

# Jupiter servo for Spiral wound paper tube

General description of  
JMD-FS Servo drive

Apply to cardboard tube machine

**JPS** corporation, Taiwan



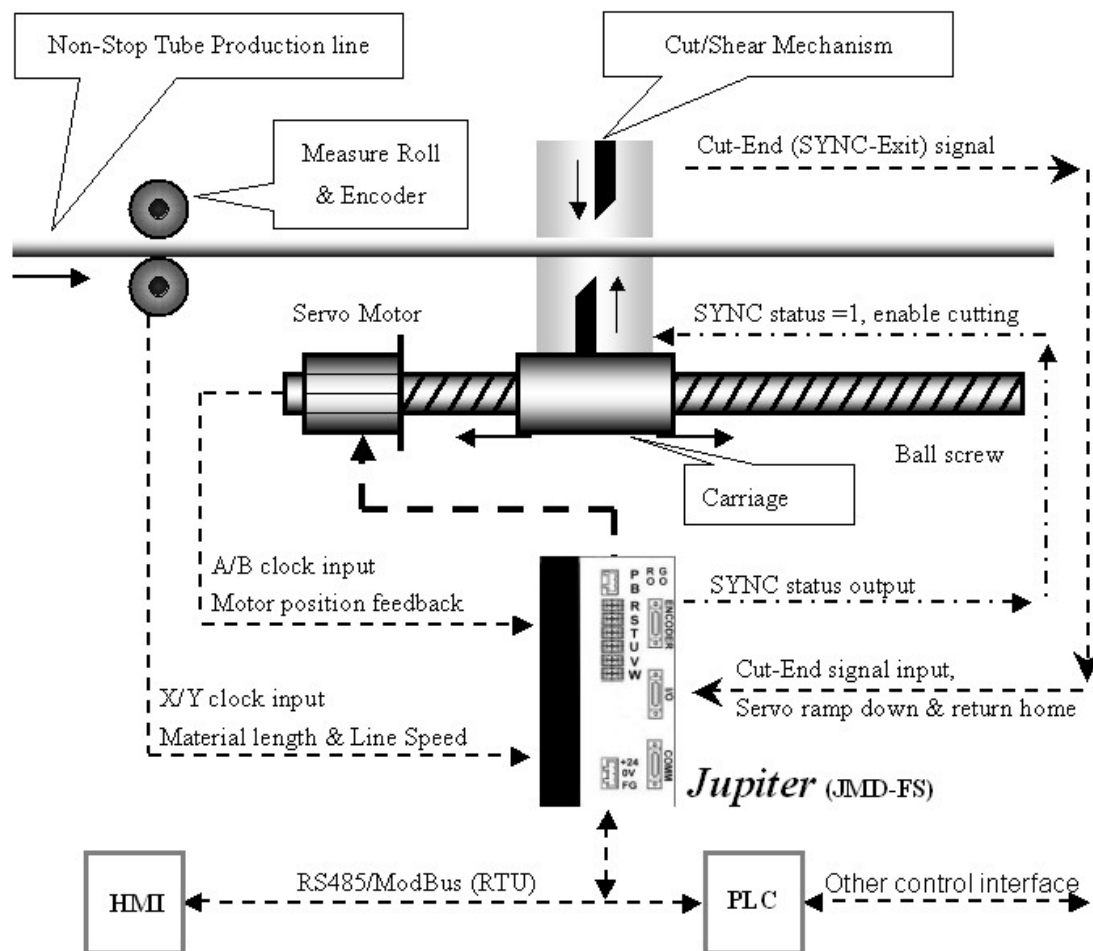
# Basics of paper tube machine



(Pictures used under courtesy of **CORENSO**)



# Jupiter JMD-FS fully controls the operation of Fly-Shear machine



# Advantages using JMD-FS

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- # JMD-FS performs all Fly-Shear function
  - # Link directly to HMI (simplest system when PLC is not used)
  - # Cost down by using standard PLC as master controller
  - # State of the art advanced functions readily embedded:
    - a. Accurate coherent tracking(position & velocity) ability
    - b.  $\text{Sin}^2$  acc/deceleration curve minimizes machine **jerk**
    - c. Inherent pre-acceleration according to line speed
    - d. Embedded Automatic Homing operation
    - e. Embedded Cut-to-Mark tracking mode
    - f. Embedded Simulation-mode minimizes field test time
    - g. Embedded Auto-Calibration, and .....
  - # Fast installation time, well proven technology  
No need of experienced motion programming engineer
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# JMD-FS special functions

