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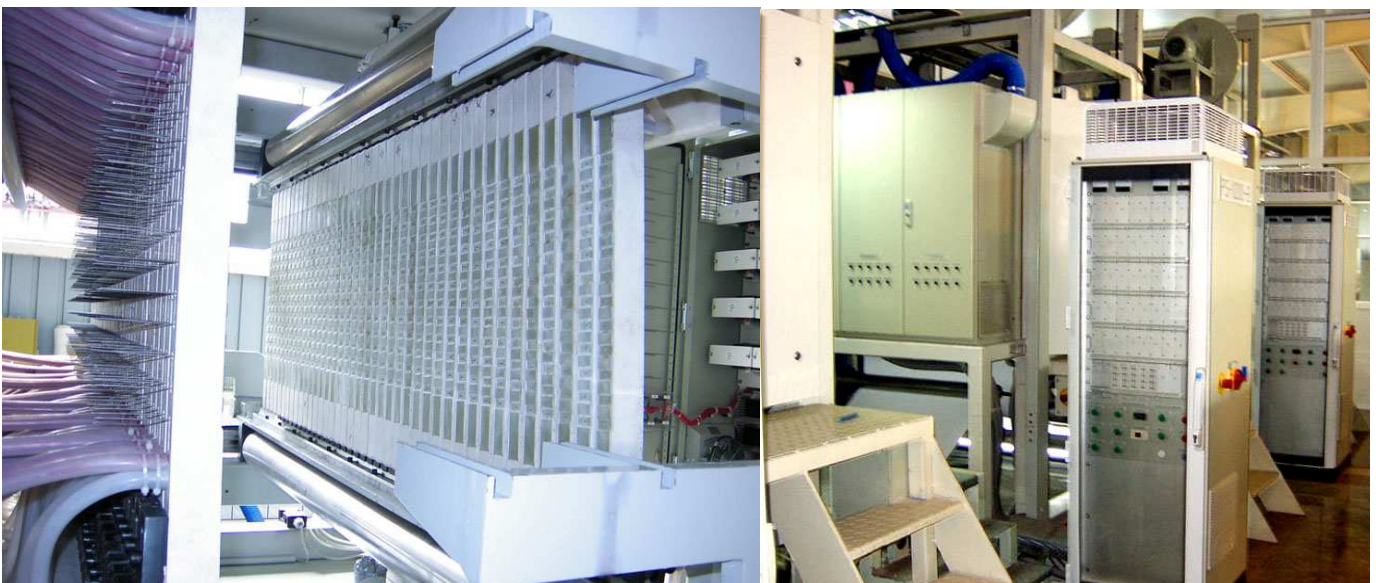
main link <http://www.microperforation.com/ipm-technology.html>

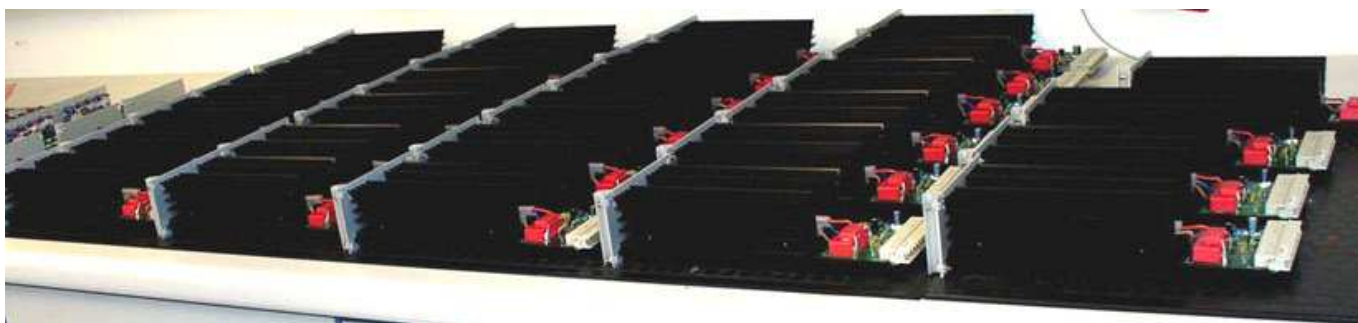
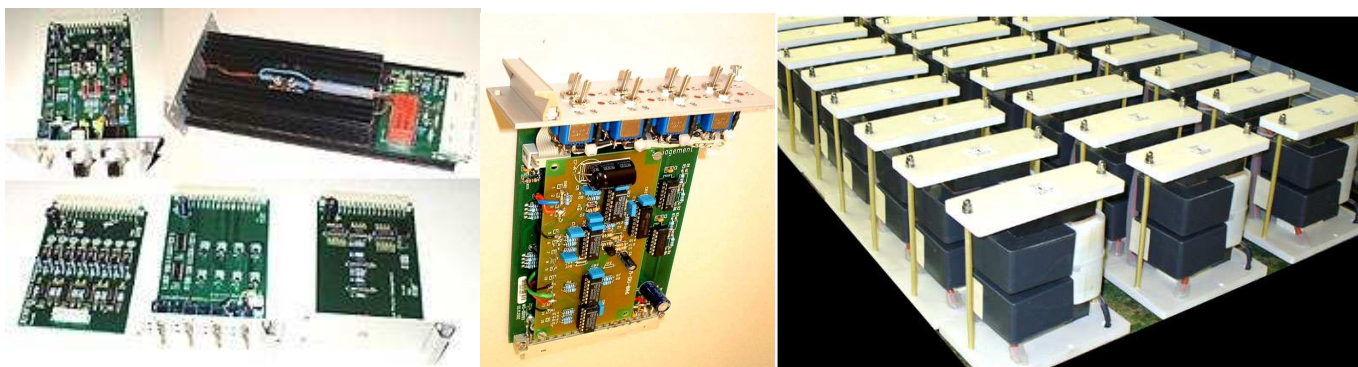
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Micro cluster perforation - archipelagos of technical possibilities

