



## Rubber & Plastics Industry Notification

Application Pack

# Rubber Sheet Extruder Solution

IABG Global Solution Center  
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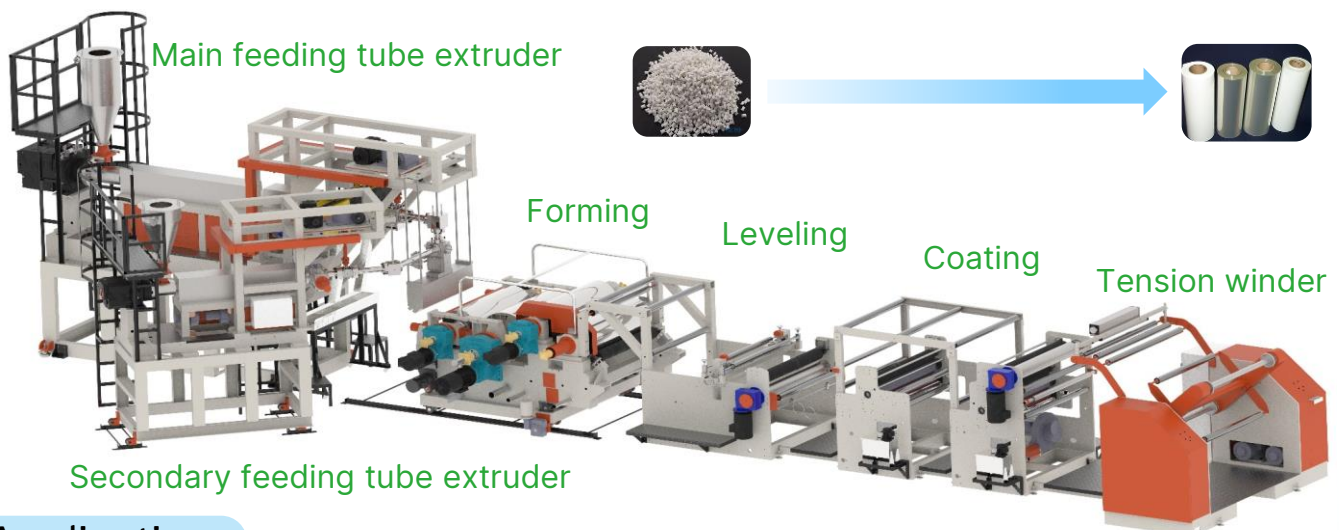
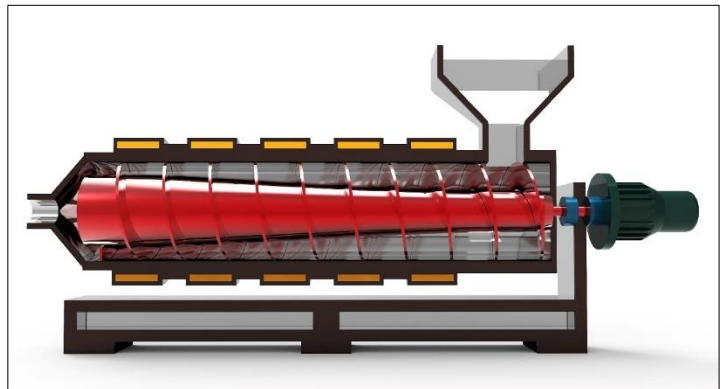


# Rubber Sheet Extruder Solution

## Introduction

Extrusion process is to use the feed barrel and screw to thermoplasticize the material, while pushing it forward to pass it through mold heads continuously to produce various of products or semi-finished products with different profiles.

The rubber sheet / sheet extruder production line mainly processes the plastic material into single-layer or multi-layer plastic sheets.



## Application

The plastic sheets produced by the rubber sheet extruder further go through the compressed air forming and vacuum thermoforming production line for heating and softening, which are then vacuum attached to molds to produce food containers, general wrappings, electronic components containers, printed wrappings and more.