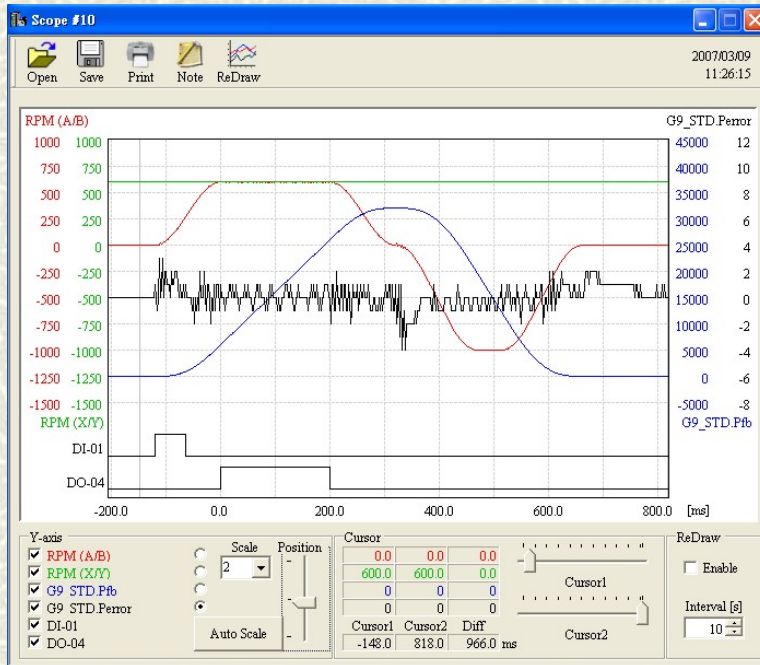
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JMD-FS embeds complex Fly-Shear motions:

- # **Sin<sup>2</sup>** smooth Fly-Shear tracking motion profile
  - # Combines **Position & Velocity** tracking minimize error
  - # With multimode **Search-Home** motion profiles
  - # **Immediate-Cut** (Waste-Cut) motion
  - # **Mark-Cut** (Registration) motion
  - # On-line **Auto-Calibration**
  - # **Unit conversion** for user convenience
  - # Virtual real time (**100us**) monitoring / recording
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# Typical Fly-Shear motion

- Step-1: Carriage(carrying knives) moves ramps up toward line speed VT
- Step-2: Carriage synchronizing to VT and tracking the desired cut-point
- Step-3: Carriage stops after end of shearing
- Step-4: Carriage returns to home position



- Green curve:** VT, tube line speed
- Red curve:** Carriage speed(servomotor)
- Blue curve:** Carriage position
- Black curve:** Cut-point tracking error

\*Carriage driven by servomotor always accelerates and decelerates using sinus curves.



# Complex Fly-Shear operation Simply set by few parameters

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No motion programming, only parameter setting

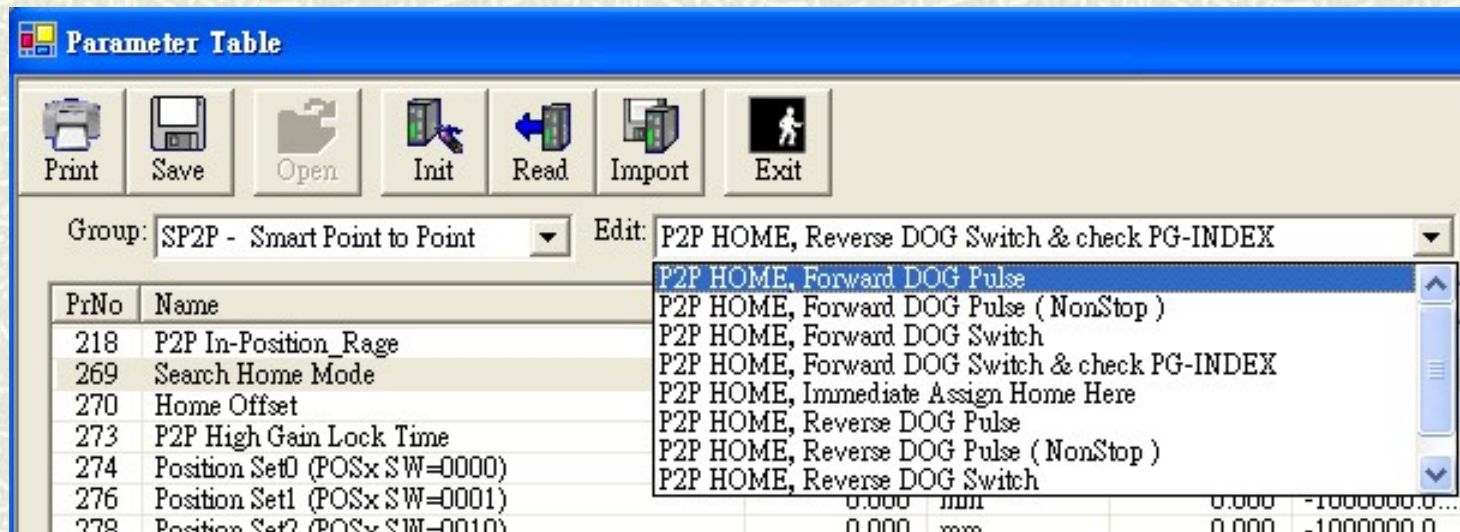
- # Set Pr.308(cks/Meter) describes the measuring encoder characteristic
- # Set Pr.310(cks/Meter) describes the servomotor + gear + carriage mechanical characteristic
- # Set Pr.xxx, ...the return speed, acc/dec rate, ...etc.
- # Set Pr.274(mm/cut) which is the desired length per cut

