IPM - International Perforation Management
hi-tech engineering - Germany - Thailand - China
phone/fax: 0049-3212-5375175
http://www.microperforation.com
http://www.microperforation.com.cn
http://www.deguodaguan.com/ipm/
Email: grosse microperforation.com - perforationpeople web.de

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IPM PORTFOLIO ENGLISH
IPM PORTFOLIO SPANISH
anti counterfeiting laser treatment solution MLL-1

Micro Cluster Production Technologies

MLL-1 anti piracy micro laser treatment, line perforation real alternative for galvo galvanometer or scanner, super-high speed rotate cone mirror, cluster micro technology for holes pattern, perforation design, waves, zigzag or packages lines, cryptograms, company logos, holograms, anti piracy, counterfeiting, security paper, safety, bank note, metal sticker, printing, laminating, coating, fruit, food, bread, vegetable, agriculture covering, credit cards, transparent film, holographic paper, cigarette, tipping, filter, aluminum foil, shrinkable film, tear tape, cardboard, matrix code, identification, RFID, tag, marking, scribing, jewelry, automotive, pharmacy, golf, marina, tobacco, smoking, chemical, medical, product, electronics part, indicator, porosity contours or profile, embossing, bioengineering, membrane, filtration, focus, holographic, hinge-lid, pack.
Patent pending DE102004012081.

LPM-1 micro laser cluster perforator, material treatment at wide web, large area, surface or entire material cluster treatment, cutting, welding, drilling, ablation, cleaning, melding, high power, ultra high speed rotate quad or twin laser beam splitter, twin level vacuum multiplexer, up to 4 Kilowatts laser input, flexible hollow fibers, HGW, HCW, up to 200 output channels, Co2 and other laser types. Material treatment and robotic handling for stainless steel, ceramic, aluminum, wafer, gold, glass, silver, brass, copper, wafer, silicon, titanium, silicon, solar, panel, photovoltaic, micromachining, slitting, rewinding, refining machines or stand along systems. Micro cluster perforation for all kind of paper or specific plastic web material. Patent granted DE102004001327.

Nano Micro perforation or other material surface treatment, electrostatic cluster perforation, micro perforator, for cigarette, tipping, filter, packaging, plug wrap, Kraft, cement, pet, powder, sack, bag, fine and other paper, silicon or other coating, certain plastic film, laminate, porosity from 80 up to 2,500 C.U., from 50 down to 4 Gurley, hole sizes from 50 nm up to 100 micron, hole densities from 80-260 h/cm2, zone widths from 2.0-6.0mm, up to 16,000,000 holes per Second, web speeds up to 600 m/min, web widths up to 2,000mm. Patent granted DE10328937.

Twin AC/AC, AC/DC frequency shift converter high power, high frequency, high voltage, ultra short mega peak current, 50 Kilovolt, 300 Amps, electrostatic nano or micro cluster perforation, ignition, sparking, arc, cigarette, tipping, filter, fine, packaging, paper, plug wrap, sack, bag, Kraft, food, plastic film, foil, textile, fabrics or other product, switching converter, compressor, emergency, train, ship or vessel power supply, generator, upward, downward, frequency shift, switching unit, stabilizer, soft starter, vector, phase, inverter, servo system, motion, stepping, machine, asynchronous, standard, motor, torque, automation, remote, gas, slab, laser, diode, stack, fibres, fiber optics, beam, material, hybrid, plug-in, battery, renewable, energy, medical equipment, membrane, filtration, robotic, photovoltaic, industrial automation, drives, IGBT, MOSFET, FRETFET, HVFET, tube, rf, hv. Patent granted DE10328937.

Online OPSS-1 porosity vision scanning control system permeability cluster control for electro static or laser micro perforation machines, multiple color sensor head, spectral intensity, DSP, FPGA, CCD, line, precise, laser, position, material finger print detection, VIS wave length, opacity, defects, inspection, image control, scanner systems, process software, line, camera, vision control, filter, tipping, cigarette, booklet, packaging, magazine, wall, Kraft, sack, paper, cement, maize, corn, pet, coffee, tea, food, co-extrusion, foil, film, agriculture, domestic or other moving fabrics or web material. Patent pending DE10251610, China patent granted 200310104764.