### Food containers

- Fruit boxes
- Food boxes
- Cold drink cups
- Refrigerated food boxes
- Chocolate boxes



### General wrappings

- Blister packs
- Shutter stocks and fishing rod boxes
- Blister pack heat sealing
- Dual-blister high-frequency bonding



### Electronic components containers

- Memory cards
- Connector
- LCD panels
- Flexible circuit boards
- Hard disk drive components
- Electronic components containers

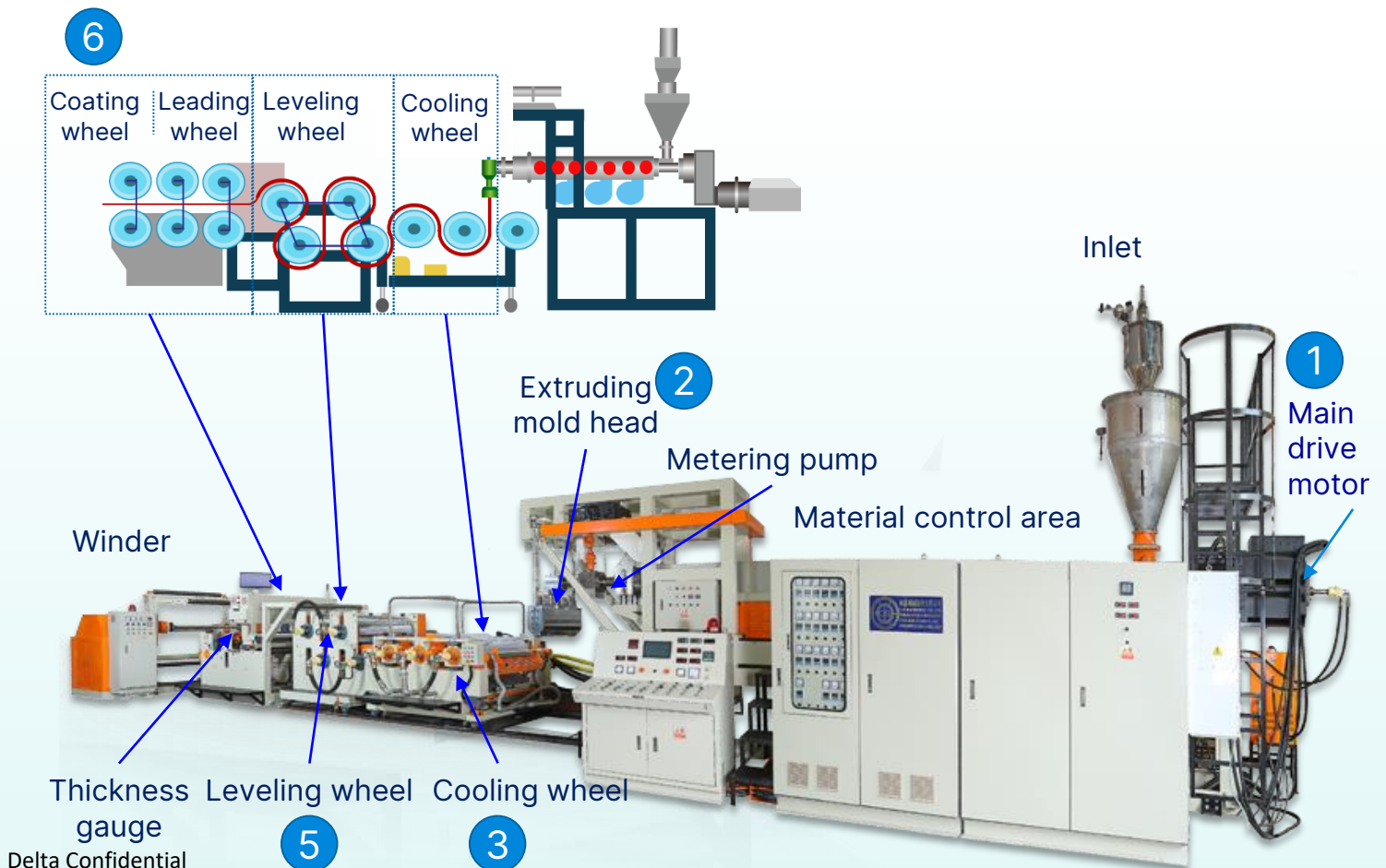


### Printed products

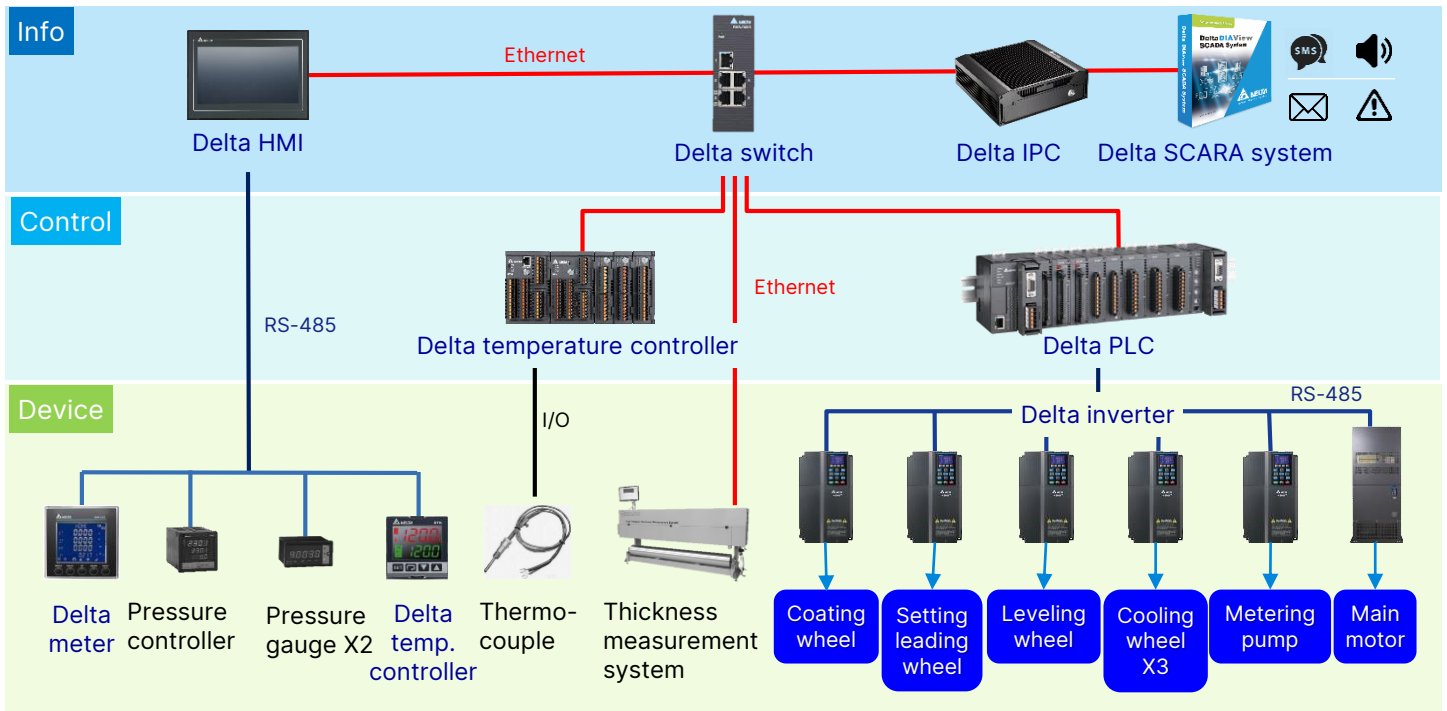
- Credit cards
- ID badges
- Cosmetic boxes
- UV printing
- Printed-folded boxes

