

# RYECO's *ROLLSYNC* Converting Management System For the Converting Industry

## Introduction

RYECO introduces ROLLSYNC, a unique concept in managing the converting process. The ROLLSYNC system places incrementing position codes (think “mile markers”) along the edge of a moving web. The codes are evenly spaced and start at *zero* at the core. Using the position codes during *unwind*, means the roll length is always synchronized to the source. ROLLSYNC allows for complete control and management of the following:

- **Auto-Stop on Defects** – Eliminates wasted time searching and improves quality.
- **End of Roll Auto-Stopping** – Never run-off or leave good product on core.
- **Waste Tracking** – Track *ALL* waste or scrap down to the inch (25mm).
- **Set-Length Control** – Control the precise *length* of all daughter rolls.
- **Stretch and Shrink Monitoring** – Know real-time distortion of flexible webs.
- **Roll Yield Management** – Know how much good product is in your warehouse.
- **Roll Historian** – Know everything about every roll produced and shipped.

All rolled-goods manufacturers and converters struggle with losses and poor quality. Current inspection systems, while great at monitoring and reporting quality, do not help converters to control quality in an efficient manner. Time and product wasted while searching for defects in a downstream process will “*kill*” the efficiency of your operations. Unsafe hand flagging or marking the defect at the point it occurred does not give you all of the benefits mentioned above. Bottom Line; RYECO's ROLLSYNC Converting Management System will ***increase your efficiency, improve your quality and create a safer working environment for your operators.***

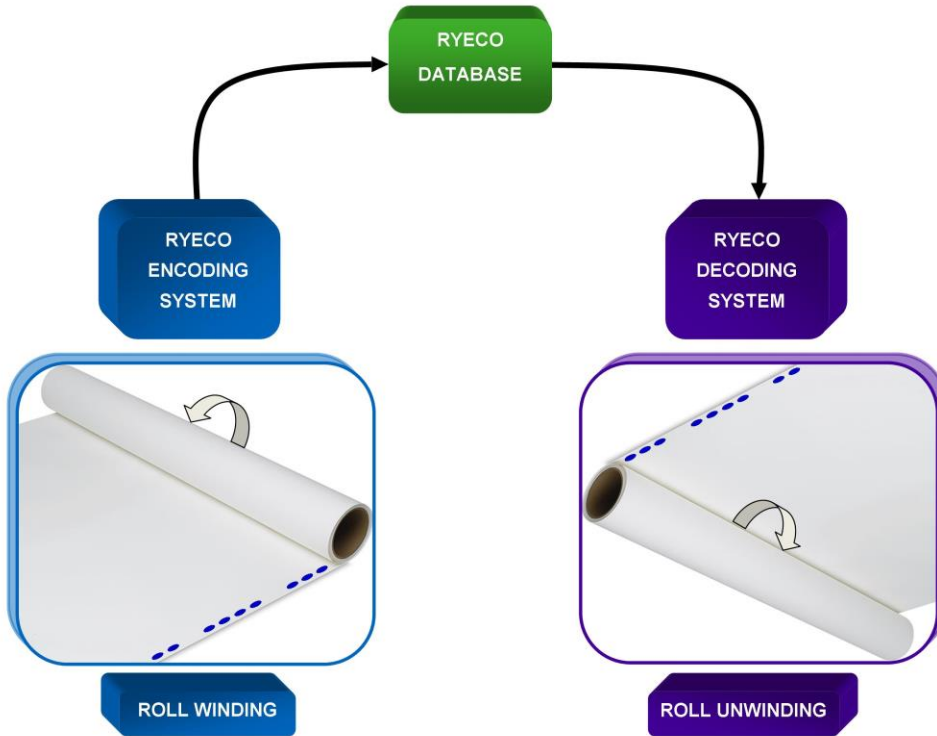
## How does it work?

RYECO's ROLLSYNC System operates in three simple steps:

- Step One** – *Encode* position codes (dye marks) along the edge of the source roll.
- Step Two** – *Collect* any and all quality and process data about the roll into a database.
- Step Three** – *Control* the unwind process by making quality decisions.

Data collection can be provided by the customer's existing data system or by RYECO. ROLLSYNC can operate very efficiently without a data base however Yield Management and Historian are only accomplished with a database. If your current converting management system does not provide these three steps: *Encode, Collect, and Control*, then you will never be able to achieve the highest level of Efficiency, Quality and Safety.

## RYECO's ROLLSYNC Converting Management System



Block Diagram of RYECO's Converting Management System

### Step One – Encode Position Codes

A RYECO Code Marking System (COM) accepts a *beginning of roll* signal and an encoder pulse. At preset intervals, an incremental code is printed (*sprayed*) onto the moving web. The encoding process can take place at web speeds of up to 5000 feet per minute (1600 meters/minute). The printing of the code continues to the end of the roll. The codes are usually printed near the edge in an area of product that will be trimmed off prior to reaching the end user. The codes are a series of dots/dashes and spaces and can be visible (any color) or invisible (UV). Each code is binary and contains enough bits to encode a full roll. Other information, such as Roll ID, can be alternated between codes.

The Code Marking System maintains the precise position between codes by use of an encoder signal. The printing of the codes is synchronized to all other process control equipment. The Code Marker can act as *Master* and assign the length values to all process upsets. For example: If a flying splice is made in the roll, a digital pulse (from the knife firing) is given to the

Code Marker and it will assign the precise footage, offset, and proper tag name to the event for transfer to the data base.

Codes are printed once during multi-pass operations. As long as the code integrity is preserved all subsequent passes of the web can use the original codes for roll synchronization. Codes can be used in reverse. Defects and process upsets in secondary processes can be added to the original database.