In-suit dyne or surface tension control ODSTM-1 at fast moving substrate, plastic, film, foil, tear tape, laminate, co-extrusion, BOPP, LLDPE, LDPE, PE, PP, PVC, MOV, MOH, FEP, PET, OPP, PTFE, MPET, spectral, extinction, monolithic, sensor, analyzing, Sub Angstrom, roughness, measurement, wavelength, wobbling, stray, light, beaming, water drop, angle, inspection, corona, plasma jet, laser, IR, NIR, scanning, monolithic spectrometer, photonics, spectral, properties, reflectometer, scatterometry, ellipsometry, opto, acoustic, basic, weight, techniques, corona, flam, gas treatment. Previous patent application DE19543289.

Press release example

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

Patent references

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Anti piracy product design with laser cluster – ultra high speed Co2 laser beam divert control

Patent pending DE102004012081 download

Micro laser perforation

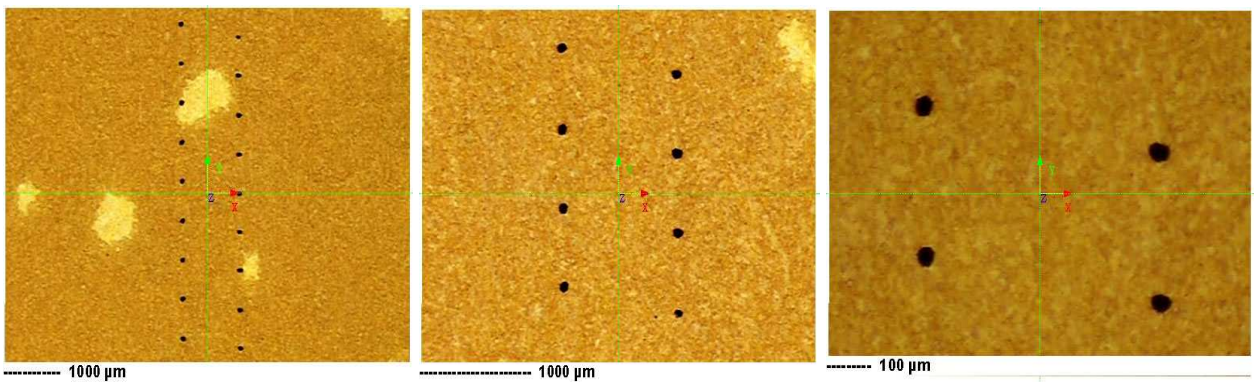
Laser perforation in general, possible to perforate by pulsed or enlarged and focused laser beams are holes sizes from 60 to 200 micron at holes densities of typical 10 to 30 holes per cm, holes sequences from 100,000 to 400,000 holes per second at maximal 16 punctured laser rows, register distribute cross material web width with traditional systems or machines. Means for cigarette, tipping, plug wrap, filter, packaging, pack, tear tape, plastic and other material. With porosity levels from 100 up to 3,000 C. U., normally in web widths from 100 to 500mm at web speeds of up to 600 m/min, depending on porosity and material consistency in relation to its ability to perforate.

IPM laser cluster material treatment, perforation technology

IPM laser cluster material treatment perforation technology LPM-1 is patent granted by DE102004001327 operates with quadruple Co2 or other laser types, beam inputs up to 4 Kilowatt to supply a high power twin level, vacuum operates multiplexer.

High spin of quad laser beams generates up to 200 individual optical output channels to supply special made flexible hollow fibers HCW, HWG, fiber optics, to obtain micro perforation rows cross moving web or static material, combines automatic positioned laser perforation heads, each with motor driven focus, web speeds up to 400 m/min, web widths up to 2,000mm, up to 2,500,000 holes per second, jumbo roll-by-roll production, optical in-line permeability scanner control for perforation line position and quality, porosity feedback, hi-tech automation level and other features. Each laser micro perforation lines can archive 100 up to 1,000 C.U.

