www.yasuiseiki.co.jp
www.mirwecfilm.com

High Technology Coating Systems

yasui SEIKI

Reach your target...
With our technology for the future

Corporate profile

Yoshinari Yasui, President

Message

Providing the state-of-the-art technologies backing up with consultation, research & development, manufacturing, and maintenance.

It has been more than 30 years since the foundation of Yasui Seiki Co., Ltd in 1979. As a precision coating machine manufacturer, we have contributed to many industries that require sub-micron coatings with our MICROGRAVURE™ and Slot Die to make high value-added products. Examining the coating machines from various points of view, we have manufactured the [one and only best] coating machines, coating heads, dryers, and curing systems differently from the other machine manufacturers. Especially, hundreds of our patented MICROGRAVURE™coating system, which is absolutely necessary for sub-micron coatings, have been sold throughout Japan and overseas. Our thin-layer Slot Die coating system for ceramics has been uniquely developed for the multi-layer ceramic capacitors and it is a must-have for the industry.

Recent growth in the developing nations has forced many coating manufacturers to face a hard time; however, Yasui Seiki has sold many of our one and only best coating machines to research labs in Japan.

With Yasui Seiki precision coating machines, Labo Co., Ltd, founded in 1986, [and MIRWEC Film, acquired in 2002] is [are] providing coating services from research & development to mid-scale coating production in Kanagawa and Nagasaki. Working with various customers and coatings, Labo has cultivated the technical know-how in coating and I believe we are the best and foremost expert in the coating industry. The know-how has been reflected to the next generation of coating machines.

In 2008, Yasui Seiki built a facility in Nagasaki for customers who would like to develop their own coating heads or to purchase a machine to run coating tests. We have the coating machines which handle 300mm wide, 700mm wide, and 1600mm wide substrates with annealing ovens. They can be used for toll manufacturing of ITO coating, Copper Clad Laminates, and low heat-shrinkable film. If you are considering the coating machines or coating services, please let us know. We are happy to assist you.

Yasui Seiki Co., Ltd backs up our group companies – Labo and MIRWEC – with our coating know-how.

Yoshinari Yasui, President

Customer needs → Research & Development (Test coating / Sampling) → Evaluation/ further testing → Coating Machine Production → Delivery

Coating Machine Production → Toll coating

Delivery → Maintenance

- Omura Research Facility
- MICROGRAVURE™ Head

- Slot Die Head

- Small Production Coater

- Small Pilot Coater

- Large Production Coater

- Maintenance

We have high performance machining centers and all the coating machine parts are made in-house.

Overview

Coating Machines & Other Equipment

○Research & Development
- μ Coater™
- β Coater™
- Mini-Labo™
- Small Test Coater
- Pilot Coater

○Production Coaters

○Precision Coaters

○Slot Die Coaters for Multi-Layer Ceramic Capacitors

○Slot Die Coaters for Lithium-ion Batteries

○Various Coating Heads

○ For Thin Coating
- MICROGRAVURE™
- Slot Die

○For Thick Coating
- Slot Die
- Knife Coaters

○Other Equipments
- Calender Machine
- Slitter Machines
- Various Drying System
- UV Cure System
- Electron Beam Cure System
- Corona Discharge Treating System

【Coating Machines and Other Equipment】

Yasui Seiki Co., Ltd– Omura Research Facility

○Coating and Annealing Treatment System
- IN-300 Test Coater
- IN-700 Coater with Annealing Treatment
- IN-1600 Production Coater

○Slitting Machine

○Various Evaluation and Analysis Equipment

Labo Co., Ltd -Ayase & Omura Falicities

○Sampling, Testing, and Toll coating

Test Coaters	x 2
Pilot Coaters	x 2
Double-side Coater	x 1
Production Coater	x 1
Sheet Coater	x 1

○Calendering Machine

○Various Evaluation and Analysis Equipment

○Aging Rooms

○Dispersion and Mixing Equipment

MIRWEC Film, Inc (USA)

Sampling, Testing, and Toll coating

○Test Coaters	x 3
Pilot Coaters	x 2
Production Coater	x 1
○Slitting Machines	x 4
○Polypropylene Film Manufacturing Machines	x 2

Product Applications

○Ceramic Capacitors (MLCC and LTCC)

○Lithium Batteries, Ion Permeation Membrane

○Solar Cells

○Optical Displays
Anti-Reflective Layers, Optical Diffusion Layers, Optical Lamination, etc

○Contactless IC cards

○Various Transfer Films

○Flexible Printed Circuit Board

○Other high value-added products

Corporate Overview

Name Yasui Seiki Co., Ltd
President Yoshinari Yasui
Address KANAGAWA-pref.

