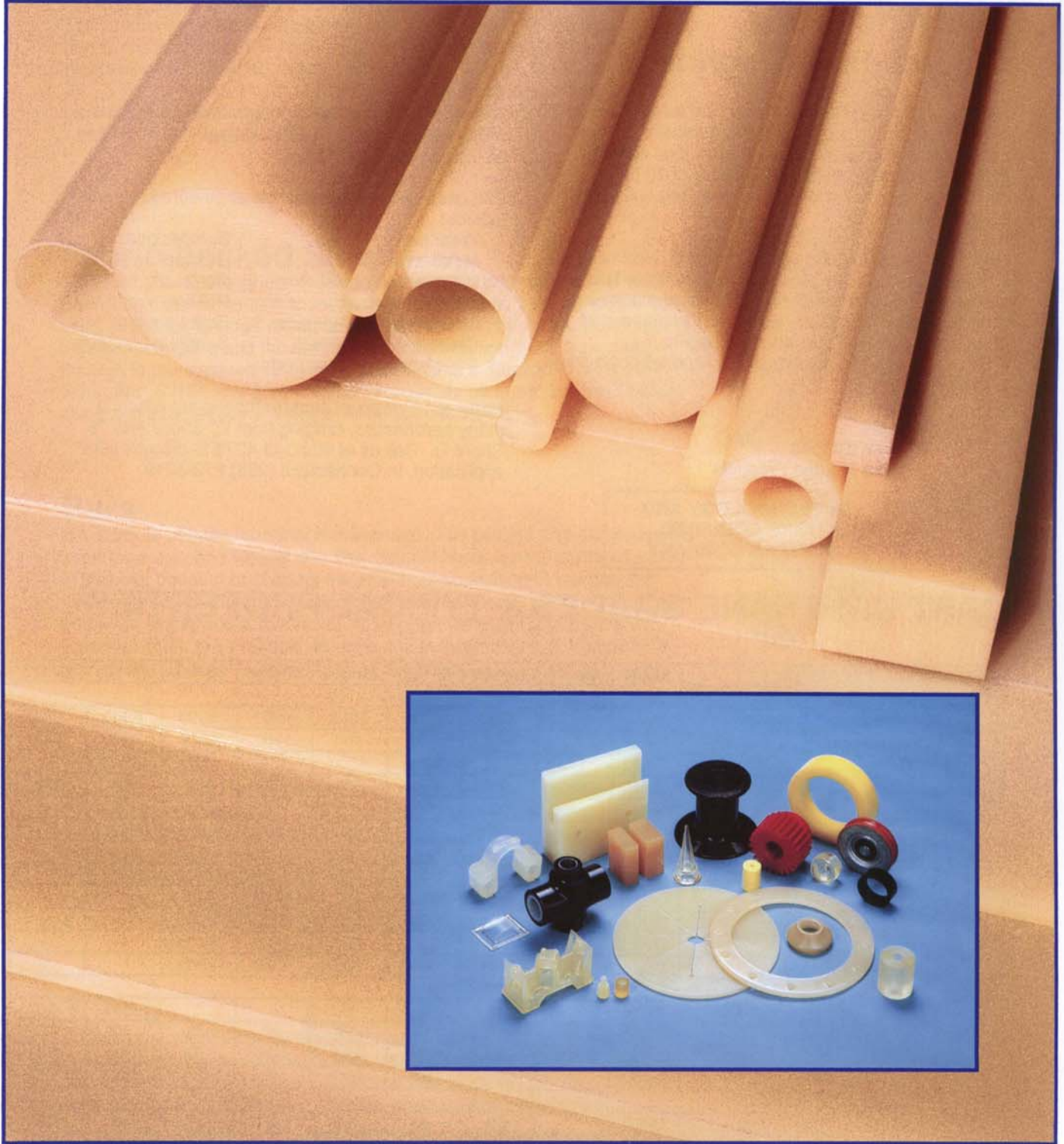




# HARKNESS Industries, Inc.

## PRECISION CAST URETHANE







# HARKNESS Industries, Inc.

## STOCK SHAPES & PROFILES



### Known for Outstanding Toughness

Harkness cast urethane products\* are well known for their extraordinary toughness and durability. In their most demanding applications, they outlast conventional rubbers and plastics by a factor of 20 to 1. When impinged abrasion is involved, they will usually outlast carbon steel.

Cast from thermosetting urethane resins, Harkness urethane products are produced to very close tolerances and typically require a minimum of machining to adapt to their end uses. Harkness precision cast products are available in several shapes:

- Sheets—both unsupported and fabric backed
- Bars
- Rods
- Tubes
- Custom Shapes
- Custom Molded Products

**\* BASED ON TECHNOLOGY AND FORMULATIONS ACQUIRED FROM J.P. STEVENS COMPANY.**

All standard forms can be shipped off-the-shelf in a wide range of sizes. Custom shapes and sizes can also be shipped promptly.