Micro laser perforated tipping paper



Super high speed in Co2 laser beam control

Technologically designed with Piezo oscillators or ultra-high scan speeds up to 4,000 Hz or 240,000 rpm with commercial air-bearing motors. Real galvanometer scanner alternatives, super dynamic, precise laser beam deflection up to 4 Kilowatt Co2 by high dynamic performances.

From 8 up to 15mm laser beam aperture diameters, advantage beam quality factor M2 less then 0.9 for focus spots down to 60 micron.
Absolute diffraction limits, because small focused spot sizes which are proportional inversely of laser beam input diameter. In other words, larger laser beam apertures will produce smaller focused spot sizes, as especially needed for micro cluster perforation, drilling and other micro machining applications.

Spin actuator with special optical coating, optimized outer shape, very precise rotation balance by inner body laser ablation, hollow body with inner cavities by low mass material condition, excellent relation of stiffness-to-weight, high hardness, adapted total vibration free vacuum cylinder case, asymmetrically rotary reflection cones from 40 up to 80mm base diameter.

Average mirror surface roughness lower as 0.1 micron, form accuracy lower 0.01 micron, operation sequences are precise synchronize with material speed. Envelope curves of the selected perforation pattern are storage and calculated by PLC control before single holes and holes groups supervised during production processes.

Product process advantages enable total different product indicators and milestones against other laser perforation or material treatment processes which allows significant product property, trademark indications, patent claims, unique company features in micro perforation of tipping, cigarette packaging or other paper or material.

E.g. wide range of laser perforation groups as common active ventilation zone to obtain several advances in air stream distributions into cigarette filter, perfect perforation line guiding around cigarette filters or other food, domestic, industry products to assure constant porosity results.

Several pattern or wave line design for different brands, number of holes or pattern with 10 or 20 per cm length are constant, porosity range from 100 up to 1,000 C.U., holes sizes from 60 up to 120 micron, holes densities from 100,000 up to 500,000 holes per second in total.

From 1 up 6 perforation pattern, lines, marks or scripts can combines a group, perforation hole, pattern quality or porosity remains in standard levels.

Other material, substrate or products are treatable in similar processes at existent laser perforation, treatment machines are modify with innovated optical, micro mechanical and control elements.

Low investment and finance budget of technical modifications because exchanges of certain elements, complete devices are adaptable on existent off-line perforation machines or other laser treatment handling systems. Capability to adapt beam divert devices or units as in-line perforation systems at cigarette making machines up 12,000cpm.

Outstanding product applications

For web or sheet material, metal, isolation, foil, film, plastic, substrate, leather, textile and paper enables now large number of possibilities for micro hole position, different pattern, design, wave, zigzag, cryptograms, scripts, marking, scribing, scratching, tear off lines or others which generates.

E.g. optimize air distribution characteristics into cigarette filters, unique anti counterfeit piracy indication and not countable product advantages.

Special remark creates fundamentally new product properties, e.g. as final products for mouthpieces with tipping paper at cigarette or other tobacco, packaging, security products, flip-off or hinge-lid packs.

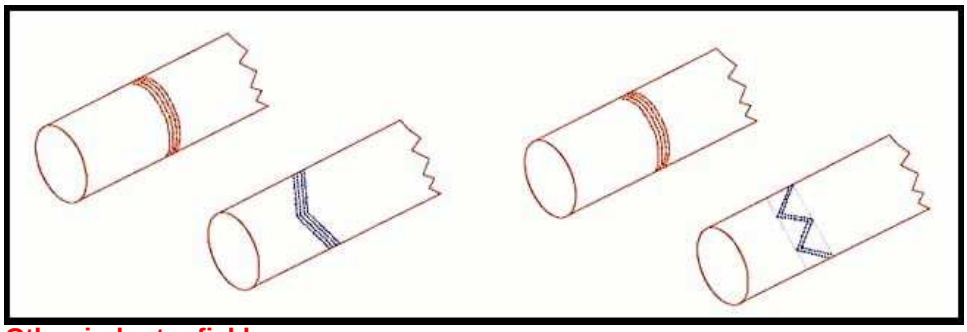
Specific indication of brand names to recognizable for everyone and even for product buyers, if micro design, holes, patterns, holograms are to see with magnified views only. Or sensitive touch able as Braille scripts generated by micro cluster cryptograms or holograms.