1980.9. Yasui Seiki Co., Ltd founded
1984.9. Labo Co., Ltd founded
1991.2. Yasui Seiki Co., (USA) founded
1994.4. The 2nd Assembly Factory built
2003.9. MIRWEC Film, Inc acquired from Mitsubishi Rayon
2007.6. The 3rd Assembly Factory built in Nagasaki
2010.4. The 4th Assembly Factory built in Kanagawa

MIRWEC Film,Inc. & YASUISEIKI CO.,(USA)

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Overview

Yasui Seiki Coating Machine sales
Manufacturing of High Voltage Capacitor PP Film
Coating Services
Test Coating
Toll Coating
Slitting

Yasui Group Network

Yasui Seiki Co., Ltd

Coating test and Machine Manufacturing

Headquater/1st Factory

The 2nd Factory

The 4th Factory

We would like to contribute to the society through our coating technologies

Since we applied for a patent in 1987, more than hundreds of Yasui Seiki' s MICROGRAVURE™ Coating Heads have been used throughout the world. MICRO GRAVURE™ have responded the thin and precision coating requirements of the times and we will continue further technical development and innovation.

Omura Research Facility/3rd Factory

Page 5

Labo Co., Ltd

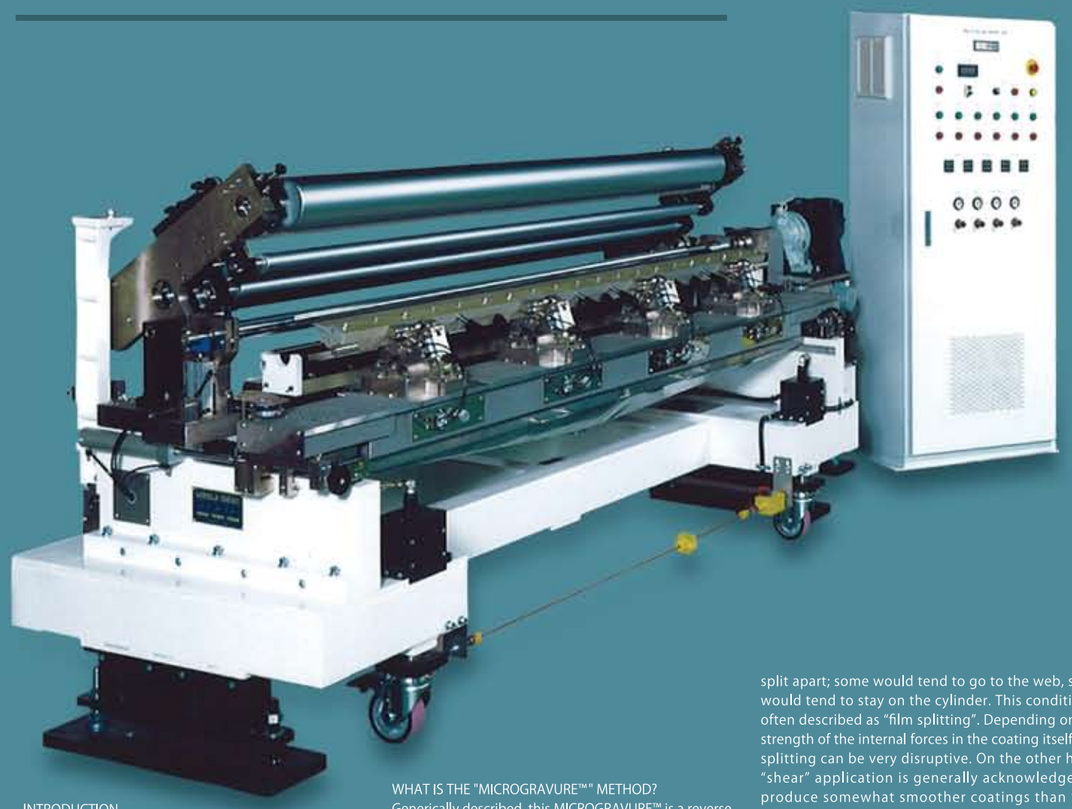
Sampling, Research & Development

Omura R&D Center

Supporting from sampling, research, development, to mid-size production

– "Micron" - 1 ／ 1000 of mm - is our specialized area of work. We support businesses and researchers as their team members by providing the precision coating expertise and services in this incredibly thin range.

Ayase Research Center



INTRODUCTION

Many different types of coating systems are available, and in use today. Direct or reverse gravure, reverse roll, die coaters, wire bar, knife or blade coaters and many more are known and are widely used. All these techniques and more, are offered by many machine manufacturers including Yasui Seiki Company.