## Process

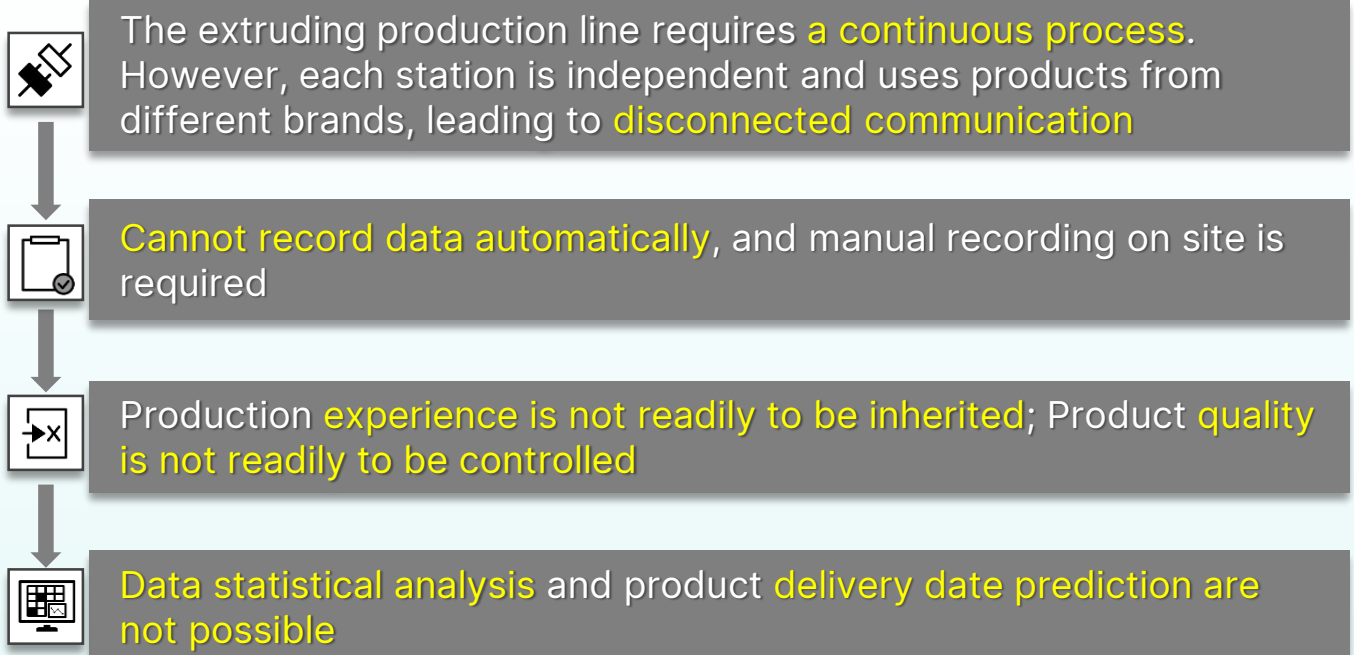
1. The main drive motor drives the material control area's screw to rotate and control plastic feed. The pressure gauge mounted at the end of the material control area feeds back feeding pressure to calculate an appropriate motor speed. It ensures proper pressure within the material control area, with temperature measurement and plastic melting monitoring at each area.
2. The metering pump stores enough melted plastic and feeds quantitative plastic to the front end regulating valve. The technician adjusts the mold head until the rubber sheet is smooth with an even thickness. The productivity is adjusted by a VR knob.
3. According to the cooling time, cooling wheels are available with single wheel, bi-wheel and even tri-wheel. It allows some time for cooling and forming rubber sheets, featuring oil pressure and thickness regulating block (mechanism) for thickness control, as well as mold temperature machine for cooling water temperature control and rubber sheet heat dissipation. Its driven wheel can fine tune speed to avoid folds or holes.
4. The thickness gauge measures the thickness of rubber sheet, and the technician checks and adjusts the regulating valve to ensure uniform thickness.
5. The leveling wheel also features a mold temperature machine for temperature control. Usually, its temperature is higher than the cooling wheel to heat and smoothen rubber sheets. Leveled rubber sheets are pulled out by the forming and leading wheel with torque control to avoid any fold and bending.
6. The coating wheel controls torque to flatten rubber sheets and coat silicon onto them, then sheets are dried by the blower so that they will not be bonded together when winding.



