



CREATING
VALUES

BLOWN-FILM LINES





Sausage casing

Lines for the production of bi-orientated tubular films for sausage casings

Line layout

- **number of layers:** 1 / 3 / 5 / 7 / 9
- **raw materials:** PA, amorph. PA, EVOH, EMA, PE, PP
- **film thickness:** 20 μ - 80 μ
- **film width:** 25 mm - 350 mm double layflat
- **output:** 20 kg/h - 150 kg/h
- **line speed:** 50 m/min - 300 m/min



Film characteristics

- adjustable shrink from 0 - 40% in MD and TD
- outstanding aroma, oxygen and moisture barrier
- exceptional mechanical strength and dimensional stability
- excellent optical properties (clarity and gloss) or uniform coloring with a natural look or matt effect if required
- outstanding film flatness for printability
- adjustable meat adhesion

Application



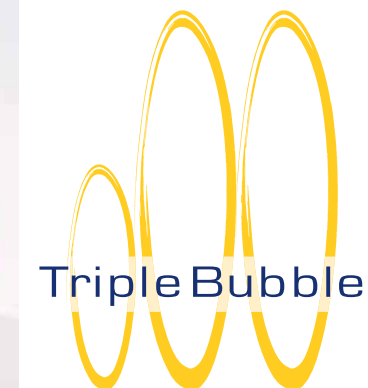
Added values

- almost 30 years of experience with casing machines
- most versatile casing line technology
- rich patent portfolio
- turnkey solutions and operator training

Application areas

- barrier sausage casings
- smokable sausage casings
- peelable sausage casings
- casings for soups, stews and pet-food
- casings for molded ham

creating the shape

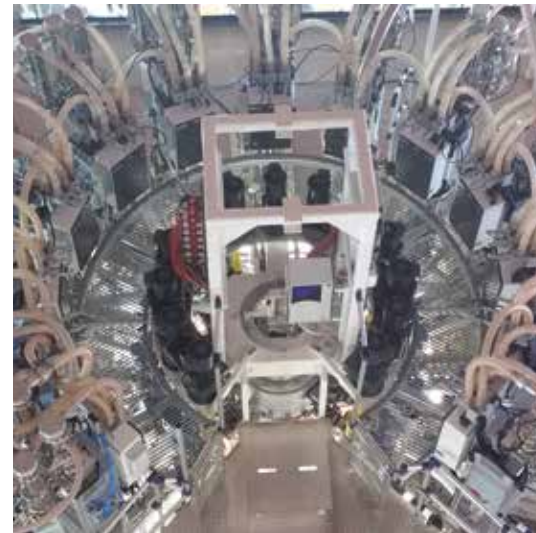


Shrink Films

Multipurpose lines for shrink films and lidding films

Line layout

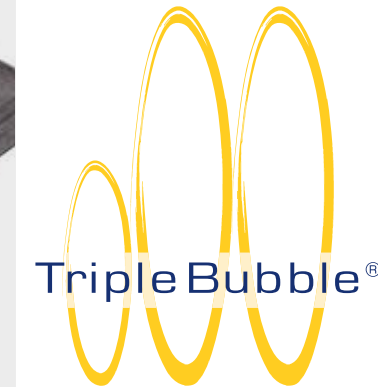
- **number of layers:** 5 / 7 / 9 / 11 / 13
- **raw materials:** PE, PP, PET, PA, EVOH, PVOH, PVDC, COC, EVA, EMA, ionomer and others
- **film thickness:** 12 μ - 150 μ
- **film width:** 100 mm - 900 mm double layflat
- **output:** 50 kg/h - 500 kg/h
- **line speed:** 30 m/min - 100 m/min



Film characteristics

- adjustable shrink from 0 - 70% in MD and TD (depending on raw materials)
- outstanding aroma, oxygen and moisture barrier
- exceptional mechanical strength and puncture resistance
- excellent optical properties (clarity and gloss) or uniform coloring if required
- outstanding film flatness for printability
- high seal strength and integrity; low sealing temperatures