However, many converters have reported disappointing results with techniques

WHAT IS THE "MICROGRAVURE™" METHOD?

Generically described, this MICROGRAVURE™ is a reverse, kiss gravure coating method. Standard gravure can be segregated into several types; direct and reverse are the two of greatest interest to this discussion. (Fig. 2) Typically, both of these types use a backing roll, usually rubber covered, and about the same diameter as the engraved roll. The web is trapped, or nipped, between the

split apart; some would tend to go to the web, some would tend to stay on the cylinder. This condition is often described as "film splitting". Depending on the strength of the internal forces in the coating itself, film splitting can be very disruptive. On the other hand, "shear" application is generally acknowledged to produce somewhat smoother coatings than "film splitting".

The Surface of the roll used in MICROGRAVURE™ coating has a number of regularly spaced "cells" which determine a finite volume of internal capacity. The geometry, number and spacing, depth or other features of the cell can be varied

contact area. The total area is a product of dimension in the transport direction and in the cross web direction. It is really the transport direction (the length of the contact) that is the critical factor. For a given set of conditions, a larger diameter roll will produce a longer line of contact than a smaller diameter. When a backing roll is introduced, this region of contact is increased even more.

In the case of standard gravure, operating in the direct mode, the amount of the coating in the cells is divided. Some is transferred to the web and some part remains in the cell after the contact point has passed. Typically, there is established a reservoir of coating at both the entry point and the departure point of the nip. Within these two beads of coating, a pattern of turbulent re-circulation will occur. The large diameter rolls used in standard gravure can produce very large turbulent beads, which in turn create aberrations in the coating. (Fig. 4) When nip roll pressure, skewness of rolls, or other mechanical factors are present, the situation is even more critical.

In standard reverse gravure, particularly with a backing roll, much of the above holds true. In some cases a very large reservoir of coating at the web exit point can be generated. This is seriously influenced by abnormal or faulty condition of the backing roll. The absence of a backing roll with MICROGRAVURE™ reduces or eliminates many of the nip induced coating defects associated with other methods. The turbulent bead problem is also minimized because of the small diameter rolls used. The volume of the bead present on the entry and exit point is very small and stable.

Like any "gravure" or "engraved roll" system the MICROGRAVURE™ system also requires two basic processes; introduction of coating to the roll surface, and a means of evenly and accurately metering the coating on the roll surface. A

range of patterns and cell volumes is available. The roll is mounted in bearings and is rotated by a small motor through a coupling. Direction of rotation is opposing that of web travel. As the roll rotates, it picks up coating in the ink pan. Continuing rotation takes the coating to the blade where a small excess amount is removed prior to the contact point with the web. The distance from coating impingement on the roll surface to web transfer point is less than a 90degree arc. The circumferential distance is about 30mm or less even for a 40mm diameter roll. (Fig.1)

The ratio of the web speed to circumferential speed of the engraved roll is critical in establishing coating thickness. (Fig. 5) At a given web speed with the cylinder stationary, no coating is transferred to the web. As rotational speed is increased, coating will start. Additional rotational speed increases the coating weight until flooding, or instability, and a decrease in coating weight occurs. Coating weight plotted against speed ratio will generally show a "hump back" or bell-shaped curve. The behavior of a "typical" coating will follow the pattern: 60% - coating starts, 100 to 130% - a smooth and uniform coating, 130 to 200% - weight increase, 200% or more ? weight decrease and instability. If the web speed is 30m per minute and the cylinder' s surface speed is also 30m per minute, it is 100% or 1 to 1, and if the roll speed is 60m per minute for 30m per minute web speed, then it is 200% or 2 to 1 ratio. Although the cell volume is the major control of coating weight, a "window" will exist on the linear portion of the curve, usually between 100% and 130%, which will allow coating weight or thickness control, while maintaining a uniform appearance. In a very practical way, weight changes of perhaps +/-10% or more, can be made for each cylinder pattern. This can result in economy through requiring a fewer number of rolls to obtain particular weights. From the list of rolls shown in Table 1, it can be seen that it is possible to overlap adjacent rolls via the ratio change. In this way almost continuous changes in weight can be made. For critical applications a curve should be developed for each cell pattern and theological combination.

micron PET. This system is also used for coating on 8 mil (200 micron) thick steel foil.

Wear of the doctor blade and of the engraved cylinder is minimized because of the light contact of blade and roll. The action is pre-metering rather than scraping.

