IPM - International Perforation Management 国际工程管理公司
hi-tech engineering – China - Germany - Thailand
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MANUAL

PS-1000, PS-1200, PS-1600

micro perforation machines

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Content

Portfolio - IPM International Perforation Management

IPM is a relative small hi-tech engineering company, based in Recklinghausen in Germany and Asia. With international specialized engineers and competent partners in Germany and China we are develop, design, manufacture, tailor-made, install, commission electrostatic micro cluster or laser perforation systems and machines for fast moving paper webs or other material treatment for mass products.

As well with sophisticated, intelligent sensor scanner porosity controls technology for global sales and potential customers as ready-to-use projects.

Strong hands-on engineering, demanding time at clients side, qualification, training, technology transfer for maintenance, operation personnel in quality as well quantity control are essential parts of our services for prosperous long-term cooperation with global clients.

The founder of IPM Mr. Werner Grosse, working since 1979 as application engineer, project, operation manager, technical director, technology expert and entrepreneur in international field of applied electrostatic and laser processes as well in optical online porosity sensor scanner measuring for tobacco, paper, refinement, packaging, printing, tobacco and other industries. During his professional career, collaboration in research assignments he initiated 46 inventions and 34 patents, outside of EEC and in China as well. Thanks patented technologies and production processes new generations of refinement procedures, products properties, characteristics, application fields, production machines and optical online controls has been developed. It includes world wide new in-situ dyne surface tension measuring process at fast moving plastic films and foils.

After he became a self-employer and entrepreneur in 1992, the GmbH was established in 1993. This resulted in an expansion of electrostatic perforation technology into application fields such as filter, cigarette, tipping, packaging, printing, bag, food and non-woven for paper refinement and packaging industry. Since 1994 the GmbH belong to an international supplier group.

After many years of prosperous cooperation as shareholder and managing director, Mr. Grosse left the GmbH at the end of 2001 in order to enhance innovations with his own engineering company, IPM International Perforation Management, in January 2002 to design tailor-made production machines for mass products which among other high demands in quality have specific outstanding product characteristics in cooperation with relatively large clients, especially in Asia, USA and South America.

Apart from this business he has joined national, international organizations whose aim is to enhance innovative, creative, patent conforming, educational targets and which exchanging of technical, economical knowledge. As a result of his membership in several organizations and due to his work in the field of micro perforation, material treatment and porosity, scanning and vision control technology, Mr. Werner Grosse has given many lectures, published a great number of technical papers and engineering reports which are available in German, English, Spanish, Mandarin, French and Italian.

Mr. Werner Grosse received government honors from China in 2004 and from other countries later on for his expertise as foreign entrepreneur for added values of innovative hi-tech production technology achieved by transfer of knowledge and successful cooperation with large industry Groups in China and others to build new machines to improve significant production processes.

Honor China Yunnan Province Government
http://bfe.yxrs.gov.cn/article.asp?id=2005092011030968
http://www.tobaccochina.com/news/data/20038/c815083548.htm
http://tobaccoreportermagazine.com/china/2004/Dec04China/Industry%20Briefs%201204.htm

IPM International Perforation Management and his engineer team operates as technology experts with project managements in the tobacco, cigarette making, supplier, paper, packaging, printing, material treatment, automotive, robotic handling and other hi-tech industries.

In mechanical and electrical engineering, manufacturing, delivery of entire perforation electronics and long term spare part guarantees IPM cooperating since many years with two German contract suppliers which manage all commercial details and goods deliveries independently to global clients.

For twin bobbin or wide web laser perforation machines we are in tight cooperation with competent hi-tech industry partners and cigarette machine manufactures in China.

Production Technologies

Perforation

Web material as regenerated cellulose films, filter, cigarette, tipping, roll-your-own RYO make-your-own MYO, wall, decoration, transparent, coated, laminate, bag or packaging paper, bonded fabrics, spun bonded non-woven, food, medical, under roof house or agriculture vegetable covering, packs, technical textiles, fabrics, laminate with base weights from 20-180g/m2, thicknesses from 10-80 microns, up to 20 g/m2 LPDE coating are perforate electro statically micro, or by laser with micro holes for wide range of application purposes.