Application



Added values

- over 20 years of know-how in shrink film technology
- most flexible line configurations
- no limitation in structure design (11 – 13 layers)
- well proven combination of high output and low scrap rates
- maximum flexibility in raw material choice

- rich and robust patent portfolio enables operational freedom
- ready-to use / print solutions without lamination (e.g. lidding films)
- turnkey solutions and operator training
- significant weight reduction/down gauging of 50% (or more for certain applications) vs. conventional packaging concepts
- most sustainable fresh food and meat packaging solutions

Application areas

- shrink bags or films for fresh, processed and frozen meat
- shrink bags or films for outgassing and non-gassing cheese
- puncture resistant shrink bags or films (bone guard replacement)
- vacuum skin packaging (VSP) films
- thermoforming shrink films (skin effect)
- flow pack (shrink) films
- lidding films (with or without drum-effect)
- stand-up pouch films

following the shape

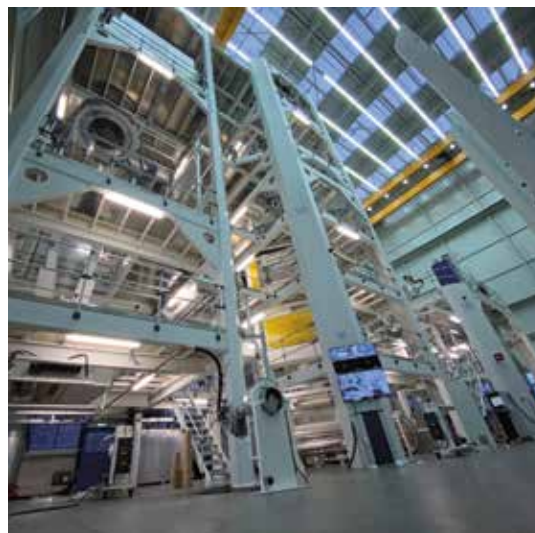
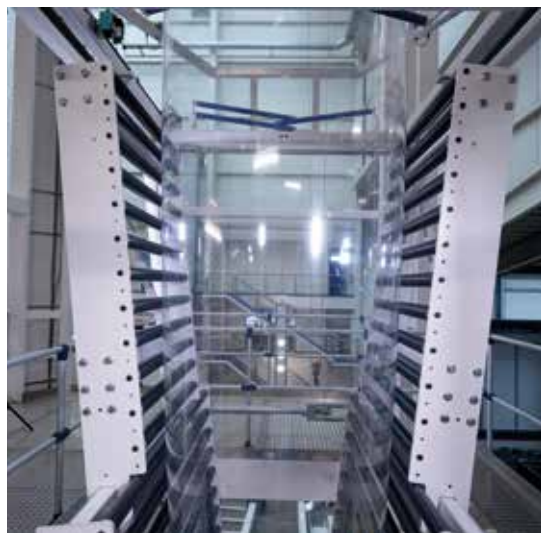


Non-Shrinking Films

High-output lines for oriented non-shrinking films

Line layout

- **number of layers:** 3 / 5 / 7 / 9 / 11 / 13 up to 17
- **raw materials:** PE, PP, PET, PA, EVOH, PVOH, COC, EVA, EMA, ionomer and others
- **film thickness:** 12 μ - 120 μ
- **film width:** 800 mm - 3.000 mm double layflat
- **output:** 150 kg/h - 2.000 kg/h
- **line speed:** 30 m/min - 200 m/min



Film characteristics

- no shrinkage or adjustable shrink up to 70% in MD and TD (depending on raw materials)
- outstanding aroma, oxygen and moisture barrier
- exceptional mechanical strength and puncture resistance
- excellent optical properties (clarity and gloss) or uniform coloring if required
- outstanding film flatness for printability
- high seal strength and integrity; low sealing temperatures
- customizable sealing properties (e.g. easy peel, re-closable seals)
- adjustable anti-fog properties