The cost of the small diameter rolls is relatively low, so that many can be on hand without economic penalty. Because of the small size, quick changes of rolls can be made to change coating thickness. Speed ratio manipulation, as previously discussed, makes thickness changes possible as well.

Reverse or shearing application normally produces smooth coatings without the need for a post smoothing system. The small diameter also allows more volatile solvents to be used without danger of cell plugging. There is considerable flexibility in formulating for the system; experience indicates a viable range of viscosity from 1 cps to 1000 cps and in some cases even to 2000 cps.

SUMMARY

Very simply, regardless of whether for production use or for laboratory use a coating machine must satisfy such requirements as 'Reliability' , 'Reproducibility of coating' and 'Simplicity of operation' . The physical comparisons of MICROGRAVURE™ to other roll coating processes show simplicity versus complexity. Machine construction is such that vibration, drive inconsistency, tension variation or similar problems do not arise to adversely effect coating quality. Particular attention is given to component selection such as: drive couplings, motors, tension controls and the like. Structural members are selected with regard to influence on the most sensitive coating methods. Sensible design and quality assembly of top grade components assures reliability and reproducibility. Simplicity of the MICROGRAVURE™ system fosters simplicity of operation.

In the past 20 years, over 300 Yasui production coating lines, laboratory use coaters, and over 100 MICRO GRAVURE™ production coating stations have been sold to companies all over the world, such as Eastman Kodak, DuPont, 3M, JVC, Hitachi, Toshiba, Panasonic, Mitsubishi Chemical, Teijin, SKC, and many other leading companies in various industrial fields. Virtually all of our customers who replaced or supplemented their production system or laboratory use system with MICRO GRAVURE™ coaters produced better results than with their other production systems or research coaters. Especially when a smooth, uniform and very thin layer such as several or a few micron or even a few hundred angstrom is required, t

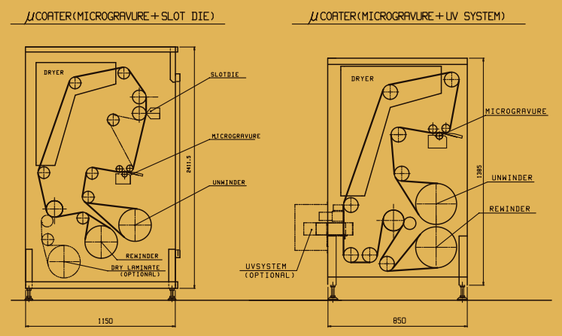
MICROGRAVURE™

Small Laboratory Coaters

http://www.mirwecfilm.com/coaters.htm

μCoater™

Dimensions
Fan Deck - 920 mm (W) x 600mm (D) x 1382mm (H)
Machine - 1317mm x 850mm x 1487mm

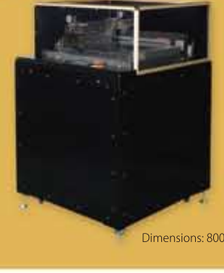


- ○Small Footprint
  Dryer, Unwinder, and Rewinder included
  Easily make small samples
- ○Coating Method
  MICROGRAVURE™
  Coating Thickness: From a few μ to 40 μ (WET)
- ○Coating Width: Maximum 300 mm
- ○Options: UV Cure Station - Effective
  Width: 200mm 120W/cm
  Slot Die Coating Head

Demo units are located at Yasui Seiki and MIRWEC Film, Inc.

Sheet Coater

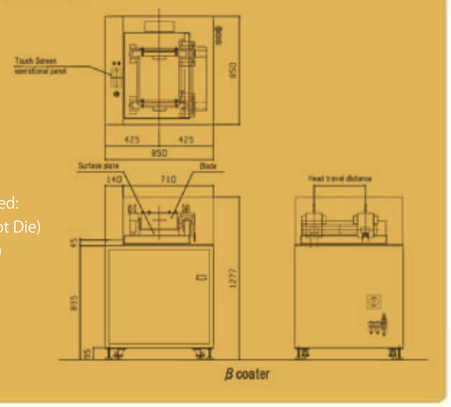
βCoater™



- ○Coating Width: Maximum 320mm
- ○Coating Length: Maximum 400mm
- ○0.5m/min ~3.0 m/min Coating Speed:
- ○Coating Method: Blade Coating (Slot Die)
- ○Coating Thickness: 20~200 μ (WET)
- ○Drive System: Linear Servo Motor
- ○Flotation System: Air Bearings
- ○Surface Plate: Precision Stone Plate

Dimensions: 800mm x 770mm x 1277mm

Outside dimention



Bench-Top Coater

http://www.mirwecfilm.com/minilabo.htm

MiniLabo™

Demo unit is available at MIRWEC Film, Inc

Affordable R&D machines with high precision MICROGRAVURE™ and optional slot die heads.
Mini Labo® Deluxe is now available, with increased drying capabilities.

