Correcting Timing Problems on Cartoning Machine

The cartoning machine in this example is equipped with an Electro Cam PS-5144-24-P16M09 PLμS Controller. This unit has 16 DC low current sourcing outputs and 9 DC module outputs. Two DC module outputs are utilized, both connected to glue guns.

The machine performs three operations: It folds the carton, places 6 cans in the carton, then glues the carton shut. The PS-5144-24-P16M09 controls the firing of the gluing system. The unit is configured with Output Enable ANDing, which only allows outputs to fire when product is present.

Two problems were discovered and resolved on this machine as follows:

Problem One - Sensor Misfiring
The machine has a single pulse in channels 17 and 18 which glues both sides of the carton, but instead of properly applying one continuous glue bead, it was applying several intermittent beads.

It turns out the sensor used to detect the presence of a carton was firing intermittently. This sensor is used for the Output Enable ANDing, which means when the sensor is ON, outputs are enabled to fire. If the sensor is OFF, outputs are OFF. Because the sensor was flickering ON and OFF, outputs were doing the same for the glue bead. The cans are reflective, which caused misfiring.

Solution
The machine is equipped with a metal bar which pushed the top carton flap down, thus blocking the reflective cans. That way the carton is triggering the sensor, and nothing is reflecting off the cans. This bar became bent with time and was not working as intended. Once it was straightened and pushed back into place, everything functioned normally.

Problem Two - Speed Comp Needed Adjustment
This problem has to do with speed compensation. The machine was initially setup correctly, but over time something changed. To correct the change, speed comp was adjusted as described below.

Solution
To set this machine up correctly, the machine was jogged to the desired position for each edge, then the pulses were programmed at these locations. Next the machine was run at low speed. The beads were a little bit off because of the time delays. While the machine was running, speed compensation was adjusted until the edges were in the correct position. Then, when the machine was run at high speed, or any speed in-between, the edges remained in the correct locations.

13647 Metric Rd • Roscoe, IL 61073 USA • 815-389-2620 • FAX 815-389-3304 • 800-228-5487 (USA & Canada)
Web Site: www.electrocam.com • email: ecam@electrocam.com

Attached is the Plusnet print out of the configuration after Don got everything working.