Technology

Electrostatic micro cluster perforation or material treatment, based at micro discharging and sparking, by Bluemlein and Plasma Tunnel effects with gas atomic ionization in Nanosecond time windows. The pores are normally statistical irregularly distributed up to 80 microns and analogically, under laser micro perforation, arranged in sizes from 60-200 microns, at best non-inclined holes rows of diverse arrangement comprehension. For the naked human eye invisible electrostatic micro perforations may be arranged in areas or zone bands with specific distances within its web.

Controlled pores from 0.050-80 micron diameters by sequences up to 16 million pores per second, 0.1-4.0 mJ discharge energy for each pore. Process and power electronics patent granted with DE10328937.

Performance

Arrangements of zones are usually carried out in width from 2-6 mm and pores density of 15-250 pores per square cm whereas the perforation of areas results in pore densities of up to 5 million pores per m2 in surface-all-over design. Electrostatic perforations allow porosity levels from 80-2,500 Coresta Units (ml/min/2cm2, 1,000 Pa), equality down to 3 Gurley material web widths from 100-2,000mm at web speeds up to 600m/min, depending on porosity and material consistency in relation to its ability to perforate.

Physical properties

One of the foremost postulation which can be applied to many application purposes and products containing bonded fabrics, bag or packaging papers, non-woven and others with gas or steam permeability but water in-permeability will be found at the application stage of the electrostatic micro cluster perforation.
Which means pore size 0.050-80 microns by up to 5 million per square meter.

This is due to the water's greater surface tension as hydrophobic property which hampers the permeation through the relatively small micro pores, instead hydrophobia impacts. These and other physical advantages of relatively small pores but high-density range necessarily demand the application of micro cluster perforation method because alternative perforation, web treatment processes as plasma jet, corona, flam, micro needle or laser perforation are not feasible, large pore sizes, low pore density, very expensive or simply uneconomical would not allows successful product application.

Products, applications, advantages with electrostatic micro cluster ventilation, perforation

- breathable, micro ventilated mass products, cigarette, tipping, filter, packaging, plug-wrap, refinish, fine paper
- booklet, bible, printing, magazine, promotion, newspaper with improved surface property
- decoration or gift paper with thin coating films
- PVC laminate, Vinyl, decoration or wall paper to eliminate one side condensation effects
- enable control gas exchanges, avoid rises of mildew or rottenness
- joints, corner, taps, Kraft paper strips to avoid glue bubbles with enable material diffusion
- fleece bonding material with thin plastic film layers for outdoor, under roof protection, covering, wooden houses which enables gas exchanges
- technical textiles for gas exchanges to avoid condensation processes
- sophisticated hydrophobia but hydrophobic product properties by certain purpose condition
- breathable overalls, heavy duty or disposable work dresses, trousers, aprons, thin PE fleece material
- thin PP or PE contacted Kraft paper bag, multiwall, layers, plies cement sacks, plaster, maize, grain, pet food, granulate or powder for gained air outlet or blowing during filling processes with multiple time reduce efficiency
- keep packed products in the same barrier condition as without micro perforation
- extending storage, live time or durability of certain goods and products
- biotopes and prevention of water pollution
- real or imitate leather, cloth inlets for non sweat wearing, high humidity, tropical condition
- soap, deodorant, hygiene, beauty creams, baby care or other packaging products which needs smell suggestion for marketing indication and buying advantages

- vegetable, flowers or food with paper packaging replacements for gas exchanges
- bread, rolls, fruits or food to improve the freshness and aroma
- high breathable biodegradable packaging material, environment friendly,
- high-holes-density multilayer foils for industry, medical, bioengineering, filtration purposes
- surface modification or improve roughness
- micro filter, membranes, battery separation layers, bio or lab analytic, alcohol, liquid or blood filtration
- clean room, agriculture plant applications to reduce or gain growth rates of bio processes

Process integration
It is also used especially for additionally treating materials when aiming special characteristics by physical or regular process reasons what cannot be achieved by other process technologies. Moving material web base weights from 20-180 grams per square meters by thicknesses 10-80 microns are possible to use. Including defect inspection, process automation, moisture vapor transmission rate, abrasion resistance of lamination, water proof, ventilated or breathable fabrics.
IPM state-of-the-art industrially approved, sophisticated, compact, multiple functional, in-line sensor scanner systems together with electrostatic laser perforation technology operates precise and reliable 24/7, are integrate able into existing rewinding, slitting, spooling, spreading, printing, labeling, complex production manufacturing lines or other machines and production processes.
Also, they can be used as completely independent micro surface-all-over or zone perforation unit.
Full new ranges of applications will be made available total new products with special features and properties.