End uses of these remarkable engineered materials include:

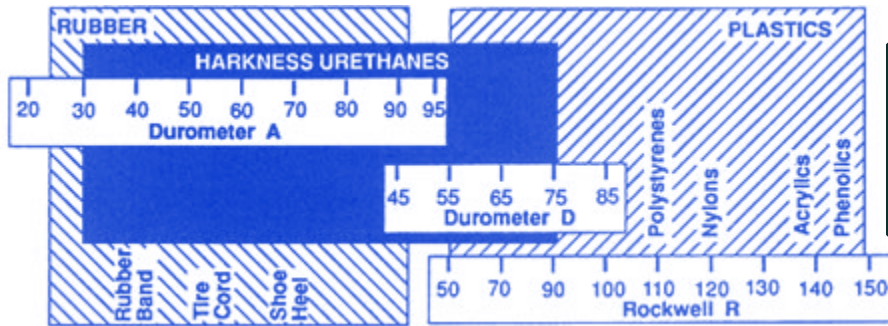
- |                          |                    |
|--------------------------|--------------------|
| Wear pads                | Bumper pads        |
| Metal-forming pads       | Gaskets            |
| Machinery mounts         | Seals              |
| Cutting surfaces         | Rollers            |
| Sound-dampening pads     | Roller covers      |
| Chute & hopper liners    | Sandblast curtains |
| Prototype machined parts |                    |

Harkness thermoset cast urethanes are made in many hardnesses, ranging from 20 Shore A to 75 Shore D. Call us at 800-343-4275 to discuss your application. In Connecticut (203) 272-3219.

## CAST URETHANE GRADES & TYPICAL PROPERTIES

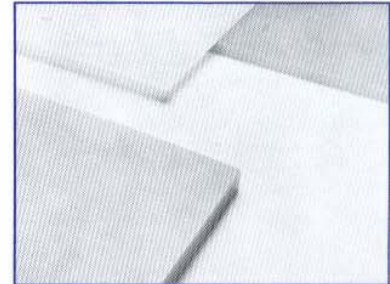
MECHANICAL PROPERTY	ASTM Test	MP300	MP600	MP750	MP850	MP900	MP950	MP160	MP175
<b>Tensile Properties</b>									
Break, psi	D-412	380	4500	5500	6000	4500	5500	6500	7500
100% modulus, psi	D-412	80	250	350	600	1100	1800	3000	5500
300% modulus, psi	D-412	170	600	1000	1500	2100	4000	6500	-
Elongation, %	D-412	515	500	500	500	450	320	300	225
Break Set, %	D-412	-	5	10	10	10	10	15	-
Modulus of Elasticity, psi	D-638	-	5	15	25	50	90	125	-
<b>Compression Properties (Shape factor 0.56)</b>									
Deflection, psi @ 5%	D-575	15	30	70	180	310	450	-	-
Deflection, psi @ 10%	D-575	25	70	140	390	625	890	-	-
Deflection, psi @ 15%	D-575	34	110	220	560	875	1170	-	-
Deflection, psi @ 20%	D-575	38	160	280	690	1125	1400	-	-
Deflection, psi @ 25%	D-575	44	220	330	800	1350	1600	-	-
<b>Compression Set, %</b>									
Method A @ 70° C	D-395	-	10	8	5	-	1	10	15
Method B @ 70° C	D-395	9	10	15	25	30	40	50	-
<b>Durometer, Shore ± 5</b>	D-2240	30A	60A	75A	85A	90A	95A	60D	75D
<b>Tear Properties, pli, Die C</b>	D-624	90	200	250	400	400	450	700	850
<b>Abrasion Resistance, Tabor</b>									
H18 @ 1000 gm. load, mg. loss per 1000 cycles	C-501	-	30	40	40	30	40	80	450
<b>Specific Gravity</b>	D-792	1.20	1.26	1.26	1.26	1.10	1.15	1.18	1.18
<b>Base</b>		Ester	Ester	Ester	Ester	Ether	Ether	Ether	Ether





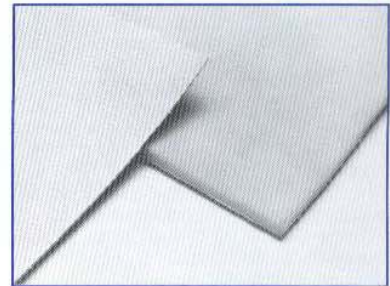
## Precision-cast Sheets

Cast sheets are ideal for fabrication into a wide variety of products. Standard sheets are available in 12" square up to 48" square sheets in the following thicknesses: 1/32", 1/16", 3/32", 1/8", 5/32", 3/16", 1/4", 5/16", 3/8", 1/2", 5/8", 3/4", 1", 1-1/4", 1-1/2", 1-3/4", & 2". Other sizes and thicknesses are available on special order. Tolerances are: 1/32 to 3/16,  $\pm 0.010$ "; 1/4 to 3/8",  $\pm 0.015$ "; 1/2 to 1-1/4",  $\pm .025$ "; 1-1/2" and over,  $\pm 3\%$ .



