

LINE FOR PRODUCTION OF ADHESIVES

The MARIS company is specialised in adhesive production technology with co-rotating twin screw extruders in continuous production mode. As a result of many years of experience and trials, the production technologies for the following types of adhesives have been developed and optimized:

- HOT MELT (HMPSA) adhesives
- High viscosity adhesives
- Solvent based adhesives



Traditionally, the production process of adhesives is carried out using batch type stand-alone machines where production batches are processed on subsequent line devices - closed mixers, rolling mills, dissolvers and other equipment requiring the preparation and processing of a separate production batch. A large number of subsequent stages of the process and related technological and logistic operations make the process time-consuming and complicated. At the same time, due to the necessary involvement of the operator in almost every stage of the process, it is susceptible to the influence of the human factor. The health and safety issues and the risk to the operator resulting from continuous contact with chemical substances are not insignificant.

The basic feature of MARIS technology is the ability to manufacture adhesives in a continuous mode.

The advantages of this technology features:

- The process is fully automatic and does not require operator's service. It is not therefore sensitive to human errors. All components of the recipe are automatically dispensed with high precision using gravimetric feeders and dosing pumps.
- The possibility of continuous monitoring of the process parameters, allowing for the current adjustment of the machine settings or the composition of the recipe, giving high

quality glue. Thanks to the constant control of the viscosity of the on-line glue, a high repeatability of the product is obtained.

- The system is easy to clean and allows you to quickly change the processed recipe.
- It is not necessary to specify the viscosity of the raw material.

In addition, when using solvents, the MARIS process has the following advantages:

- A small amount of the solvent being once in circulation and a small amount of stored finished product located on the production floor - thanks to this, the installation takes up little space and is safe. Most raw materials, including solvents, can be stored outside the hall in silos and tanks.
- It is possible to reduce the solvent content from 70 to almost 40%, which reduces the drying time of the adhesive and allows you to increase the coating speed by reducing costs.
- The process is safe for operators - all volatile substances are fed automatically and their evaporation to the environment is eliminated - no contact with air. Thanks to this, the operator is not exposed to inhaling harmful solvents.

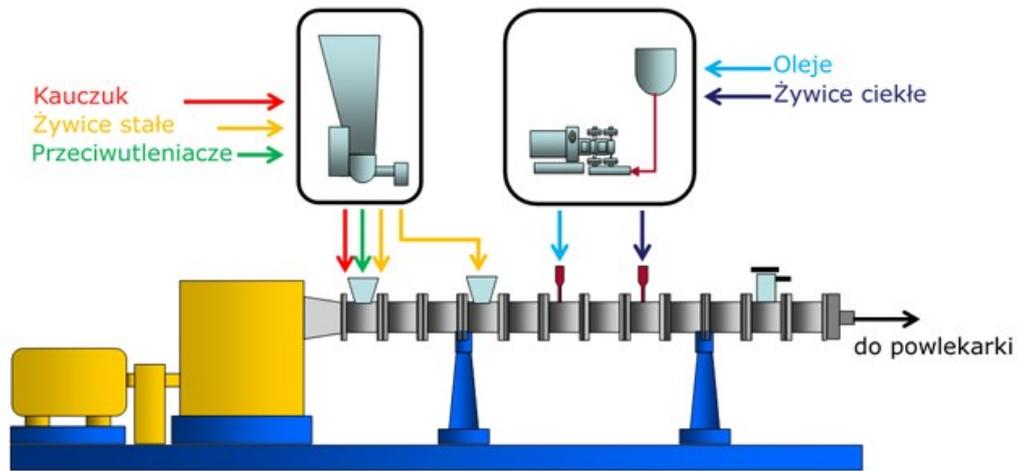


LINES FOR PRODUCTION OF HOT-MELT VEHICLES AND HOT-MIXED ADHESIVES

High viscosity adhesives are adhesives that due to the ingredients used and to low solvent content or lack of them have a very thick consistency. Thanks to this, the bonding strength of such adhesives is very high and they have high initial adhesion that guarantees high strength of pre-bonding of bonded elements before the adhesive reaches its target parameters.