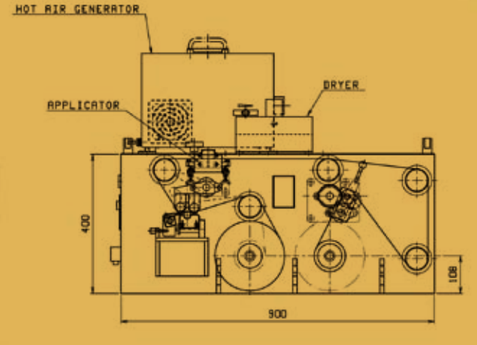
Dimensions-600mm x 700mm x 450mm

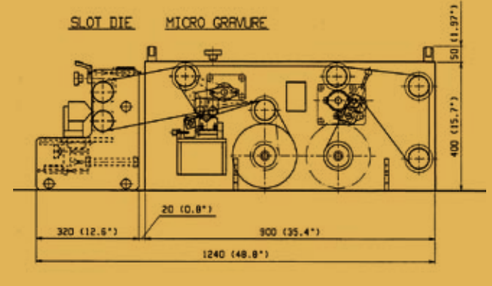
Specification (Standard)

- ○Coating Speed: 2 meters/min (max.)
- ○Coating Method: Microgravure (tm)
- ○Coating Width: 80mm (std.)
- ○Winding Tension: 0-2kgf
- ○Power: AC120V 60Hz

Options:

- ○Coating width up to 120mm
- ○Slot die coating
- ○Applicator Box Coating
- ○Extended Frame
- ○Hot Air Dryer
- ○Resettable Length Counter
- ○unwind/rewind direction selectors



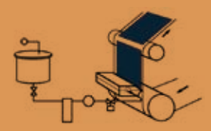


Slot Die Coater

http://www.mirwecfilm.com/slotdie/

Features of Slot Die Coating

The Slot Die coating uses an enclosed system to feed the coating solution. All the fed solution is applied to substrates; therefore, if the substrate speed is constant, the coating thickness is determined by the amount of coating solution fed. We utilize a precision air regulator for a tank to adjust the feeding amount and when using high viscosity solution, we typically use a precision gear pump. The Slot Die coating is suited for mid- to high-viscosity solutions and using the "off-the-roll" coating position, it also coats low-viscosity solutions. Currently Yasui Seiki offers a lineup of machines that can coat a strip and a pattern coating, depending on customer's needs.



Slot Die Coater

Slot Die (Registered Design) Its method and features

Yasui Seiki's Slot Die, received design registration certificate, has been capable of coating wide thickness range from sub-micron to hundreds of microns. Currently, ceramic capacitors require less than 1 μ (dry) coating, and lithium ion electrodes and flexible print circuits require more than 100 μ (dry). Yasui Seiki's Slot Die

Pilot Coaters

Slot Die Coater for Lithium Ion Batteries

The Slot Die Production Coater for Lithium Ion Battery Electrodes. This machine is capable of the pattern coating and the double-sided coating.

OMD-M6.0/D/8.0

○Coating Method: Slot Die
○300 ～ 600mm Coating Width
○Drive System: AC servo motor sectional drive
○Drying System- Roller support and flotation dryers
○200℃ (Max.) Hot Air Temperature: Maximum 200 ºC

Test Coaters

CAG-S3.0/MD/U/4.0

Yasui Seiki's test coaters are all made-to-order and we reflect customers' needs, such as substrate width, coating methods, UV System, Corona System, Web Cleaner, and other options, in the machines.

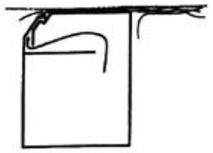
○Coating Method: MICROGRAVURE™, Slot Die
○1~20 m/min Line Speed
○300mm Coating Width:
○Drive System: AC servo motor sectional drive
○Drying System: Slit Nozzles with Electrical Heaters
○Others: UV Cure System

Other Equipment

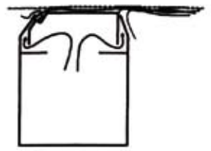
Flotation Dryers

Yasui Seiki Flotation Dryers

Typically, Flotation Dryers have complicated airflow due to the reciprocally-effects from the top and the bottom nozzles. If the balance among hot air velocity, pressure, and the web tension is not stable, the web easily becomes floppy inside the dryers.
There are two factors in order to increase the drying capacity - Hot Air Temperature and Air Velocity. If we keep the temperature constant, we need to increase the air velocity; however, we do not want the floppy web. How can we increase the air velocity without the web instability?
The cause of the floppiness comes from the vertical force against the web, created by the non-parallel airflow; therefore, we need to create the parallel airflow against the substrate while removing the solvent gas layer. There are several ways to make the parallel airflow. One of the typical method uses angled slot orifice: however, the jet stream created by this method still causes the vertical force against the web.



