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cc:

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J-M 83

PRELIMINARY STUDIES FOR PLASTICS STANDARDS
FILE: 20-1-6-1 

Preliminary studies in the Plastics Shop indicate that an opportunity exists for methods improvement and corresponding substantial savings.

The following proposals are submitted for consideration, ranging from extensive automation of lines down to improvement of present machinery and methods. These proposals are based on Class A estimates of costs, savings, and time requirements.

We recommend two changes that would be an integral part of all three alternate proposals.

1. The belling cycle can be cut considerably by setting the outer skin of the bell with chilled water then removing the pipe from the head and inserting an end plug to stop shrinkage. We have successfully reduced cooling on 3" from .50 minutes to .20 minutes with a 0. C. plug gage and 64° water. We believe that with an oversize plug this can be further reduced. Cooler water would reduce it still further.
2. Eliminate the weighing of pipe, it serves no purpose. The operator controls the material usage by wall thickness measurements, and a more meaningful material usage figure can be obtained from the book weight of pipe produced versus monthly inventories of raw materials, scrap, etc. This change, in conjunction with Proposals 1 and 2 that follow, will have the extruder operator picking up pipe one time and asiding it directly to the belling ramp - instead of transferring pipe to the scale, from the scale to a dolley, from the dolley to belling ramp.

Proposal Number 1

Description

This proposal requires the least amount of additional equipment and modifications to present equipment but is a "necessary minimum" prior to working up a wage incentive standard.

First, the present chamfering machines are inadequate. Every set-up for each different size is a series of frustrating trial and error adjustments. The chamfer machine should be modified in the following ways:

1. Redesign the air tube arrangement for positive and quick adjustment for all sizes; - the present copper tubes have to be bent back and forth to a precise position, the tubes soon break and have to be replaced from behind a flywheel - a complete chamfer set-up frequently takes two hours.

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2. Make variable O.D. mandrels for quick adjustment to pipe I.D. and ovalness variations. The operator now selects a mandrel and sorts back pipe that won't run on that mandrel, then later uses 1/2" strips of tape to build up or reduce size of mandrel. Variable O.D. mandrels could be made any of several ways: angle split mandrels, chuck type mandrels, alternate layers of metal and rubber that can be contracted or expanded, an air bladder; Hollis may have even better ideas.
3. Move marking wheel so as to operate on same mandrel as chamfer tool; this would eliminate several motions now being made in moving the pipe to a chamfering mandrel, taking pipe off of mandrel and moving backwards to a marking mandrel, then taking pipe off marking mandrel and moving it past the original mandrel.
4. Put bearings in marking wheel and arms to maintain alignment.
5. Move air clamp actuator to the lever that moves air clamp, or to a foot pedal.
6. In lieu of the above modifications, design a chamfer machine like the K & C lathe, to chuck in I.D. of pipe and automatically feed, chamfer, and mark.

After the chamfer machine has been made efficient, we recommend moving it to a position past the roller. The accumulation ramp can be extended out even with the edge of the door and the oil immersion tank for spare heads. The storage racks on the north wall can be moved to the old vacuum forming area to make more unitizing room. With the chamfer machine in this position, the extruder operators will then slide their pipe directly to the belling ramp and eliminate double handling. The roller operator will cycle pipe through the roller for 8 hours. The chamferer/unitizer will chamfer one or two layers of pipe, return that many plugs to roller, and unitize one or two layers of pipe, then return to the chamfer machine.

To make this proposal work we must be able to design a chamfer machine that will not bottleneck the belling line.

With this proposal, the three extruder operators will be relieved of weighing and recording weights, of emptying pipe to scales when to deliver. They will now grind scrap as it comes off the machine eliminating need for scrap accumulation area and reducing exposure to contamination (start-up rejects can be accumulated at take-off until in good production, then ground). The operators will also make up "rickey mouse" fittings internal, and when running adapter stock cut it up as it comes off the machine. To further reduce operator work load a large refrigerator could be bought, placed in the department for quick running of acetone tests.

With improved scheduling of shifts in terms of shipping date, the extruder operator can count down internal. A magnetic cable could have to be put on locking wheels and vacuum connections travelled at extruder lines.