A special type of high viscosity adhesives are HOT-MELT hot melt adhesives, which are activated when heated to the appropriate temperature when their viscosity drops to a level that allows processing. The HOT-MELT glue is bonded immediately after the joint has been cooled and the glue has changed from liquid to solid state. In the case of HOT-MELT reactive adhesives, the bond strength of the adhesive additionally increases after the cross-linking reaction.

The technology of high-viscosity adhesives and HOT-MELT adhesives is one of the specialties of MARIS. Many years of experience has allowed to develop and optimize the production technology of this type of adhesives. MARIS offers not only the supply of a proper complete installation for the compression, but also the development of a complete technology for specific recipes, which guarantees the achievement of the highest quality adhesives with high viscosity and HOT-MELT adhesives.



Wydajność produkcji klejów HOT MELT i klejów o dużej lepkości

MODEL WYTLACZARKI	20	30	40	50	58	70	80	92	112	133
Taśmy, etykiety	15	50	150	300	500	900	1200	1500	2500	4000
Wydajność kg/h	30	100	200	400	600	1000	1500	2000	3500	5000
Taśma pakowa	5	30	70	130	200	350	500	700	1300	2000
Wydajność kg/h	10	40	80	150	250	450	600	900	1500	2500
Drewno	15	100	200	400	600	1000	1800	2500	3500	6000
Wydajność kg/h	30	150	300	500	800	1500	2000	3000	4500	6500



SOLVENT ADHESIVES

Solvent adhesives are adhesives in which the adhesive is dissolved in a large amount of solvent. The solvent acts as a carrier for the adhesive and after the application of the adhesive it is evaporated.

The MARIS company is a pioneer of the solvent glue production technology on co-rotating twin