MLL-1 targets a large area of existent and new applications with high speed scans of laser beam mirror or optical element diverts, by horizontal or vertical position.

Sophisticated ultra high speed spins optical divert elements allows low budget modifications at existent systems and production machines.

Micro Laser Line technology means real alternative for high speed galvanometer scanner to archive micro cluster perforation, pattern design, waves, zigzag, packages line, cryptogram, company logo, hologram, anti counterfeit piracy contours for security paper, safety, bank notes, cards, metal sticker, printing, laminating, coating, fruit, food, bread, vegetable, agriculture covering, transparent films. Plastic sheets, holographic paper, cigarette, tipping, filter, aluminum foil, shrinkable film, tear tapes, label, cardboard, matrix, marking, scribing, automotive, pharmacy, smoking, chemical or medical products, electronics part, chips, indicators, writing contours or profiles, embossing or holographic. The patent of devise, process and product properties are pending as DE102004012081.

MLL-1 micro laser perforation example at filter cigarettes



Other industry fields

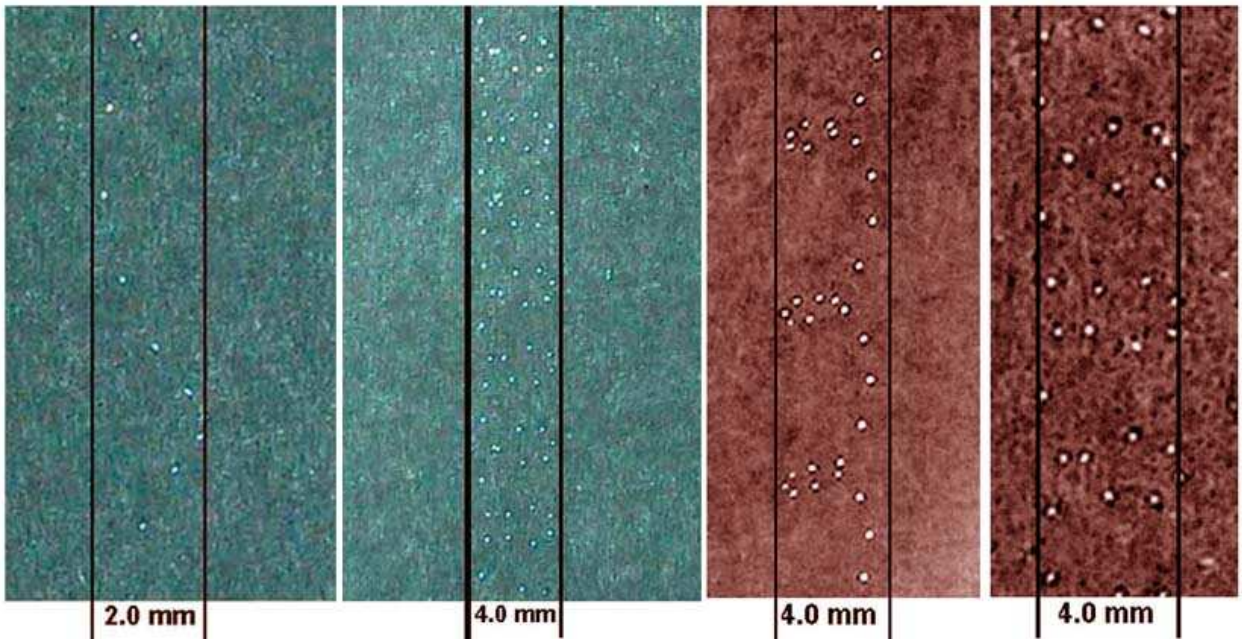
The conception of high power twin level laser beam multiplexer enables hundred other application fields for cutting, cut-off, welding, surface finishing, drilling, ablation, cleaning, micromachining, polishing, forming, melting, surface treatment, roughness improvement.

Each of 200 single laser beam and coupled flexible hollow fiber HWG HCW up to 3,000mm length obtains treatment processes or perforation heads for precise, compact, robotic positioning in X/Y direction of running web or static placed sheet material.