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Cost of Proposal

Redesign chamfer machine
 Move chamfer machine, extend ramp
 Make end plugs (20 per size or 120 plugs)
 Refrigerator
 Make downdraft table portable

TOTAL

\$

Savings Potential

Based on 1969 forecast of 7,000,000 lbs., the sections per size to be belled are as follows:

<u>Size</u>	<u>Sections</u>	<u>Hours Required by Proposed Method</u>
1-1/2	35,818	304.6
2	171,412	1427.8
2-1/2	33,680	364.0
3	73,704	935.2
4	31,173	1597.9
5	13,204	338.0
	TOTAL HOURS	5215.4

Allowing for change-over, $5215.4 \times 108 = 5,643$ total belling hours required by proposed method. We are presently running 2 lines 6 days per week, or 12,096 hours, of which we estimate 80% is actually belling pipe (other 20% is spent grinding scrap, making fittings, etc.). $12,096 \times 80\% = 9677$ hours. The new method reduces beller hours by 4029 hours @ \$5.89 per hour, or \$23,731 savings attributed to method and standard.

Proposal Number 2Description

It is proposed to purchase an Anger automatic in-line, cut-off, and chamfer machine. The pipe would come off the extruder line with all thick sections on the same end, the in-line machine cuts out the transition section for regrinding, then chamfers the plain end of pipe. The operator will aside pipe directly to the belling ramp, grind his own scrap as it comes off machine, cut up own fitting stock when scheduled, etc., as in Proposal Number 1 above.

By eliminating chamfering at beller the unitizer now has spare time in which he can set up the No. 2 beller internal (will run only one beller at a time), so that as one line is caught up, the beller operator can move to the No. 2 with no downtime. The unitizer can also make up "mickey mouse" fittings internal. The down draft station can be moved to the unitizing area.

This proposal appears to have advantages over Proposal Number 1 in that the work loads are not as tight. The unitizer picks up cementing fittings from the extruder operators and can set up the other belling machine. Also, the possible shift of control to the chamfer-unitizer does not exist as in No. 1.

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Cost of Proposal

The cost of this proposal is as follows:

3 Anger in-line, cut-off, and chamfer units @ \$11,170 =	\$33,510 (+installation and freight)
Belling End plugs (same as in Proposal No. 1)	=
Refrigerator (same as in Proposal No. 1)	=
Move downdraft table to unitizer area	=
TOTAL	\$

Savings Potential

The Savings Potential is virtually the same as in Proposal No. 1 except that some beller downtime can be eliminated by having the unitizer set up the other line internal. Also, by having the unitizer cement fittings, the extruder operator will have more available time for miscellaneous jobs such as grinding own scrap, cutting up own fitting stock, etc.

Estimated savings \$ 25,731.00

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Proposal Number 3Description

This alternative would require the automatic in-line chamfer machine (see No. 2) plus an improved, guaranteed in-line belling machine. The big "if" in this proposal is a 100% design on in-line belling unit that is automated enough that it does not require operator time other than set-up? It appears so, because the unitizer would not basically transfer pipe. A traveling "basket" could be used to carry the unit section to the end of the preceding section in one lift. If this section were slipping the time its pipe section came off, it could be picked up by a clamp, forced onto the head, flash cooled, transferred to a chilled water cooled end plug, and off onto the inspection conveyor all automatically.

The extruder operator would inspect the pipe and put it directly into a unit loader, doing the same as in the previous proposal. The unitizer would be a 3 man (2 men with a new unitizer) and the unitizer would not have a full set of tools for cement fittings and perform other miscellaneous duties.

Costs of Proposal

3 Anger in-line, cut-off, and chamfer units @ \$11,170 =	\$33,510 (+installation and freight)
2 additional in-line belling units @ \$11,170 =	\$22,340
2 additional in-line belling units @ \$11,170 =	\$22,340
Refrigerator	=
TOTAL	\$

3. A modification to the unitizer to be performed on the unitizer.
4. Stocking in-line belling units and a new unitizer, estimated cost of \$700.

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Potential Savings

The savings from this proposal would be 8 or 9 men or around \$54,000 to \$61,000 (based on a joint Moulder's year-to-date earnings).

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700

The savings from this year will be \$61,000 (based on a 10% savings rate).

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