Application



Added values

- more than 10 years solutions in film structures and machine technology
- significant down-gauging of 50% (or more for certain applications) vs many other production methods
- homogenous "A" quality film resulting from the simultaneous biaxial bubble orientation
- well proven combination of high output and low scrap rates
- no limitation in structure layout (up to 17 layers)
- rich and robust patent portfolio enables operational freedom
- ready-to use / print solutions without lamination (e.g. lidding films)
- turnkey solutions and operator training
- most sustainable fresh food and meat packaging solutions
- flexibility to produce mono-material films or recyclable multilayer films

Application areas

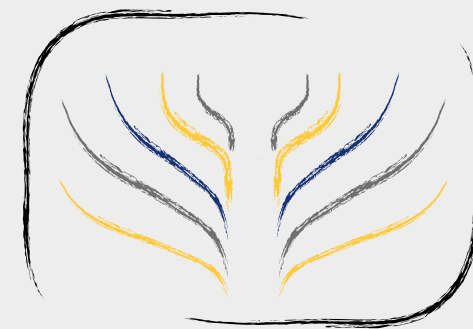
- lidding films (with or without drum effect)
- high barrier films, with or without shrink, for food packaging
- flow pack (shrink) films
- vacuum skin packaging (VSP) films
- thermoforming shrink films (skin effect)
- stand-up pouch films
- vacuum packaging films
- laminate replacement films



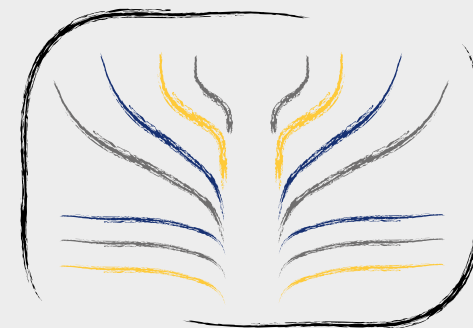
Die-Head Concept

Kuhne Anlagenbau GmbH

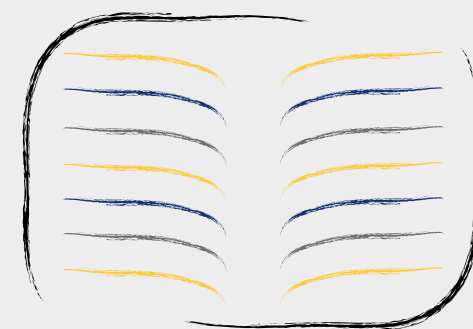
Kuhne Anlagenbau designs and manufactures blown film dies optimized for every application. For top quality and reliable supply, the dies are manufactured in-house in a state-of-the-art facility that guarantees the tightest design tolerances.