Laser micro perforation

Laser perforation in general, possible to perforate by pulse or enlarge, focus laser beams are holes sizes 60-200 micron at density of holes of typical 10-30 holes per cm, sequences by 100,000-400,000 holes per second at a maximal of 16 punctured laser rows cross web with traditional systems or machines.
Means for cigarette, tipping, plug-wrap, filter, laminate, printing, flexible packaging or other material webs. By porosity levels of 100-3,000 C.U. normally in web widths 100-1,000mm, by web speeds up to 600m/min, depending on porosity and material consistency in relation to its ability to perforate.

IPM micro laser cluster perforation
IPM laser cluster treatment perforation technology LPM-1, patent granted as DE102004001327, operates with two Co2 or other laser sources inputs, up to 4 Kilowatt twin level vacuum beam multiplexer to generate up to 200 individual laser output channels, perforation or treatment heads cross web or sheet material. Combines automatic head positioning, auto focus setting, speeds up to 400m/min, flexible web width up to 2,000mm by up to 2,500,000 holes/sec.
Jumbo roll-by-roll production, online sensor scanner permeability, porosity, perforation line measurement, trend feed-back, high automation, PLC process visualization and other features. Each laser micro perforation lines can achieves 100-1,000 C.U.

Other industry fields
The conception of high power, twin level, vacuum, high spins laser beam splitter into the multiplexer enables many other options of industry fields as cutting, cut-off, welding, surface finishing, drilling, ablation, cleaning, micromachining, polishing, forming, melting, surface treatment, roughness improvement.

Each up to 200 laser perforation or treatment head are connect via hollow waveguide fibers HWG HCW for flexible laser beam leading cross webs or static sheet material.

To position easy fast in X-cross and Y-down web direction or exact location at static placed sheet material.

That full flexible automatic process with optical devices opening outstanding possibilities in industry, metal, plastic, domestic, tobacco product, medical, hygienic, wall covering, security cards, bank notes or food application. LPM-1 means cluster treatment at wide web, surface-all-over, line, zone or others materials.

Anti piracy, counterfeiting laser product design
As known offline laser perforation machines and processes are generating strait holes line in web direction at running tipping paper or other material sheets. Excluding spray laser designs which looks similar as random holes into certain zone areas as electrostatic perforation.
The patent pending DE102004012081 Micro Laser Line technology generates cluster pattern, micro holes, sinus, waves, zigzag, cryptograms, logos, perforation scripts, holograms, brand names or other kind of micro perforation designs in web direction which can look likes a group of micro laser lines.

Concerned tipping paper means non coaxial circumference at the cigarette filter.

High speed spins laser beam divert, steering, mirror scanning, flipping element controls each single laser beam and perforation line cross material which are precise focus for micro holes in ranges from 50-120 micron. Co2 or other laser sources are to use.

Ultra high speed laser beam steering

Technologically performed as ultra fast scanner device up to 4,000 Hz or 240,000 rpm as real galvanometer alternative, precise laser beam deflection up to 4 Kilowatt optical power by 8-14 mm diameter, actuator with metal optics or asymmetrically, rotary reflection cones which movement sequences are precise synchronize able with material speed. Envelope curves of selected perforation pattern are storage and calculate able by PLC control before single hole and hole groups supervised during production processes.
Product process advantages enable total different product indicators and milestones against other laser perforation or treatment processes which allows significant product property, trademark indications, IP claims, unique company features as micro perforation of tipping, cigarette packaging, other paper or material.

E.g. wide laser perforation group as common active ventilation zone to obtain smoking advances with better air stream distribution into the cigarette filter.

Perforation line guiding around the cigarette filter rod, tipping paper strip by freedom of lips area, other food, domestic or industry products assure constant porosity results.
Several pattern or wave line design for different brands, number of holes or pattern per cm length are constant e.g. 10-20, total porosity 100-1,000 C.U., hole sizes by 50-120 microns, densities 100,000-500,000 holes per second in total, 1-6 perforation pattern, lines, marks or scripts can combines in one group, micro perforation holes, pattern quality or porosity remains in standard levels.
Other flexible web material, substrate, products are treatable in similar processes, at existent laser perforation machines are able to modify with new optical, sophisticate mechanical, control elements.
Modification with low investment, finance budget because exchanging of certain elements, complete devices are adaptable at existent offline laser perforation machines or other systems.
Capability to adapt super speed beam steering devices or units at online perforation units at cigarette making machines up 12,000 cpm.