Andrew Que
(aque@electrocam.com)
(que@staack.com)


```
;                       Electro Cam Corp.
;              PLuSNet II Communications Software v2.57
;                    Upload Date: 2/29/2000
;
; Comments may be added to any line as long as they start with a ";" and do
; not contain a carriage return.  However, these comments will not be
; retained when the file is uploaded from a controller.
; Be careful to save and name files accordingly to archive information.
; NOTE: Plusnet will not report invalid data errors.
; ALSO: Plusnet does not use decimal points in decimal numbers.
;      Example: rate multiplier of 1000 is actually 1.000
;
;Data              Line# Comments
;-------------------------------------------------------------------------
;                       SYSTEM INFORMATION
;-------------------------------------------------------------------------
2: 5144            ;   1; Model
3: 310             ;   2; Firmware revision
4: 25              ;   3; Output quantity
5: 5,1             ;   4; Option: -H; High resolution
5: 6,1             ;   5; Option: -L; Leading/trailing speed comp
5: 7,1             ;   6; Option: -A; Analog output
;-------------------------------------------------------------------------
;                       SETUP CONFIGURATION
;-------------------------------------------------------------------------
6: 1               ;   7; Default Program
;-------------------------------------------------------------------------
;                       SPEED COMP SETTINGS
;-------------------------------------------------------------------------
7: 17,85,750         ;   8; Speed comp (.1mS): chn, leading, trailing
7: 18,180,1250       ;   9; Speed comp (.1mS): chn, leading, trailing
9: 1,1187          ;  10; Offset: group#, offset
9: 2,49            ;  11; Offset: group#, offset
10: 1,10,350         ;  12; Analog output: Analog chn#, offset, high RPM
11: 1,10,300         ;  13; Motion detection: 1, low rpm, high rpm
11: 2,10,300         ;  14; Analog level: 2, offset, high rpm
17: 0              ;  15; Direction of increasing rotation: 0=CCW, 1=CW
18: 1188           ;  16; Scale factor
19: 505            ;  17; Absolute offset
20: 1              ;  18; Analog quantity
21: 0              ;  19; Resolver type: 0=ECC, 1=Other
22: 0              ;  20; Program select mode: 0=bin, 1=BCD, 2=Gray
25: 1,1            ;  21; Termination resistors: grp1 on/off, grp2 on/off
26: 2              ;  22; Default display: 0=rpm, 1=pos, 2=auto
28: 0              ;  23; Toggle rpm
29: 0              ;  24; Rpm update rate: 0=1/Sec, 1=2/Sec, 2=10/Sec
30: 1              ;  25; Speed comp mode: 0=Single, 1=L/T
31: 0              ;  26; Group pos display mode: 0=Each, 1=One
;-------------------------------------------------------------------------
```

```
;                       USER ENABLE CODES
;-------------------------------------------------------------------------
32: 2               ;  27; Operator ID number (P2)
33: 1               ;  28; Setup ID number (P1)
;-------------------------------------------------------------------------
;                       OPERATOR ENABLE ACCESS
;-------------------------------------------------------------------------
35: 1;0,0,0,0,0,0,0,0 ;  29; Per chn enable: chns 1-8; chn on/off
35: 2;0,0,0,0,0,0,0,0 ;  30; Per chn enable: chns 9-16; chn on/off
35: 3;1,1,0,0,0,0,0,0 ;  31; Per chn enable: chns 17-24; chn on/off
35: 4;0,0,0,0,0,0,0,0 ;  32; Per chn enable: chns 25-32; chn on/off
36: 0               ;  33; Operator enable: Setpoints
37: 0               ;  34; Operator enable: Default program
38: 0               ;  35; Operator enable: Speed comp
39: 0               ;  36; Operator enable: Timed outputs
40: 0               ;  37; Operator enable: Offsets
41: 0               ;  38; Operator enable: Motion detection
;-------------------------------------------------------------------------
;                       MOTION ANDING
;-------------------------------------------------------------------------
43: 1;0,0,0,0,0,0,0,0 ;  39; Motion ANDing: chns 1-8; chn levels (0=none)
43: 2;0,0,0,0,0,0,0,0 ;  40; Motion ANDing: chns 9-16; chn levels (0=none)
43: 3;1,1,0,0,0,0,0,0 ;  41; Motion ANDing: chns 17-24; chn levels (0=none)
43: 4;0,0,0,0,0,0,0,0 ;  42; Motion ANDing: chns 25-32; chn levels (0=none)
;-------------------------------------------------------------------------
;                       OUTPUT ENABLE ANDING
;-------------------------------------------------------------------------
44: 1;0,0,0,0,0,0,0,0 ;  43; Output enable ANDing: chns 1-8; chn on/off
44: 2;0,0,0,0,0,0,0,0 ;  44; Output enable ANDing: chns 9-16; chn on/off
44: 3;1,1,0,0,0,0,0,0 ;  45; Output enable ANDing: chns 17-24; chn on/off
44: 4;0,0,0,0,0,0,0,0 ;  46; Output enable ANDing: chns 25-32; chn on/off
;-------------------------------------------------------------------------
;                       GROUP & MODE SETUP
;-------------------------------------------------------------------------
45: 2               ;  47; Output group quantity
46: 1,16,0            ;  48; Output group config: group, #chns, mode
46: 2,8,5             ;  49; Output group config: group, #chns, mode
47: 2               ;  50; Enable input quantity
;-------------------------------------------------------------------------
;                       SETPOINTS
; Format: pgm, chn, on, off
;-------------------------------------------------------------------------
51: 1,1,1,1           ;  51;
51: 1,2,0,150         ;  52;
51: 1,3,400,550       ;  53;
51: 1,4,1010,118      ;  54;
51: 1,17,390,1165     ;  55;
51: 1,18,415,160      ;  56;
51: 1,92,0,1187       ;  57;
51: 2,1,1,1           ;  58;
51: 2,2,295,495       ;  59;
51: 2,3,1000,100      ;  60;
51: 2,4,500,600       ;  61;
51: 2,4,700,800       ;  62;
51: 2,17,660,425      ;  63;
51: 2,18,650,425      ;  64;
51: 2,92,0,1177       ;  65;
51: 3,1,1,1           ;  66;
51: 3,2,96,295        ;  67;
51: 3,3,402,506       ;  68;
```

```
51: 3,4,989,1083      ;  69;
51: 3,17,436,237      ;  70;
51: 3,18,436,248      ;  71;
51: 3,92,0,1177       ;  72;
51: 4,1,1,1           ;  73;
51: 4,2,989,0         ;  74;
51: 4,3,71,178        ;  75;
51: 4,4,694,742       ;  76;
51: 4,17,554,330      ;  77;
51: 4,18,578,330      ;  78;
51: 4,92,1047,413     ;  79;
51: 18,1,1,1          ;  80;
51: 18,2,48,201       ;  81;
51: 20,1,1,1          ;  82;
51: 20,2,96,295       ;  83;
51: 20,3,88,200       ;  84;
51: 20,4,1177,71      ;  85;
51: 20,17,222,1165    ;  86;
51: 20,18,222,1165    ;  87;
51: 20,92,0,1187      ;  88;
51: 21,1,1,1          ;  89;
51: 21,2,1107,0       ;  90;
51: 21,3,88,200       ;  91;
51: 21,4,785,840      ;  92;
51: 21,17,651,383     ;  93;
51: 21,18,651,383     ;  94;
51: 21,92,0,1187      ;  95;
51: 31,1,1,1          ;  96;
51: 31,2,96,295       ;  97;
51: 31,3,88,200       ;  98;
51: 31,4,991,1090     ;  99;
51: 31,17,356,1065    ; 100;
51: 31,18,396,1090    ; 101;
51: 31,92,0,1187      ; 102;
51: 41,1,1,1          ; 103;
51: 41,2,96,295       ; 104;
51: 41,3,88,200       ; 105;
51: 41,4,991,1090     ; 106;
51: 41,17,356,1056    ; 107;
51: 41,18,396,1078    ; 108;
51: 41,92,0,1187      ; 109;
51: 42,1,1,1          ; 110;
51: 42,2,96,295       ; 111;
51: 42,3,672,813      ; 112;
51: 42,4,496,684      ; 113;
51: 42,17,96,1083     ; 114;
51: 42,18,96,1083     ; 115;
51: 42,92,0,1177      ; 116;
```