GEORGIA INSTITUTE OF TECHNOLOGY OFFICE OF CONTRACT ADMINI

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PROJECT ADMINISTRATION DATA SHEET

Project No. A-2942 DATE: 5/21/81

Project Director: R. L. Tessner ~~School~~/Lab EDL/IED

Sponsor: Nachman Corporation (Fisher-Haynes Corp. of Ga.)

Type Agreement: Purchase Order No. 922

Award Period: From 4/27/81 To 5/4/81 (Performance)

Sponsor Amount: $470.00 Contracted

Cost Sharing: None GTRI/GI

Title: Concept Study Wire Forming Machine

ADMINISTRATIVE DATA OCA CONTACT Faith G. Costello

1) Sponsor Technical Contact: See Below

2) Sponsor Admin./Contractual Contact: E. L. Anderson, Nachman Corporation, 654 Drive, Box 1084, Norcross, Ga. 30071

Reports: ~~Same as Schedule~~ N/A Security Classification: N/A

Defense Priority Rating: N/A

RESTRICTIONS

See Attached N/A Supplemental Information Sheet for Additional R

Travel: Foreign travel must have prior approval - Contact OCA in each case. Dome travel requires sponsor approval where total will exceed greater of $500 125% of approved proposal budget category.

Equipment: Title vests with N/A

COMMENTS: This document also serves as TERMINATION SHEET.

Required Close Out Action: Issue Final Invoice

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A 2942-000
project complete

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

EES

May 4, 1981

Mr. Ed L. Anderson
Fisher Haynes Corp. of Georgia
P.O. Box 1084
Norcross, Georgia 30071

Dear Mr. Anderson:

The enclosed report covering your wire-forming production bottleneck should provide enough data to allow you to make an informed decision as to the "best" method to resolve the problem.

The machine was not running well when I saw it, so I could not get production data. I used synthesized data generated from the figures which Richard supplied to me. While the number may not match your production rate, the relative difference is what is in question, and that is correct since the same data was used in all cases.

If I can be of any further help, please call me at 894-3831.

Yours truly,

[redacted]

R. Lynnard Tessner
Research Engineer
INDUSTRIAL EXTENSION DIVISION

RLT:j
Enclosure

Industrial Extension Division
Engineering Experiment Station
GEORGIA INSTITUTE OF TECHNOLOGY

# Report to Fisher Haynes Corp. of Georgia

The Fisher-Haynes Corporation of Georgia requested technical assistance with the problem of how to get more throughput on a wire-forming machine.

The problem machine was studied to determine what approaches might yield useful solutions to the problem. For this study it was assumed that timing signals were or could be made available on a continuum. It was also assumed that both the cut-off machine and the crimper would be modified together.

As with most problems, there appears to be a number of possible solutions. These are:

1. Adjust machine timing to "nest" the strokes to the welder
2. Change gearing in addition to Solution #1 above
3. Add air cylinder to fingers in addition to Solution #1 and #2
4. Add electric clutch and brake to #1, #2 and #3
5. Use machine as holder for short stroke air cylinder on die
6. Use long stroke cylinders to activate the machine

It should be possible to "nest" some of the time needed to crimp the wire so that the welder will run during part of the crimping cycle. The crimper cycle time is approximately 1.6 seconds and uses a 2" stroke. However, it appears that only 1" of die opening is needed to clear the formed wire, and less for the plain wire. If the crimper cycle can be started at the same time the wire is started forward, the weld cycle should be completed before the die closes.

If the machine release switch is backed up in the crimp cycle, the welder can start feeding wire forward before the crimper finishes its return stroke.

If the die takes 1.6 seconds to cycle and we can nest by .50 seconds on the wire feed and nest the next feed after the crimp cycle by .35 seconds, then we can save .85 seconds. A grid that now takes 27.18 seconds would then require 19.98 seconds, or 132/hr to 180/hr.

The material cost of this approach is very small as it would require at most a support arm for two micro switches and two cams plus perhaps one relay per machine.

In addition to the nesting, the gear ratio could be changed. Because of the fixed center line spacing, only certain gear ratios are possible. The present ratio on the final drive gear is 5.6 to 1. The next easy choice is 4 to 1, which would change cycle time to 1.14 seconds. But "nesting" becomes more difficult.

If it can be adjusted finely, the savings should reduce cycle time to .53 seconds effective or 204 grids an hour. The gears would cost approximately $500 for the crimper, and $500 for the cut-off machine. It appears that for the expenditure of approximately $1500 cash, a 54% increase in production is possible.

If the stop fingers are modified to include air cylinders at a cost of $250/cylinder, a $120/4-way and $500/slides and fingers, the cycle time could be reduced by approximately .05, resulting in a rate of 209 grids per hour at the additional cost of $870.

Since the crimp cycle is "nested" with the welder, no cost saving will result; if an electric brake and clutch is added to the machine, however, it may reduce maintenance.

If the present head is used as a mount for 5 small short stroke air cylinders, the press can be powered by air and the present clutch and brake retired. It may be possible to shorten the cycle time to 1/3 - 1/2 second. The only problem may be the control of the stroke stop and the change of the machine height. The cost would be $500 air cylinder/machine; a $110/4-way; $400/timer, plus labor and materials to install the cylinder and modify the die set. It may also require an air tank and pressure control at $370.

A long stroke air cylinder set could also be installed, but it will not respond as quickly as the short stroke design. The starting and stopping of the head of the crimper is difficult to do quickly because of the large mass involved. No cost was developed for this option because of the difficulty of such an approach.

It would appear that the best approach would b e to "nest" if the resulting 180 grid/hours is sufficient. If the maximum possible production is wanted, the crimper should be air driven and the cut-off nested. It may be possible to air power the cut-off, but the gain would not cover the cost.

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