Power switching converters

IPM developed a dual high power, high voltage, medium frequency switching converter which works with hybrid drives, full in order of EMI, EMV, NEC, CE restrictions, compact semiconductor power electronics stages, supporting capacitors and ferrite transformers generating ultra short high voltage pulses and sparking bursts. Advantages are based on uses of standard circuits with extended semiconductors for cluster, corona substrate treatment, ac/ac, ac/dc, converter, drives, frequency, upward, downward converter, power electronics supplies.
Industry applications for electrostatic micro cluster perforation, converting, drives, others with IGBT, MOSFET, HVFET power stages. In high-power, high-current, high-voltage circuits to obtain micro perforation, surface treatment, modifications, corona treatment, drives or other switching applications by frequencies up to 250 KHz, Uce up to 1,400 Volt, power levels up to 50 Kilowatt.
Higher power efficiencies by low switching losses are further advantages. Precise pulse timing by certain time window with constant or variable frequencies generating high-voltage sparks and holes sequences into fast moving flexible materials.
Repeat frequency of entire circuit can up to double switching frequency of each semiconductor. The patent is granted as DE10328937.

Online porosity sensor scanner measurement

Patent pending DE10251610, patent granted in China 200310104764 for stationary or sensor scanner measuring at flexible webs or other material sheets to detect very precise, reproduce their specified product properties while production.
OPSS-1 OPRL-1 sensor control systems are equipped with multiple monolithic color sensors, precision line lasers, CCD image devices and internal ATMEL controller, firmware, high-speed data link, scanning speeds 20-500mm per second, flexible material web widths up to 5,000mm, measuring gaps 2.0-5.0mm, inline detection of permeability, porosity, spectral transmission, opacity, extinction, particle absorption, porosity 80-5,000 C.U. respective from 50 down to 3 Gurley, speeds up to 600 m/min, position control of perforation lines with 0.1mm accuracy, 0.1-200 microns pore diameter by up to 300 pores per cm2.
Real time data determining of certain parameters, optical transmission, spectral grades, porosity integrals, envelope curves, internal calculated measuring values.

Thus direct with close-loops and feedback to power electronics of fabric treatment units. Micro perforation or other system makes it possible to compensate small changes in web treatment parameters and their partial locations. That each jumbo roll as well single, twin or quad bobbin sets can be quality controlled without intermediate stops in order of ISO 9001/9002 demands.

IPM - Products - Services

Electrostatic micro ventilation, perforation machines PS-1000-2, PS-1200-3, PS-1600-2, PS-2000-1 for cigarette, tipping, filter, packaging, plug-wrap, fine, Kraft, cement sack, bag other paper, agriculture or food products with base weights from 30-160g/m2, web width 50-2,000mm, porosities from 80-2,500 C.U., or alternative from 50 down to 3 Gurley, hole sizes from 10-100 microns, hole densities from 120-260 holes per cm2, zone widths from 2.0-6.0mm, surface-all-over perforation up to 2.5 Million holes/m2, up to 16,000,000 holes per second by web speeds up to 500m/min.
Up to 60 perforation channels or 30 bobbin sets, jumbo roll-by-roll production up 25,000 meters, automation control, OPSS-1 porosity sensor scanner measurement, PCB unit feedback, PLC process visualization. Annual production output up to 4,000 tons of tipping paper by 220 C.U. with triple perforation sections. Patent granted DE10328937.

Twin bobbin laser perforator L-400 in cooperation with laser system manufactures in China, tipping paper weight 32-38 g/m2, up to 8 laser lines, porosity from 100-1,500 C.U., holes sizes 80-150 microns, densities 10-20 h/cm, up to 150,000 holes per second, speeds up to 300 m/min, annual production output up to 30,000 bobbins by 300 C.U.

