"



All gear sets are precisely manufactured to conform to American Gear Manufacturers' Association, (AGMA), standards.



From beneath the crusher, looking upward, one may see the relationship between the three major components, i.e., the roll shell (red), breaker plate assembly (blue), and the spring-loaded toggle release mechanism (yellow).

FRAME

The frames of all of our single roll models are fabricated from rolled steel plates and shapes. In all areas of wear, replaceable steel liners are used on the Hercules and Atlas.

For servicing or inspection, a doorway provides access to the roll shell and breaker plate areas. Where the roll shaft protrudes on either side of the frame, dust seals are attached to prevent the escape of any fines. We also provide machined pads for the bearings. These pads are an integral part of the frame so that set up is speeded and alignment is assured whenever the bearings undergo service or replacement.

MAIN GEAR, PINION AND DRIVE SHEAVE

The main gear has a tapered bore and is keyed to the roll shaft. This design assures tight fit yet allows for easy removal for servicing. To achieve best fit, we precisely machine the main gear and pinion teeth. This prevents pounding and results in minimal gear play and quiet operation. In addition, the pinion is forged and heat treated to ensure maximum service life. Smooth running is further enhanced as a result of the flywheel effect of the drive sheave.

AUTOMATIC PROTECTION FROM UNCRUSHABLES

If tramp iron, timbers or other uncrushables enter the crusher with the feed, protection of the internal crushing elements is achieved by means of a patented, spring-loaded toggle release mechanism which causes the breaker plate to retract. This allows the uncrushable material or object to pass safely between the roll and the breaker plate and out of the crusher. Once the material is clear of the crushing chamber, the breaker assembly is immediately reset to its crushing position.

DRIVE

Hercules, Atlas and Type K Single Roll crushers are driven using normal torque electric motors through a V-belt. The motor is separately mounted and the drive sheave may be located on either side of the crusher, depending on your layout requirements.

LUBRICATION, ALL MODELS

The roll and counter shaft have standard grease fittings for manual greasing. The gears are lubricated by an oil bath and protected by an oil-tight gear guard. On the Hercules model, optional automatic grease lubrication can be furnished for the sleeve bearings on the roll shaft.

COUNTERSHAFT

The countershaft is machined of turned and polished alloy steel and it runs the entire width of the crusher in the smaller models. On certain larger models, there is a stub countershaft, supported at one end on a pedestal.

BEARINGS

All three models, the A, H and Type K, use spherical roller bearings on the countershaft. The Atlas and Type K also use this type of bearing on the roll shaft, but the Hercules uses a bronze journal sleeve bearing.

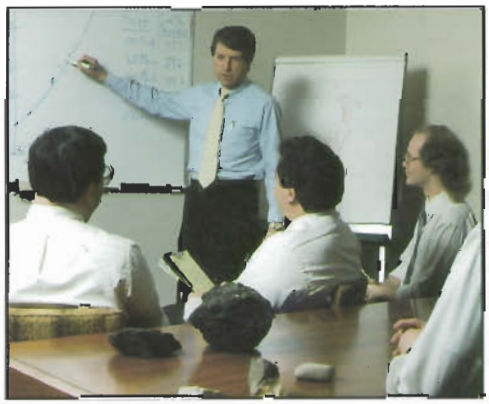
SELECTION OF CRUSHER SIZE, TYPE, AND DRIVE MOTOR

Our applications engineering department is best equipped to determine the model and size of crusher that will produce best results in your application, and to provide you with recommendations for alternate models where appropriate. The entire process of crusher applications requires careful collection and analysis of all relevant factors such input size, moisture content, height of drop, material characteristics, desired output size and gradation, to name but a few.

In support of our analysis, we draw upon our data base which documents crusher performance at thousands of installations worldwide and upon test results obtained in our material crushing laboratory.

Our applications engineering department is staffed by the most experienced crusher application specialists in the world, professionals who are exclusively dedicated to the task of matching the right crusher to the job. By relying on our expertise, you can be assured that the equipment we recommend will provide the most cost-effective crusher for your operation.

Coupled with our expertise in crusher applications is our knowledge of crusher drive motors. We will advise you of the correct motor type and size along with our crusher recommendations.



TEST CRUSHING

Unlike other types of crushers, the test crushing of materials for single roll crusher applications would be inappropriate. While compression tests *can* be performed on the material, the data base of field application results which we possess is normally sufficient for us to advise you on the correct size and type of single roll crusher, together with the appropriate motor size.

SUPPORT SERVICES

We will review the general layout for your crushing system at no obligation. We can also assist with installation and start-up supervision, train your operating staff, and advise you of other factors we judge important for an efficient crusher system. After start-up at your site, we can provide continuing support throughout the life of the crusher, in the form of parts and services, remanufacturing, upgrading to match newest designs, life extension and other valuable support.

Low profile fits into limited space.

View from beneath. The lower lip of the breaker plate is immediately to the right of the roll. Behind that plate can be seen one of the two toggle release mechanisms.

View from above; breaker plate is to the right

Teeth are welded to the roll shell, forming a very rugged and secure one-piece assembly.

PRECISION MANUFACTURE AND ASSEMBLY IS PERFORMED IN THE PENNSYLVANIA MANUFACTURING CENTER BY OUR HIGHLY CAPABLE SPECIALISTS.

For complete information, call your Pennsylvania representative or contact our application engineering department.

Pennsylvania Crusher®

The Most Choices, The Most Experience

Pennsylvania Crusher Corporation
600 Abbott Drive, Box 100 ▪ Broomall, PA 19008-0100 U.S.A.
(610) 544-7200 ▪ FAX: (610) 543-0190
e-mail: buster@penncrusher.com