Stabilflow



Highflow

Turboflow

1600mm wide Yasui Seiki Flotation Dryers

Yasui Seiki Airbar uses steps instead of a smoothly converging passage to move the air from inside the airbar to the web. As the air rushes past the top of the step, the flow separates from the step and continues to flow parallel to the jet axis. Since the jet tries to drag surrounding ari along with it on the free surface, a vortex is formed. The deflects the jet until it reattaches to the wall paralleling the web. Therefore, Yasui Seiki calls this airbar, "Step Vortex Airbar". It contains baffles to distribute the airflow uniformly to the entire web and provide uniform and controlled heat transfer. It allows our customers to run the dryers easily as it does not require fine adjustments of the jet airflow.

UV Cure System

The UV Cure system allows customers to cure the UV resin continuously. Yasui Seiki Nitrogen Purge UV Cure System is capable of curing very thin layer of UV layer.
○Attains low Oxygen level at less than 1000 PPM (UM2049217)
UV Lamps
○Electrode Lamp
○Electrodeless Lamp

MIRWEC Film,Inc.

www.mirwecfilm.com

A Member of Yasui SeikiGroup

MIRWEC Film Inc

MIRWEC Film, Inc. was incorporated in 1988 as a joint venture between Mitsubishi Rayon Company, Ltd. (MRC) and Westinghouse for the purpose of assuring Westinghouse a reasonably priced, high quality source of polypropylene film for Westinghouse's capacitor division.In 1989 Asea Brown Boveri Ltd. (ABB) acquired MIRWEC shares held by Westinghouse as a part of the purchase of certain Westinghouse facilities and assts. MIRWEC benefited from the advance technology and experience of two leaders in the manufacture and use of high quality capacitor grad film. The joint venture ended in 1992 when MRC acquired the interest held by ABB. In 2002, Yasui Seiki Co., Ltd. acquied the majority interest of MIRWEC Film, Inc. from MRC.We expanded our facility in 2004. Since summer 2004, we have provided precision coating services for a wide variety of indusries, using Yasui Seiki's precision coating macines.Due to the increasing volume of coating interests, we extended our facility in 2006 to install a new coating machine, IS-1600.

Our Service Goal:

It is our goal to help our customers succeed in product developments and improvements by providing highly value-added coating services.

R&D Test and Toll Coating Services

With their vast experience in coating and material development, Labo Co., Ltd, a member of the Yasui Group, has been providing the coating services from the small quantity R&D test coatings to large toll coating services. They have aided in the development of many new and novel coated web products, and contributes in a significant way to the "high technology" for which Japan has become famous. MIRWEC Film Coating Division has utilized their knowledge and experience and played the same role in the United States. We have helped many customers develop new products and make wide range of high value-added products since 2004.
At our Bloomington, IN facility, we have 7 coating machines; the Mini Labo₃, βCoater₃, μCoater₃, CAD-150, NCR-300, SG-700, and IS-1600. Those coating machines are available for toll coating small to medium size orders for special products, such as:

- ▶Digital Press Print Adhesion
- ▶Dye coating,
- ▶Inkjet,
- ▶silicone release films,
- ▶Optical Coatings,
- ▶-Li-ion Batteries
- ▶TFT LCD displays
- ▶MLCC green sheets
- ▶AR films
- ▶Optical Hardcoats
- ▶Other Energy Storage and Conversion,
- ▶-etc…

We have minimum overhead, so we can coat these and other products for you at economical rates.
Our facilities feature Yasui Seiki's patented Microgravure₃ and Slot Die coating technologies. Our machine technology has been refined by many years of successes with a wide range of high quality coated products in both Laboratory and Production applications.

Benefits of our R&D Coating and Toll Coating Services:

- ·High quality results with little "red tape"
- ·Ability to make samples with small quantities of materials.
- ·High quality coatings with precision equipment and experienced personnel
- ·Pilot manufacturing with minimal lead times.