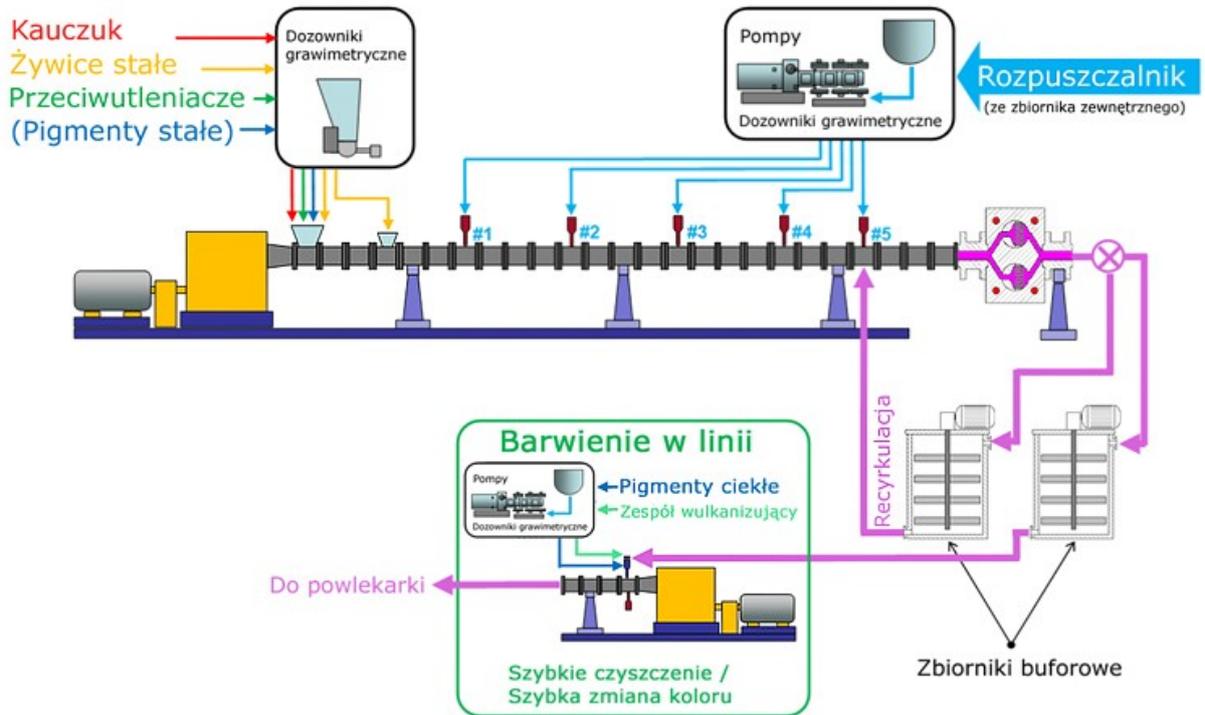


screw extruders. The experience gained by MARIS in the field of Hot-Melt adhesives allowed us to develop a technology for the production of solvent-based adhesives. This particular category of adhesives distinguishes the need to use significant amounts of solvent during the production of the adhesive and its application. In this type of glue, the solvent acts mainly as a glue carrier, reducing its viscosity and allowing its application on the surface of the product. After applying the adhesive, the solvent is evaporated. In this way, large amounts of solvent get into the atmosphere and pose a major environmental problem.

MARIS automated production lines allow you to solve many problems related to the production of solvent glues:

- The new technology allows for constant monitoring of the viscosity of the adhesive and, depending on the needs, allows the current formulation to be corrected in order to obtain an adhesive with a precise, predetermined viscosity. As a result, it is possible to reduce the solvent content in the recipe and the speed of application of the adhesive due to shortening the evaporation time of a smaller amount of solvent.
- Thanks to the new production technology, MARIS has been able to significantly reduce the proportion of solvent in the adhesive and thus reduce its emission to the environment. For production with a capacity of 500 kg / h, solvent emissions have been reduced by up to 30,000 l / a, which means significant environmental and financial benefits.
- Due to the excellent mixing properties of twin screw extruders it is possible to use rubbers with less stable viscosity and of lower quality. It has a measurable effect on the price of the finished product without decreasing its quality.
- An important advantage of the system is the improvement of work safety. Harmful solvents are found in closed circuits and their vapors do not escape. In addition, the amount of solvent currently in the system is negligible compared to the amount needed to fill the dissolver. As a result, work safety on the line increases and the storage of fewer raw materials is safer. Also, storage of finished products is easier, and therefore safer.