The system can also be run in Continuous Code mode. The code does not reset after each roll change. This allows for automatic Roll Identification based on the starting code. This works well when rolls do not spend a long time in storage prior to processing.

## Step Two – Collect the Data

All process events will be collected into a database for synchronization to the roll. The database may be provided by the plant or by RYECO. The system can operate very efficiently without a data base. Roll Yield Management and Roll Historian are not available without a database. Examples of data to include in the database are:

- Web Inspection System data
- All web splices
- Coating head lifts or skips
- Grade changes
- Raw material changes
- Shift change
- Quality data from QCS scanner
- Web breaks
- Lamination defects
- Make ready and startup material
- Printing defects
- Room temperature and humidity

All data is collected and stored in the database by roll. Defect locations are offset according to their relative position to the Code Marker. Along with information about the defect, a default corrective action is also stored. For example: If it is necessary to stop for all splices then the default corrective action will be to stop the line during processing each time a splice was unwound. Other possible actions are to *slow*, *crawl*, or *alert only* (light or horn). All default actions can be overridden by the operator.

The format of the data will be similar to this:

- Defect Number – A unique defect ID, incrementing
- Defect Type – A classification of the defect
- Defect Offset – The +/- position relative to the Code Marker
- Defect Start Position – Start of Defect in Machine Direction
- Defect End Position – End of Defect (if a Discrete Defect, then same as Start)
- Defect Cross-Web Start Position – If available
- Defect Cross-Web End Position – If available
- Default Corrective Action – For the unwind process
- Photo of defect from the Web Inspection System

Along with the defect information above, the database file will contain a header which includes critical information about the roll. The system can use existing roll ID and bar code scanners to read in the roll ID as it is being loaded for processing. Information included in the file header is as follows:

- Roll ID – Roll Identifier from Plant
- Time Stamp – Time and Date of Roll Completion
- Code Specification – Code Frequency, Data Bits, Check Sum, Etc.
- A Number of User Fields – To encode other important information about the roll such as:
  - Operator Name
  - Customer Name
  - Product Grade

Files can be maintained on the plant's servers or on a separate RYECO provided server. If the rolls are shipped to another plant the data should be accessible via remote access. Files can also be sent via flash drive or emailed to the next customer. All RYECO systems will use the code specification in the file header to properly read and process each roll.

Once files are saved, the data can be analyzed for high level **Roll Yield Management** and Control. An analysis of unprocessed rolls can inform you of things such as:

- Total amount of product by grade
- Total amount of off-quality product in each roll and estimated waste
- Longest section of good product in each roll
- Total amount and length of partial rolls to process

An analysis of processed rolls can inform you of such things as:

- Yield in the form of good product to waste product
- Processing efficiencies in the form of wasted time
- An accurate history of defects and quality issues for customer complaint tracking
- Production through-put

The database becomes the center of the entire process. Data can come from several sources and is brought together in a single, comprehensive package (The Hub). RYECO uses standard data collection and server software such as WonderWare and SQL Server. Most standard interface protocols are available and custom interface protocols can be created as needed. This approach allows the customer to customize the system to suit their own needs. A history of every roll produced is saved for further analysis in the **Roll Historian**.

## **Step Three – Control the Unwind Process**

All of the efficiency increases and quality improvements take place during the final or subsequent processing of the rolls. Once a roll is marked with codes and the data has been collected, the next step is to send it downstream for further processing. As a roll arrives for

processing a bar code scanner reads the roll ID and retrieves the correct data file from the server.

A RYECO Decoding System (DEC) is ready to read the codes and synchronize the roll position to the data in the file; even product that is run before the system reads a code is “remembered” and added to the length totals. Every splice upstream is recognized and waste calculated using the unique position codes. Any product lost to splices or slabbing done at the winder is also tracked. All wasted product is tracked by the **Waste Tracking** feature and displayed for each roll and tracked in the Roll Historian module.

Once the codes are read and position is determined, the system will display the next approaching defect or event to the operator. The default action (Slow, Crawl, or Stop) is displayed for the operator to override, if necessary (or can be locked). As the defect or event approaches, the system will send a single command to the drive to stop precisely at the intended spot. This is the **Auto-Stop on Defect** feature of the system. A display on the system will allow for manual entry of all stop points even if there is no database associated with the roll.

To avoid leaving good product on the core and to ensure there is no accidental run-off of the core, the system will automatically stop the drives precisely with the correct amount of product left on the core. This reduces waste of good product, increases sellable product and speeds up the whole process enormously. This feature is called the **End of Roll Auto-Stop**. Most ROLLSYNC systems can be financially justified through this feature alone.

If your process involves creating daughter rolls (sets) from the master roll, the system provides efficient and precise length control of sets. The **Set-Length Control** feature will track each daughter roll length and stop the drive with just the right amount of product in each daughter roll. This means there will be no more making extra product just to be sure. If you make a flexible web that has stretch you can make sets based off of either pre or post stretched lengths.

Another unique feature of the RYECO Decoding System is that it can determine how much stretch or shrinkage there is in any web. This **Stretch and Shrink Monitoring** is especially useful for flexible products such as bandage wrap or plastic film. Since the web contains evenly spaced codes, which were placed there on an upstream process, the system can measure how much variance there is in the spacing during subsequent processing. This variance will represent real time stretch or shrinkage of the final product. This information can be used to control winding tension or for more accurate length counting.

## Summary

RYECO’s ROLLSYNC System is a new revolution in **Efficiency, Quality and Safety**. Whether your process requires the complete ROLLSYNC Converting Management Package; or just one particular function, such as **Auto-stop on Defects**, RYECO can provide all or just one to fit your needs.