Services Provided:

- ·Coating of many types of webs on a daily fee basis.
- ·Coating Experiments with Test Coating Machines
- ·Coating Machine Demonstrations with Microgravure₃ and Slot Die coating
- ·New Product Development and Sample Preparation with Pilot Scale Coating Machines
- ·Market Test Samples of New Products
- ·Toll Manufacturing (small to medium scale production)
- ·Surface modification of base substrates by Corona Discharge Treatment.
- ·UV cure of coatings for 100% solid and/or functional improvement of coatings
- ·Coordination of activities for tests at Labo Co., Ltd. in Japan

Coating Capabilities and equipment:
Machines: Mini Labo₃, βCoater₃, μCoater₃, CAD-150, NCR-300, SG-700, and IS-1600 (Details are available at http://www.mirwecfilm.com/)
Coating Methods: MICROGRAVURE™ ~40 microns (wet), width up to 63",
Slot Die >10 microns (wet), width up to 39 1/3"
Viscosity range: 1~15,000 cPs
Substrate thickness: > 6 microns

Labo Co., Ltd. and MIRWEC Film are a part of the Yasui Group of Companies. We cooperate closely to keep abreast of the latest technologies and methods. We strive to push improvements in the many products that are close to all of our lives. Yasui Seiki develops and builds the latest and best machines in the industry for liquid on web coating. The staff of both Labo and MIRWEC Films are always endeavoring to discover and develop innovations in coating and mechanical technology, as required, to help enable the success of our customers.
We are excited and capable of helping you with your difficult and challenging goals.

We at MIRWEC Film realize that helping Customer's Successes leads to our own success.

Development Purpose Multi Test Coater

NCR-300

NCR-300 is one of the friendliest machines for early stage of development equipped with ***MICROGRAVURE™***, Slot Die, Knife over plate, among other types of coating heads in a totally enclosed, clean class 3000, coating booth.

This coater is designed for maximum 300 mm coating width and it requires minimal volume of coating material, yet it is equipped with a long enough hot air dryer and many useful capabilities.

Major specifications:

- Web width: Up to 320 mm
- Coating width: 300 mm
- Line Speed: 1 - 30 m/min
- Maximum unwind/rewind roll diameter: 300 mm
- UV cure lamp: 120 W/cm unit without backing rool
- Dryer hot air temperature: 150 ℃ maximum
- Others: Patch coating (intermittent coating), wet lamination, dry lamination
- Clean room class 3000

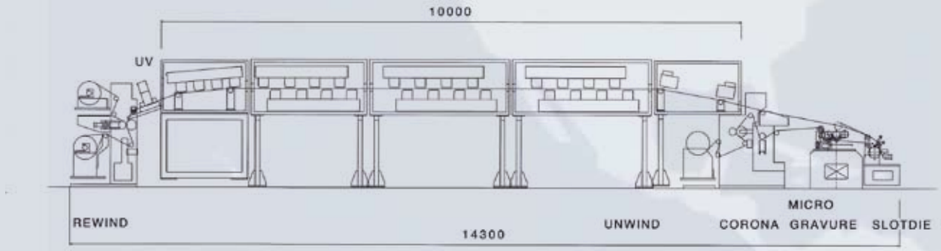
Marketing Test Coater

SG-700

SG-700 is the most useful machine to make marketing samples with a smaller quantity coating solution or to study scale up possibility based on the new products developed on the NCR-300 test coater.

Specifications

- Coating Methods: ***MICROGRAVURE™*** and Slot Die
- Coating Width: up to 700mm for both coating methods (Web width up to 740 mm)
- Line Speed: 2.5 to 25 m/min with Corona treatment
- Hot air dryer: Dryer consists of 5 temperature zones including one pre-dry zone, with guide roll supported flotation airbar dryer with maximum 150℃ hot air temperature.



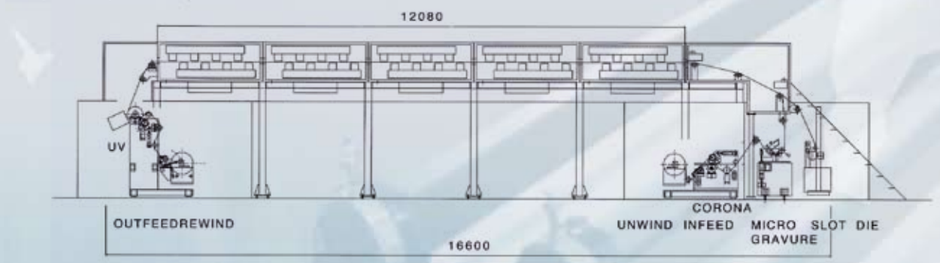
Multi-Purpose Test Coater

IS-1600

IS-1600 is capable of coating up to 1600mm wide, or 63-inch wide with Yasui Seiki patented ***MICROGRAVURE™*** and up to 750mm wide, or 29.5 inch wide with Slot Die coating. IS-1600 will be useful for customers whose objective is to make small-to large-scale samples and/or semi-production. This machine is available for coating test and toll manufacturing.