Re-Con

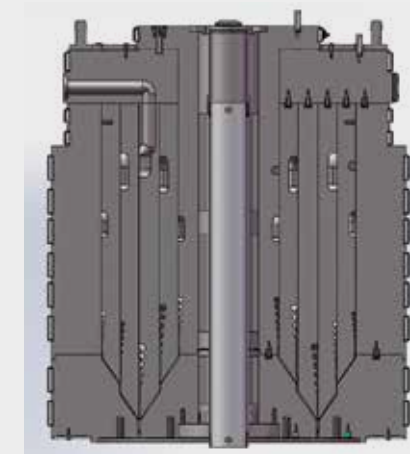


Hy-Con

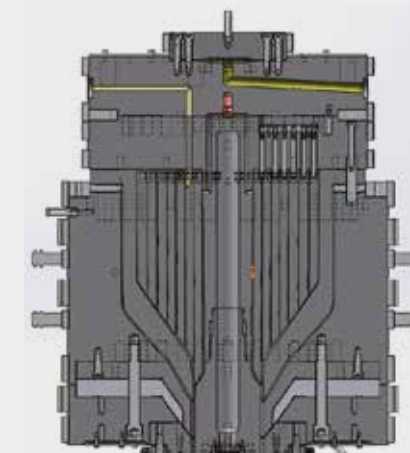


Mo-Con

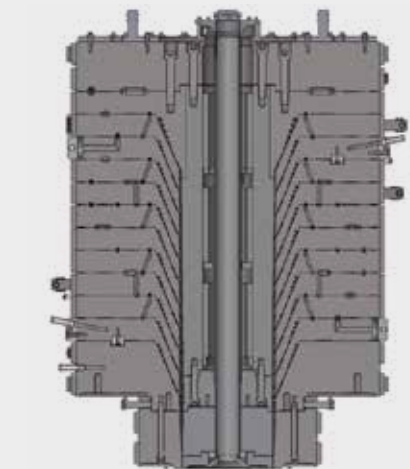
ReCon



HyCon®



MoCon®



Application

Triple Bubble® sausage casings

Artificial sausage casings are typically produced in 3-, 5- or 7-layer lines, where we have the option to use the well proven ReCon (regular concept) spiral mandrel design. An alternative to consider is our MoCon® (modular concept) stackable plate die, which allows much more flexibility in structure design. Both options, in conjunction with our precise manufacturing technology, delivers tight thickness tolerances for very thin layers.

Triple Bubble® shrink films

Systems with 9, 11 or 13 layers are now the industry standard for bioriented shrink films. For mid-size lines, up to 9 layers, we developed our HyCon® (hybrid concept) die consisting of a core of spiral mandrels with the outer layers applied via stackable plates positioned just before the die exit. These layers can be heated independently of the temperatures of the rest of the die, a very important feature for PA or PET outer layers. For systems with 11 or 13 layers (17 layers are possible) it is crucial to ensure the best thickness uniformity for the very thin layers at the center of the film structures. In this case our MoCon® (modular concept) stackable plate die offers the best solution. It also allows the most versatile use of the entire extrusion line since in these cases the MoCon® die would typically be fed by equal size extruders. Besides delivering the best combination of high output and excellent thickness control, our MoCon® die can operate with pressures up to 1000 bar if required.

Additionally, our MoCon® die can be configured to process heat sensitive resins like PVDC without degradation. This is done with thermal isolation by using additional insulating plates on either side of the PVDC layer. If necessary, this same layer can also be used to process EVOH without any changes.

Triple Bubble® non-shrink films

The die concept specified is contingent of the application and the polymers used. Typically, systems with 7 and 9 layers are equipped with our HyCon® (hybrid concept) dies, especially in cases where high melt temperature polymers need to be processed, as with heat resistant outer layers for example. The most versatile concept, often used for polyolefin rich structures, is the MoCon® (modular concept) stackable plate die. It is ideal for film structures with up to 13 layers (17 layers are possible) since this design will provide a shorter flow path and an optimal residence time. This concept offers maximum flexibility so that new market requirements, such as films designed for recyclability, can be fulfilled quickly and without additional costs.



Specialization is our business

Kuhne Anlagenbau GmbH is one of meanwhile 3 companies owned by family Kuhne; besides the mother company Kuhne GmbH and its subsidiary Kuhne Anlagenbau GmbH there is another subsidiary in the US, Kuhne North America Corp.

The origins of company Kuhne date back to the machine building company



Heinrich Koch founded in 1934. This company developed the first extruder in 1949 and in 1957 was taken over by company Werner Battenfeld. In 1959 the leadership of Battenfeld Extruderwerk Siegburg was assigned to Mr. Walter Kuhne. In 1970 Mr. Kuhne took over this company (Battenfeld Kuhne Extruderwerk GmbH) which was renamed as Kuhne GmbH in 1975 when the company moved to its new and today's site in Sankt Augustin.

Kuhne Anlagenbau was created in 1972, at that time as a department of Battenfeld Kuhne Extruderwerk GmbH. In October 1979 Kuhne Anlagenbau GmbH finally was founded as independent 100% subsidiary of Kuhne GmbH. In the 70ies and 80ies Kuhne Anlagenbau GmbH made its mark as general contractor for large-scale turnkey projects in the plastic branch. At that time Kuhne Anlagenbau GmbH also acted as sales department of Kuhne GmbH for the countries of the Middle East and the former USSR.