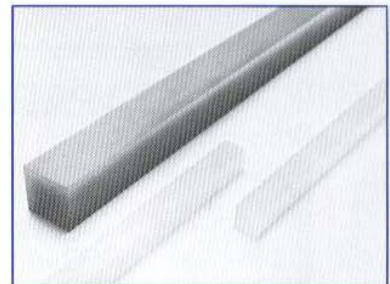
## Fabric-backed Sheets

Standard sheets are available integrally cast onto duck cloth (.048" thick), permitting easy cementing to metal or other surfaces. This composite converts effectively to large roll coverings or chute and bin liners. Bond strength between the fabric and the urethane is excellent, and there is no strike-through to the exposed side of the fabric. Sheet is stocked in 3/16", 1/4", 5/16", 3/8", 7/16", and 9/16" overall thicknesses up to 48" square. Custom sizes and thicknesses are available on special order.



## Bars

Bar stock is popular for metal forming uses. The precise size eliminates the need for a matched female die. The material becomes the contact surface in forming, bending or shaping metal without scratching or marring the finished product. Bar stock is also used as press-brake pads, bumper pads, and wear strips, and is machined into a great variety of prototype parts. Standard sizes are available 48" long and in thicknesses of 1" square, 2" square and 2" x 3". Custom sizes are available.



## Rods

Cast rods are used for guide, drive and pinch rollers and outwear conventional rubber rollers 20 to 1. They are excellent for bulge forming. Rod stock is used for prototype parts like gears, bearings and bushing, and is easily machined to close tolerances. Standard rods are 36" long and are available in diameters of 1/4", 3/8", 1/2", 5/8", 3/4", 7/8", 1", 1-1/4", 1-1/2", 1-3/4", 2", 2-1/4", 2-1/2", 2-3/4", 3", 3-1/4", 3-1/2", 3-3/4", 4", 4-1/4", 4-1/2", 4-3/4", 5", 5-1/2", 6". Custom sizes are available on request.



## Tubes

Cast tube stock makes excellent roll covers when press fitted over metal cores. They are also converted into gaskets, seals and rings. Tubes are well suited for prototype parts. Standard cast tubes are 36" long and are supplied in several diameters (custom sizes available on request):

ID	1"	1-1/4"	1-1/2"	1-3/4"	2"	2-1/4"	2-1/2"	2-3/4"	3"
OD	2"	2-1/4"	2-1/2"	2-3/4"	3"	3-1/4"	3-1/2"	2-3/4"	4"





# Custom Molded Urethane Products

## UNIQUE CAPABILITIES AND APPLICATIONS

Here are several examples of Harkness's ability to solve difficult engineering problems. Harkness products are applied to a wide variety of industries and applications, worldwide.

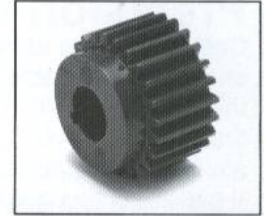
### ROLL NUT HOUSING FOR ELEVATOR DOOR ASSEMBLY

Application required a three material design, consisting of a nylon insert for low coefficient of friction, a steel core for strength and polyurethane to bond the two together and provide abrasion resistance and sound dampening.



### CUSTOM GEARS

This gear replaced a nylon design. Harkness can pour custom gears at a fraction of the machining costs normally required by other plastics and metals. Turnaround time can be as little as two days. Urethane gears provide longer life, quieter operation and tooling is low cost.



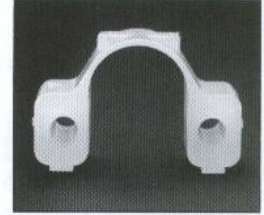
### MARINE CAPSTAN

Replaced bronze design capstans because of lighter weight, quieter operation and excellent resistance to abrasion in a salt water environment.



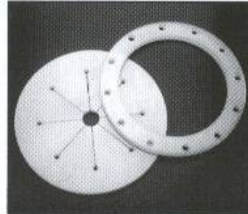
### PIPE CENTERING BLOCK

Used in the aircraft industry for vibration dampening and shock absorption. Polyurethane is an ideal shock absorber and can be designed in a wide variety of hardnesses to meet your specific application needs.



### CUSTOM PRECISION SEALS

Manufactured to customer specific requirements with tight tolerances. Provided longer life over all other materials tested to date.



### MEMBRANE SEAL/WINDOW

Designed to both seal and prevent environmental contamination to keyboards, motor controls, operator safety switches etc. Allows operator to maintain visual contact with working area.



## CAPABILITIES FOR CUSTOM MOLDED URETHANE PRODUCTS

- Hardnesses from 20 Shore A to 75 Shore D
- Colors available upon request
- Certifications as required (Military, F.D.A., Mining etc.)
- Chemical analysis of your existing parts can be performed
- Part weights from a few grams to over 400 pounds
- Single piece prototype to full production quantity capability
- Toolmaking design and/or fabrication
- Application engineering and technical support provided



**HARKNESS Industries, Inc.**

*"Your Urethane Store"*

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