## Solution Architecture



## Customer Pain Points





## Features

- **Open Communication Architecture to Avoid Information Silo**

For a continuous process, Delta utilizes its electric control products, which cover diverse and open communication architectures, to build an electric control host for all machines in the production line. It takes Modbus TCP as the main communication network to connect machines, Modbus RTU/ASCII and CANopen to connect auxiliary machinery to get rid of information silo with traditional production lines.

- **All-In-One Central Control and Auto Digital Recipe Generation**

Integrate machine data from the whole production line into Delta PLC and HMI by communication, and centralize operation of all machines onto the HMI for all-in-one parameter adjustment and automatic digital recipe generation to eliminate manual work.

- **SMB IIoT Data Box to Control Quality and Drive Data Value**

This solution utilizes Delta SCADA system DIAView to connect the PLC and HMI to integrate production line data, meanwhile saving key parameters to the database. It implements Industry 4.0 by connecting the information layer of end user factory, which can help the managers monitor production data and equipment condition remotely so that to control product quality. In addition, data statistical analysis makes it possible to predict product delivery date.

- **Multi-Channel Digital Temperature Control System to Accelerate Commissioning**

It integrates the temperature control of the whole production line into Delta multi-channel temperature controller, and consolidates all operation interfaces into the HMI project, with 30~60+ temperature points clear at a glance. Comparing with the traditional single-point temperature controllers on multiple panels, it can not only record temperature control, but also reduce cost and save commissioning time significantly.

- **Drive Motors with Inverter to Reduce Maintenance Cost**

This solution utilizes Delta high-performance inverter to drive various of motors required by the whole production line, including high power (400~500KW) host PM motor, forming rollers / leveling rollers / coating rollers requiring precise velocity, winder requiring stable torque, as well as auxiliary machinery such as recycling crusher and cryophorus, greatly saving maintenance cost and operating time.

## Advantages



### Higher Commissioning Efficiency and Productivity

Delta Rubber Sheet Extruder system architecture connects extruder, cooling wheel, auxiliary machinery and oil hydraulic press for centralized digital operation. The HMI offers temperature recipe selection for fast commissioning, and relatively independent meters allow easy configuration, improving commissioning efficiency by 50%.



### Higher Rubber Sheet Product Quality






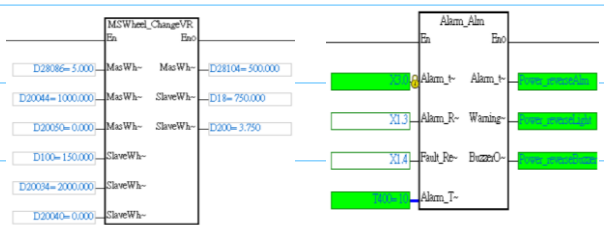





Centralized control of temperature, speed, auxiliary machinery and pressure with HMI to prevent overheating and eliminate poor matter property issues. In addition, function blocks for speed signal conversion between master and slave axis and stop delay upon alarms are developed, combined with Delta multi-channel temperature controller's built-in alarm function for stable forming of smooth rubber sheets without any hole and wave.



### Diversified Rubber Sheet Production Profiles

Customer information system is connected with IIoT to regularly record plastic material, speed and temperature data, measure thickness and predict capacity. Furthermore, production profiles are also the basis for future parameter adjustment.

## Solution Resource

	Delta Rubber Sheet Extruder Solution includes:	
 	Promotion file: Delta rubber & plastics industry_rubber sheet extruder	
 	Project file: Delta rubber & plastics industry_rubber sheet extruder (Device list, wiring diagram, IO table, parameter definition, FB description)	
	Complete program: PLC AS300	
	Complete project: HMI DOP-112	
	Parameter setup: Temperature controller DTM	
	Request for resource: Solution Contact  TEL : +886 3 3626301 ext. 7180  E-Mail : frank.ho@deltaww.com	