Then, the Jupiter will measure the line speed, total input length, ..., and do all the rest of fly-shear work for you!

**Take it easy, because we made it easy**

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# Multi Search-home mode



Cardboard cut off system is normally an absolute coordinate system,

- # Variety of Search-Home selectable
- # Jupiter can execute Auto-Home by specified action.
- # Home position may be randomly changed to any position.  
(Depend on cut off length)



# Special motion profile of Fly-Shear

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## # Immediate, Waste or Edge-detection Cut

This function is used when:

1. Operator first starts the machine,
2. Operator observes tube defect,
3. Edge-detection sensor used for very long cut-length simply by digital input to initiate the special motion profile.

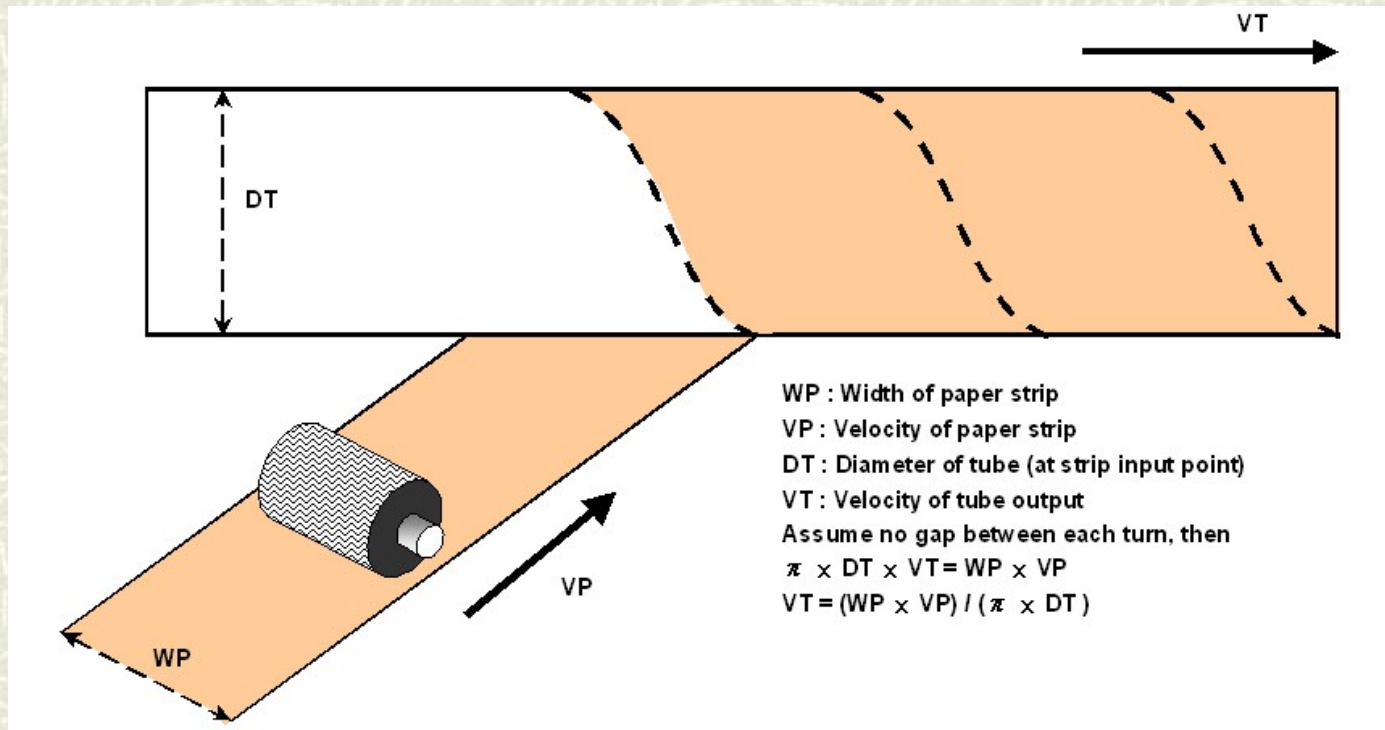
## # MARK registration cut

Some special tube requires to track print-mark on the tube. Jupiter helps to execute the function simply by setting a parameter that specifies the sensor's location.