Major specifications:

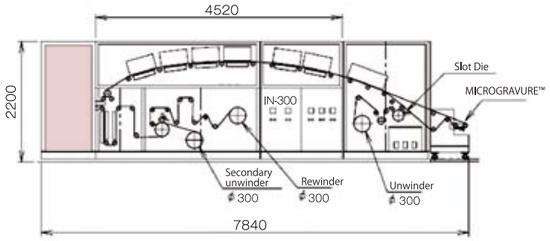
- Coating Methods: ***MICROGRAVURE™***, Slot Die
- Web Width: up to 1600mm ***(MICROGRAVURE™)***
  up to 1000mm (Slot Die)
- Dryer Length: 14.5 meters, or 41 ft
- Dryer Temp: 160 degree C
- Line Speed: up to 50 m/min, or 164 ft/min
- Corona treater
- UV Unit: 200 and 300 W/inch
- Clean Room: Class 1000 in coating room and Class 3000 in unwind/rewind rooms



Omura Research Facility

From testing to analysis on site

Testing and toll coating with nitrogen-purged high temperature dryers (400℃) for annealing treatment




MG Pattern


Slot Die Pattern

Coating machine with high temperature annealing ovens
Roll-to-roll continuous coating


IN-300: 300mm wide Research Machine


Dryers


Coating Head

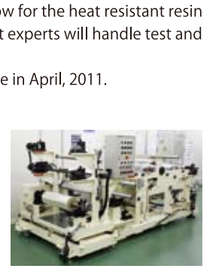
Yasui Seiki Co., Ltd - The test and production machines with nitrogen-purged 400℃ annealing ovens installed at Omura Research Facility

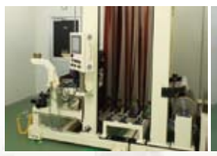
We have installed the Yasui Seiki test coater and pilot coater, which are able to coat, dry at 200℃, and anneal at 400℃ with nitrogen purge for heat resistant resin such as polyimide. The accumulated know-how for the heat resistant resin coating and the annealing have been integrated into these machines. Our heat treatment experts will handle test and toll coating.
Also, the new 1600mm wide coating machine, with 230℃ hot air drying, will start its service in April, 2011.

Machine Specifications

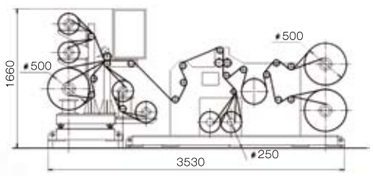
IN-300 test coater	IN-300	IN-700	IN-1600
System	Roll-to-roll	Roll-to-roll	Roll-to-roll
Maximum coating width	300mm	650mm	1600mm
Cleanroom	Class 1000	Class 1000	Class 1000
Dryer length	4.5m	24m	35m
IR anneal oven length	5m	16m	-
Curing method	Hot Air & IR 400℃	Hot Air & IR 400℃	Hot Air (Max. 230℃)

Slitter: 700mm wide
Small oven for evaluation - 500℃






IN-700 pilot coater

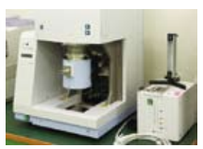


Slitter

Applications

Polyimide products (CCL, COF, etc)
Solar cells
Display film (heat resistant polymer)
Clear electrodes
Heat resistant film, heat shrinkable film, and other film

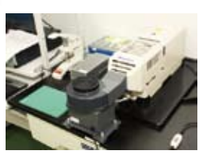

TMA


DMA

Analysis equipment

DMA、TG-Data、TMA - Thermal Analysis Instruments - DMA, Tg-Data, TMA
2D Measuring Equipment
Surface and Volume Measuring Instrument
Breakdown Voltage Measuring Instrument
Peel Strength Measuring Device
Bending Tester
Soldering Heat Tester


2D Measuring Equipment


TR-DTA

Best coating service available for thin & uniform coating

We provide coating services to serve various customers in Research and Development and in small- to mid-scall toll manufacturing. Our patented MICROGRAVURE™ coating has been proven to provide one of the best wet coating qualities in the industry.

Contact Information

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http://www.mirwecfilm.com

The Yasui Seiki Group of Companies emphasizes on confidentiality. After signing the non-disclosure agreement, we will discuss the machine specifications, maintenance, research, and toll coating. For further information, please contact Yasui Seiki, Labo, or MIRWEC Film.