In the 90ies Kuhne Anlagenbau GmbH built up a production and sales program of their own for the plastic recycling branch in addition to their sales activities for Kuhne GmbH. After an impressively short time, Kuhne Anlagenbau GmbH was successfully offering complete lines for the recycling of plastic waste. However, as this market almost completely collapsed when the public subsidies were suspended, Kuhne Anlagenbau GmbH had to look for a new field of activity. Basing on the decades of film blowing know-how of Kuhne GmbH, Kuhne Anlagenbau GmbH started the development of the first Triple Bubble® line for the production of bi-oriented blown films in 1996. The Triple Bubble® technology allows to produce high-class food packaging films (for meat, sausages, cheese, etc.) which meet special requirements such as high oxygen barrier for the prolongation of shelf life and a corresponding aroma



barrier in combination with an excellent mechanical strength. Since then Kuhne Anlagenbau GmbH continuously developed the Triple Bubble® technology and set up a broad product range.

The production program nowadays ranges from mono-layer high-speed lines for the production of small calibre sausage casings with production speeds up to 300 m/min ("XXS" series); and multi-layer lines for food packaging with up to 17 layers and medium film width ("M" and "L" series); up to the large scale orientation lines especially for widths of up to 3 metres ("XXL" series). Especially the "XXL" series provide extremely high barrier and mechanical properties while at the same time film thickness is reduced by up to 50% compared to films produced by conventional technologies. The large scale Triple Bubble® lines meanwhile allow for output capacities of up to 2 tons, especially for applications such as deep drawn and vacuum packaging.

This wide-ranging production program provides ideal solutions for all types of flexible packaging with or without shrink or for formable packaging respectively.

Highlights

1934

foundation of machine building company Heinrich Koch

1949

development of the first extruder HKS 80/60

1953

supply of the first complete blown film line

1957

company Werner Battenfeld takes over company Heinrich Koch

1959

Dipl.-Ing. Walter Kuhne assumes management of Battenfeld Extruderwerk Siegburg

1960

supply of an industrial blown film line with a working width of 2,000 mm

1970

Walter Kuhne takes over company Battenfeld Extruderwerk Siegburg

1974

supply of various 2 to 4-layer coex systems for the production of multicolored carrier bags

1975

relocation of company Kuhne GmbH from Siegburg into the new site in Sankt Augustin

presentation of the complete extruder program with the designation K 25 - K 150 in 24, 30 and 33 D length

1979

foundation of KUHNE Anlagenbau GmbH

1980

presentation of the first IBC blown film line with spiral distributor

1982

presentation of the first pure HDPE blown film line for 6 µm films

1990

presentation of a fully automatic blown film line with automatic thickness control
presentation of the data management system = KEC

1994

presentation of a 5-layer blown film line for the production of barrier film

1996

first Triple Bubble® line

1997

first 5-layer Triple Bubble® line

2000

first "high speed" Triple Bubble® line (>200m/min)

2003

first 7-layer Triple Bubble® line
presentation of the first shrink film system based on Triple Bubble® process

2005

first WQB line (Water Quenched Blown film)

2006

Supply of a new "high speed" generation of Triple Bubble® lines (>300m/min)

2007

50th Triple Bubble® line

2008

first 9-layer Triple Bubble® line

2009

first large 7-layer Triple Bubble® line (Roller width 1800 mm) XL-Serie

2010

first 11-layer Triple Bubble® line

2011

first large WQB line (roller width 1600 mm)
first large 9-layer Triple Bubble® lid film line (roller width = 1800 mm) XL-Serie

2012

first large sausage casing line (high output > 150kg/h)

2013

first 7-layer conventional blown film line
first supply of a Triple Bubble® line with a "Mo-Con" die

2014

first 9-layer conventional blown film line

2015

first 11-layer conventional blown film line

2016

first delivery of a conventional blown film line with a "Mo-Con" die

2017

first 13-layer Triple Bubble® line

2018

100th Triple Bubble® line

2019

first 5-layer battery film line (roller width = 2100 mm) XL-Serie

2020

first 13-layer Triple Bubble® line (roller width = 1800 mm) XL-Serie

2021

first Triple Bubble® shrink film line for PVDC

2022

first Triple Bubble® lamination film line (3-layer line / roller width = 2100) XL-Serie

2025

first 13-layer Triple Bubble® line (roller width = 3200 mm) XXL-Serie





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