Quad bobbin electrostatic mirco perforation machine PS-250-4 up to 4,500 meters bobbin tipping paper length, slim rolls up to 25,000 meters at unwind section, roll-by-roll production with 16/24 bobbins non stop, with/without integrated slitting, flying-splice unit for simultaneously quad bobbin set production, OPSS-1 online porosity sensor scanner measuring with close-loop, quality/quantity controls of each perforation zone, porosity range 80-800 C.U., deviation CV <3 % by 260 C.U., tipping web width up to 300mm, speeds up to 600m/min, hole density 120-260 h/cm2, zone 2.0-6.0 mm width, holes 10-70 microns, up to 7,000,000 h/sec., annual output up to 120,000 bobbins by 300 C.U. High automation level, patent granted DE10328937.

Online porosity sensor control OPSS-1-A/B, OPRL-1-A/B for electrostatic or laser perforation machines, porosity 80-5,000 C.U., speeds up to 600 m/min, web width up to 2,000mm, feedback of each perforation zone, porosity with multi colour sensor, zone and line position control, accuracy of 0.1mm with precise laser line unit, sensor controller firmware, RS-232 serial link up to 230,400 Bit/s, RS-485, Ethernet, USB, industry PC, C++, process visualization, quantity, quality, statistics, link to PCC/QCC. Patent pending DE10251610, China patent granted 200310104764.

IPM business
Technology expertise, consulting, support, improvement, modification, overhauling, high tech engineering.
Sales, manufacturing, installation, commissioning, project management, service.
For tailor-made, turn-key electrostatic or laser micro cluster perforation, high-holes-density ventilation machines, online porosity sensor scanner systems for entire production lines world wide.

Press releases and technical reports are published at websites.

Cooperation with Chinese partners

MLL-1 laser line cluster perforation, ventilation, anti piracy design for tobacco or other mass products, enables advance smoking air streams into cigarette filters by further product advantages, high speed rotation of non symmetrically mirrors, cones for laser beam steering, up to 240,000 rpm, holes sizes from 60-150 microns, densities 10-30 h/cm, porosity from 100-1,500 C.U. by up to 300,000 holes per second.

The MLL-1 micro-laser-line perforation and material treatment enables large numbers of capabilities for hole or treatment positioning with different pattern, design, waves, zigzag, cryptograms, scripts, lines for unique anti counterfeiting indication and others. Special remark of MLL-1 creates fundamentally new product properties, e.g. final products for mouthpieces with tipping paper at cigarette filter or other tobacco, cigarette packs, packaging or security products. Specific indication of brand names which are recognizable for everyone and product buyer, if the micro holes or pattern are to see with magnified glasses only.
Or touch able as Braille scripts as micro cluster cryptograms. Patent pending DE102004012081.

LPM-1 wide web laser micro perforation machine, sheet material treatment particular for paper products as cigarette, tipping, filter, packaging other mass material production, up to 200 laser perforation or treatment heads cross web or sheet material, automatic head positioning, focus setting, dual 4 Kilowatt Co2 others laser source inputs, beam factor M2<0.9, twin level multiplexer, flexible hollow fiber, web widths up to 1,200 mm, speeds up to 400 m/min, 25,000 metres jumbo roll-by-roll, fully automatic production, PLC process visualization. Integrated OPSS-1 porosity sensor scanner control, perforation holes from 60-150 microns diameter, densities 10-30 h/cm, porosity from 100-1,000 C.U., up to 2,500,000 holes per second, annual production output up 1,800 tons by 400 C.U. Patent granted DE102004001327.

OESP-1, OLP-1 ventilation for mass products at cigarette makers or packers development with a Chinese firm consortium, uses of IPM mini laser multiplexer and hollow fibers up to 3,000 mm length, see above patent, designed for 4 or 8 laser perforation lines, sealed-off laser source 400 Watt, 48-64 mm bobbin width, precise perforation round or oval holes from 60-150 microns, porosities from 100 up to 900 C.U., cigarette ventilation levels from 10-80% by twin or quad lines at each bobbin strip side, up to 14,440 holes/s in total, up to 12,000 cpm or speeds up to 150 m/min.

Flexo & Gravure Asia 1-2008 http://www.flexo.de/download/fga/1-2008/Inhalt_FGA_1_2008.pdf

On requests - more details about projects references in tobacco and packaging industry.

patent download http://www.microperforation.com/englishengineerreport.html

main link http://www.microperforation.com/ipm-technology.html

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