Automatic PLC controlled processes, equipments and devices enables now outstanding possibilities in industry, metal, plastic, domestic, tobacco product, medical, hygienic, wall covering, security cards, bank notes or food application.

LPM-1 means cluster material treatment at wide web, large area, surface or whole material treatment, high power twin or quad rotation laser beam splitter, mirror into a vacuum twin level multiplexer, Co2, YAG, Fiber, Excimer, UV laser with multiple optical inputs, flexible hollow fibers, HCW, HWG up to 200 output channels. Material treatment and robotic handling for stainless steel, ceramic, aluminum, wafer, glass, ceramic, brass, copper, wafer, silicon, plastic sheets, titanium, jewelry, silicon, solar, panel, photovoltaic, micromachining, slitting, rewinding, refining, hybrid laser cutting machines or stand along systems.

MLL-1 micro laser perforation example at packaging material



more information on request and on websites

High power twin level laser multiplexer for many industry applications as well for wide web micro perforation machines LPM-1 with tipping, packaging paper, non-woven, spun-bonded, textile, plastic films or other material substrates

Patent granted DE102004001327 - download here

IPM laser micro perforation process

IPM owns development of micro laser perforation technology LPM-1, patent granted DE102004001327, operates with quad laser beam inputs of 8 KW optical power input (fast flow, slab laser by 10.6 micron wave length or laser types) to an upper, lower dual beam multiplexer to generate up to 200 individual laser perforation beams, rows, lines cross web, combines automatic laser perforation head position and align system, focus setting, by web speeds up to 400 m/min, web widths up to 2,000 mm, up to 4,000,000 holes per second. Each laser perforation lines are archive able from 100 up to 2,000 C.U.

Jumbo roll-by-roll production, **optical in-line porosity vision OPSS-1** with simultaneous perforation line position control, full feed-back system for constant porosity levels are further features. Each laser perforated jumbo roll is ISO production data controlled and certificated.

Hollow wave guides

Each of 200 single laser beam and coupled flexible hollow fiber HWG HCW up to 3,000mm length allows treatment processes or perforation heads for precise, compact, robotic positioning in X/Y direction of running web or static placed sheet material.
In using of new Co2 hollow wave guide fiber, one high speed rotary cubic element, or two quadruple beam splitters, or high speed polygon facet wheel into the centre of optical high power twin multiplexer generate industrial suited single channel outputs.

High automated motor, robotic, adjustable, driven focusing optics for/one each perforation head allow a PLC controlled and precise positioning across the web/sheet material. The procedure looks like as full automatic controlled knife setting system on a slitting machine.

Between laser perforation section and rewind stand the optical in-line porosity scanning system OPSS-1 is located to control very precise each laser line position, holes qualities, holes quantities as well all porosity levels at fast running material web.

That state-of-the-art automatic procedure and their devices open now fully new industry challenges in wide web laser perforation and many other application fields. Automatic PLC controlled processes, equipments and devices enables outstanding possibilities in industry, metal, plastic, domestic, tobacco product, medical, hygienic, wall covering, security cards, bank notes or food application.

Other industry fields

The conception of high power twin level laser multiplexer with multiple single beams enables incredible options for industry application fields as cutting, cut-off, welding, surface finishing, drilling, ablation, cleaning, micromachining, polishing, forming, melting, surface treatment, roughness improvement.

IPM – in-line laser perforation – OLP-1 - patent granted high speed multiplexer DE102004001327

A - laser source and IPM patent granted multiplexer with 8 optical channels

- 10.6 micron wavelength, Co2, sealed off laser, M2<0.9
- e.g. Coherent, Synrad, PRC, 400 Watt, by 8 laser lines
- 10.6 micron wavelength, Co2 sealed off laser, M2<0.9
- e.g. Coherent, Synrad, PRC, 250 Watt, by 4 laser lines
- laser source dimensions all over approx: 1,130*260*260 mm, air convection
- output 45 grad divert mirror
- octagonal super high speed rotate laser beam splitter up to 900 rpm/sec.
- IPM laser beam multiplexer
- diameter approx. 400mm, high approx. 200mm
- 8 optical output channels, coupled special hollow fiber
- HCW, HWG, each in lengths 1,000-3,000 mm