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# Possible error due to: Indirect measure of line speed

Tube is always rotating through winding mechanism,  
Tube speed(VT) can only be measured indirectly.





# On-Line Error-correction

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If all mechanical coefficients were correctly set, the Jupiter's tracking performance is actually beyond doubt.

However (in practice), the measuring error, humidity change, or slight angle tilt of the winding machine, etc. All those factors will cause defect in finished product.

According to years experience, we provide two On-Line calibration method, allowing the operator to tune the system automatically:

## # **Cut-Edge error calibration**

This method often used in long tracking distance & large diameter

## # **Cut-Length error calibration**

This method often used in short tracking distance & longer length

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# Cut-Length calibration method



- # Step-1: Set Cut-Length reference in Pr.484(mm)
- # Step-2: Set Cut-Length error in Pr.483(mm)
- # Step-3: Trigger DIx(141) to initiate calibration



# Cut-Edge calibration method



Cut-Edge is perfect



Cut-Edge has 1mm error(leading)

- # Step-1: Set Tracking-Length reference in Pr.484(mm)
- # Step-2: Set Cut-Edge error in Pr.483(mm)
- # Step-3: Trigger DIx(141) to initiate calibration

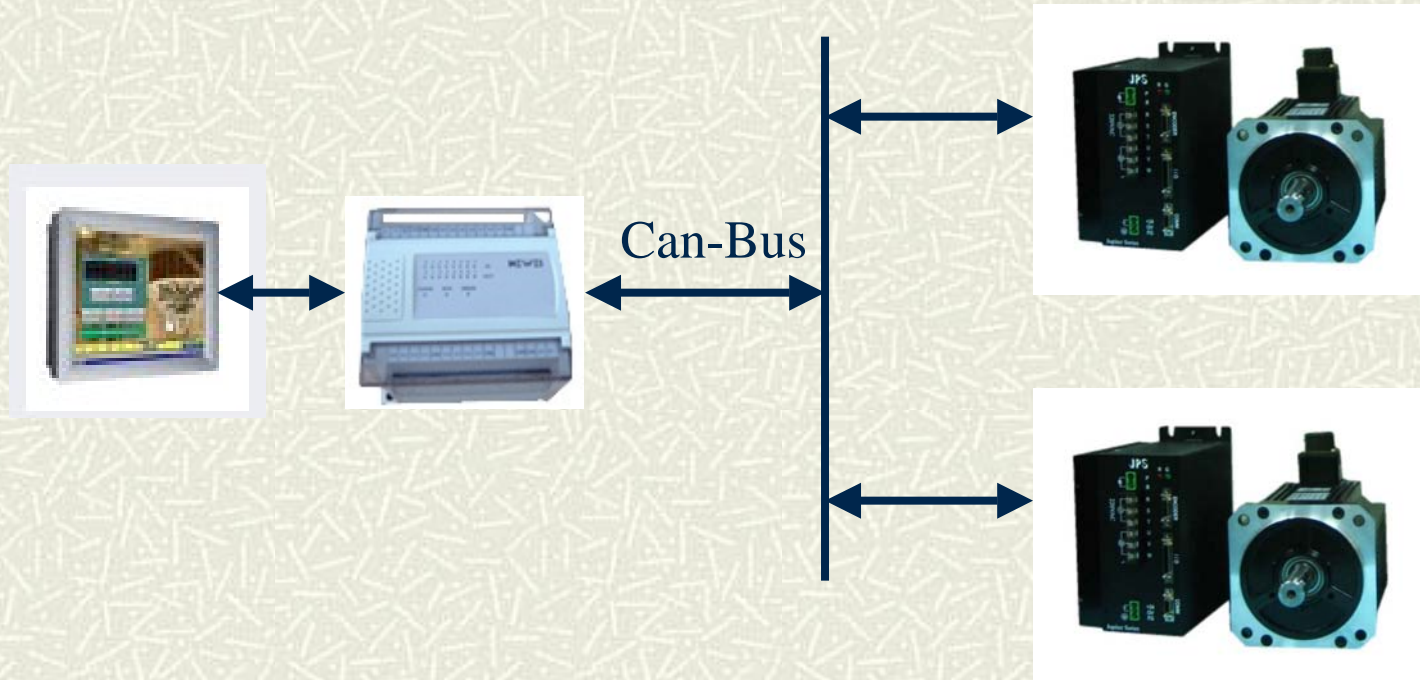
# Jupiter links HMI with Modbus





# System integration by Canbus

If necessary, by cooperating with third parties companies, we can also supply “Fully integrated system” to meet your specific request.





# The End

Thanks for your attention.  
Hope to cooperate with you!

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