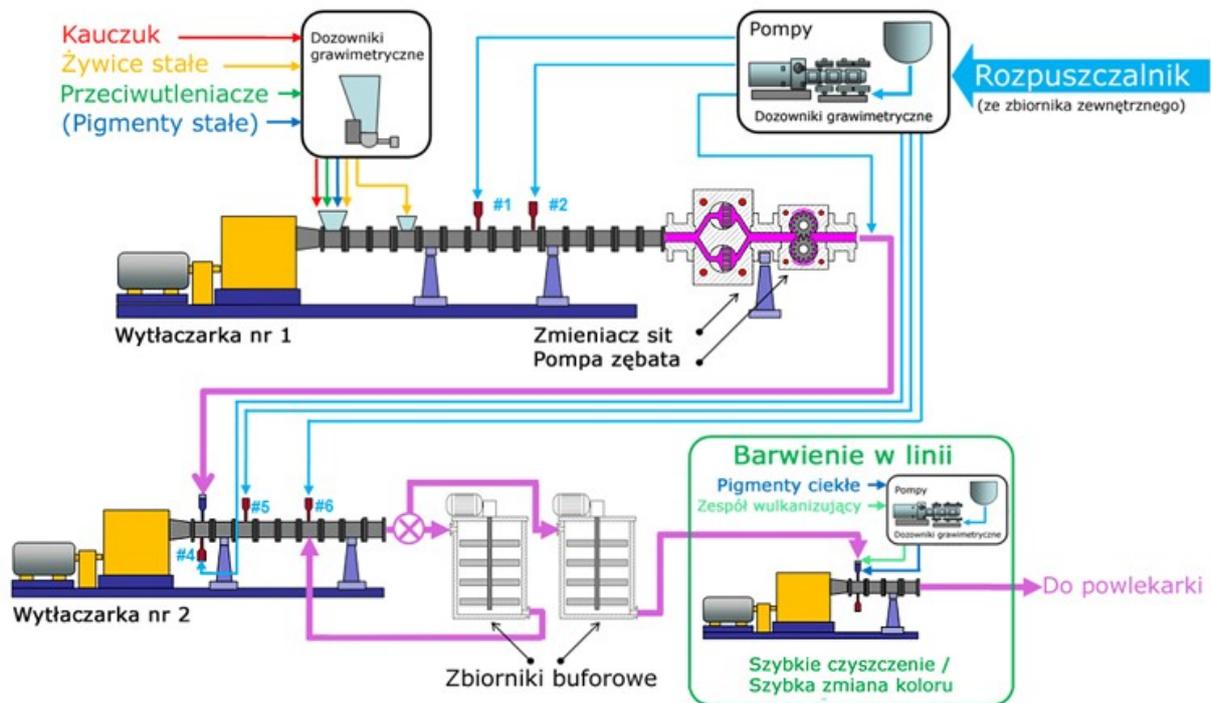
One-stage process



Wydajność produkcji klejów rozpuszczalnikowych (kg/h) w procesie jednoetapowym

Zawartość % rozpuszczalnika	30 MV	40 MV	50 HT	58 MV	70 MV	80 HT	92 MV	112 MV	133 MV
65	10-15	30-35	60-70	100	150-170	250-300	350-400	550-600	800-1000
60	10-15	30-35	60-70	100	150-170	250-300	350-400	550-600	800-1000
55	15-20	35-40	70-80	125	170-200	300-350	400-450	600-700	1000-1100
50	20-25	40-50	80-90	125	200-250	300-350	450-550	800-900	1100-1300

Two-stage process



Wydajność produkcji klejów rozpuszczalnikowych (kg/h) w procesie dwuetapowym

Zawartość % rozpuszczalnika	30-30 MV	40-30 MV	50-40 HT	58-40 MV	70-58 MV	80-70 HT	92-80 MV	112-92 MV	133-112 MV	150-133 MV	177-150 MV
65-70	10-15	30-35	70-80	120-140	170-200	250-300	400-500	700-800	1000-1200	1400-1600	2200-2500
60-65	10-15	30-35	70-80	120-140	170-200	250-300	400-500	700-800	1000-1200	1400-1600	2200-2500
55-60	15-20	35-50	80-100	140-150	200-250	300-350	500-600	800-900	1200-1400	1600-1800	2400-2500
50-55	20-25	50-60	100-120	150-170	250-300	350-450	600-700	900-1200	1400-1600	1800-2000	2500-3000

Summary

Modularity and adaptability of co-rotating twin screw extruders allow their use in many industrial applications. In the case of adhesives, the use of twin screw extruders brings excellent results both in the production of Hot Melt adhesives and solvent adhesives.

In the case of Hot Melt adhesives, accurate control of the process temperature and simultaneously minimized access of air eliminates the oxidation of the material and guarantees a stable adhesive viscosity. In the case of solvent-based adhesives, the use of twin screw extruders allows to reduce production costs by reducing the solvent content and increasing the speed of coating and the performance of the entire line. It is also very beneficial from the point of view of environmental protection and work safety.

All this makes co-rotating twin screw extruders, which are continuous dynamic mixers, a useful tool for the production of adhesives in a continuous process. They enable the production of self-adhesive tapes directly from raw materials using a single processing line, in a completely automatic and monitored on-line. They help to reduce the risk of human error in the production process and eliminate the limitations of the traditional system using periodic mixers.