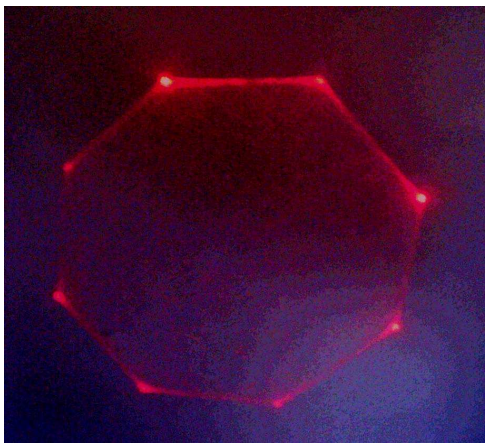
B - bobbin unwind disc unit, perforation heads

- tipping paper from 48 up 64mm web width
- 8 perforation heads, four at each side
- each laser beam supply with special hollow fibers, HCW, HWG, auto focus devices
- diameter of each focus device around 25mm
- distances in web direction around 50mm
- length of necessary perforation section approx. 200mm by 8 laser lines
- necessary width of perforation section - tipping paper width + 40mm on both sides

C - tipping paper with 8 laser perforation lines

- up to 10,000 cpm or 135 m/min tipping paper speed
- four laser perforation lines at each side
- total round or oval hole sizes between 60 up to 150 micron diameter
- up to 8 holes/cm, one hole with e.g. 14 C.U.
- 8 h/cm*14 C.U./h*4*2cm (Coresta) = in total around 900 C.U.
- ventilation grad from 10 up to 80% with twin or quad rows
- by 8h/cm*8 holes/rows*135 m/min = 14,440 holes/s in total

Octagonal super high speed rotate laser beam splitter with visible beam alignment by 650nm



more information on request and our websites

Portfolio - IPM International Perforation Management

IPM is a 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 in-line porosity control 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 in-line control systems has been developed. It's includes world-wide new in-suit dyne control 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 tied 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 und hole 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 mill Joule 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 hydrophilic 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 perforation

- breathable, ventilated mass products, cigarette, tipping, filter, packaging, plug-wrap, refinish, fine paper
- booklet, bible, printing, magazine, promotion, flyers or 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 hydrophilic 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, 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 comfortable 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-density small-pore-size 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, multi 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 units.
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, flexible packaging, tear tape, plastic and 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 perforation

IPM laser cluster material treatment perforation technology LPM-1, patent granted DE102004001327, operates with two Co2 laser beam inputs, up to 4 Kilowatt to a twin level vacuum beam multiplexer to generate up to 200 individual laser beam output channels, perforation rows cross web. Combines automatic positioning of laser perforation heads, auto-focus setting, up to 400m/min, flexible web widths up to 2,000mm, up to 2,500,000 holes per second. Jumbo roll-by-roll production, one in-line sensor scanner permeability, perforation line position quality control unit, porosity trend feedback, hi-tech automation, plc 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 spin laser beam splitter, multiplexer enables other options of industry application fields as cutting, cut-off, welding, surface finishing, drilling, ablation, cleaning, micromachining, polishing, forming, melting, surface treatment, roughness improvement.
Each of 200 single laser outputs are coupled to hollow waveguide fibers HWG HCW for flexible laser beam leading to all material treatment or micro perforation heads. To position them easily and fast in X cross and Y down moving web direction or the exact location of static placed sheet material.
That full and flexible automatic processes with new optical devices opening now outstanding possibilities in industry, metal, plastic, domestic, tobacco product, medical, hygienic, wall covering, security cards, bank notes or food application. LPM-1 means cluster material treatment at wide web, surface-all-over, line, zone or entire material treatment.

Anti piracy, counterfeiting laser design

As known off-line laser perforation machines and processes are generating strait hole lines 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 is generating 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 spin laser beam divert, 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 divert

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 8-14mm 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 off-line laser perforation machines or other systems. Capability to adapt high-speed beam divert devices or units at in-line 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 electronic 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.

In-line porosity sensor control

Patent pending DE10251610, patent granted in China 200310104764 for stationary, sensor scanner controls at fast moving 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, in-line detection of permeability, porosity, spectral transmission, opacity, extinction, particle absorption, porosities 80-5,000 C.U. respective from 50 down to 3 Gurley, position control of perforation lines with 0.1mm accuracy, 0.1-200 microns pore diameter by up to 300 pores per cm2.
With 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

Jumbo-roll electrostatic micro cluster perforation machine PS-1000-2, PS-1200-3, PS-1600-2, PS-2000-1 for cigarette, tipping, filter, packaging, plug wrap, fine, Kraft, sack, bag other paper products with base weights from 30-160g/m2, web width 50-2,000mm, porosities from 80-2,500 C.U., hole sizes from 10-100 microns, hole densities from 120-260 holes per cm2, zone widths from 2.0-6.0mm, up to 16,000,000 holes per second by web speeds up to 500m/min. Up to 54 perforation channels or 27 bobbin sets, jumbo roll-by-roll production up 25,000 meters, PLC, high-tech automation, OPSS-1 porosity sensor scanner control, feedback system. Annual production output up to 4,000 tons of tipping paper by 220 C.U. with triple perforation heads. Patent granted DE10328937.

Twin bobbin tipping paper laser perforation machines L-400 in cooperation with laser system manufactures in China, porosities from 100-1,500 C.U., holes sizes 80-150 microns, densities 10-20 h/cm, up to 150,000 holes per second, annual production output up to 30,000 bobbins by 300 C.U.

Quad bobbin tipping paper electrostatic mirco perforation machines PS-250-4 up to 4,500 meters bobbin 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 in-line porosity sensor scanner controls with close-loop, quality and quantity control 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 holes per second, annual output up to 120,000 bobbins by 300 C.U. High automation level, patent granted DE10328937.

Porosity sensor control OPSS-1-A/B, OPRL-1-A/B for electrostatic or laser perforation machines, porosity 80-5,000 C.U., 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, high-speed serial link up to 230,400 Bit/s, RS-232, RS-485, Ethernet, USB, industry PC, C++, process visualization for quantity, quality, statistics, link to PCC/QCC. Patent pending DE10251610, China patent granted 200310104764.

IPM's service

Technology expertise, consulting, improvement, modification, overhauling, hi-tech engineering, manufacturing, sales, installation, commissioning, project management, service for tailor-made, turn-key electrostatic or laser micro perforation machines, in-line porosity sensor systems and production lines world-wide.

Several press releases and technical reports are published at our websites which shows strong competence and long lasting cooperation with cigarette making, supplier, refiners and packaging groups world-wide.

Cooperation with Chinese partners

MLL-1 laser line perforation anti piracy design in particular for tobacco products, enables advance smoking air streams into cigarette filters by further product advantages, holes sizes from 60-150 microns, densities 10-30 h/cm, porosities from 100-1500 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 positioning with different perforation pattern, design, wave, zigzag, cryptograms, scripts, and lines generating 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.
Or touch able as Braille scripts as micro cluster cryptograms. Patent pending DE102004012081.

LPM-1 wide web laser micro perforation, material treatment in particular for paper products as cigarette, tipping other mass material production up to 200 single laser perforation rows cross web, automatic laser perforation line position, focus setting, dual 4 Kilowatt Co2 or others laser beam inputs, web widths up to 1,200 mm, speeds up to 400 m/min, 25,000 metres jumbo roll-by-roll full automatic production.
Including OPSS-1 porosity sensor scanner control, perforation holes from 60-150 microns diameter, densities 10-30 h/cm, porosities from 100-1,000 C.U., up to 2,000,000 holes per second, annual production output up 1,600 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 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 150 m/min.

Press release example
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
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更多信息请联系
IPM - International Perforation Management 国际工程管理公司
hi-tech engineering - China - Germany - Thailand
Mr. Werner Grosse 威尔那.**克**罗瑟先生
传真 **tel/fax: 0049-3212-5097465**
网址：http://www.microperforation.com
网站： http://www.microperforation.com.cn
网站： http://www.deguodaguan.com/ipm/
Email: grosse @microperforation.com