Mikro Perforation - ein Archipel technischer Möglichkeiten

Online sensor scanner porosity and in-situ dyne surface tension measurement at webs





Nano Mikro Technologien für Materialbahnveredelungen

Zur Ventilation oder Atmungsaktivierung werden Zigaretten, Mundstückbelag, Filter, beschichtete Spezial, Kraft, Sack oder Verpackung Papierbahnen, Vliesstoffe, spun bonded non-woven, technische Textilien, Fabrics und Lamine mit Flächengewichten von 20 g/m² bis zu 140 g/m² elektrostatisch ESP Nano, Mikro oder Laser- oder mechanisch Mikro oder Makro perforiert.

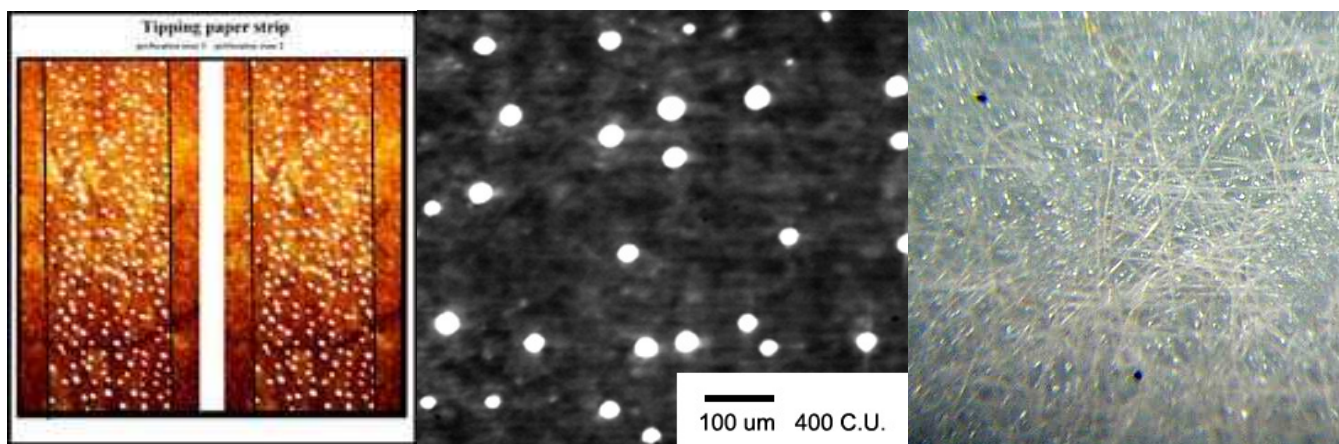
Unter elektrostatischer ESP NANO MIKRO PERFORATION sind statistisch unregelmäßig verteilte, in der Größe, wenn gewünscht mit bis zu 40 % variierende und analog hierzu unter LASER Mikro oder Makro PERFORATION, gleichmäßig angeordnete und im Durchmesser etwa gleichgroße, nach Möglichkeit runde, gradfreie Löcher und Lochreihen verschiedenster Anordnung zu verstehen. Im bis 1.5 mm weiten atmosphärischen Elektrodenspalt erfolgt durch Blümlin- und dielektrisch geförderte Mikroendladungen mit Filamentierung die Erzeugung eines Plasmentunnels zum ionisierten Funkenstreckenkanal im Nanosekundenzeitfenster.

Mit jeder Entladung und Deionisation entsteht für die im Elektrodenspalt relativ schnell durch bewegte Materialbahn eine elektrostatische Nano oder Mikroperforation mit sehr präzise gesteuerten Energieanteilen von 0.1 bis 3 mJ pro Pore, die mit dem menschlichen Auge unsichtbar ist und vollflächig wie auch zonenförmig in bestimmten Abständen über die Bahnbreite verteilt sein kann.

Erzielbaren Lochgrößen sind im Durchmesserbereich von 500 nm - 80 µm bei Lochsequenzen von 1.5 – 16 Million Poren pro Sekunde möglich.

Zonenanordnungen sind in Breiten von 2 bis 6 mm und Porendichten von 120 bis 250 Poren pro cm² erreichbar, wobei Flächenperforationen Lochdichten bis zu 3 Million Poren pro m² generieren.

ESP Perforationen ermöglichen Porositätsbereiche von 80 bis 2500 C.U. (Coresta Unit ml/2cm²/min), Bahnbreiten von 100 bis 2000 mm bei Bahngeschwindigkeiten bis zu 500 m/min, abhängig von der Porosität und Material Konsistenz zur Perforierbarkeit.



Anforderungsprofile

Kardinalforderungen die für viele Applikationsbereiche und Produkte mit Vliesstoffen, Sack- oder Verpackungsbahnen mit einer Gas- oder Wasserdampfdurchlässigkeit aber Wasserundurchlässigkeit verbunden sind, finden sich im Anwendungsbereich der ELEKTROSTATISCHE MIKRO PERFORATION TECHNIK wieder, da Wasser oder andere Flüssigkeiten die relativ kleinen Nano oder Mikroporen von z.B. < 0.5 - 5 µm Durchmesser aufgrund der hydrophoben Oberfläche nicht penetrieren kann.

Diese und weitere physikalische Vorteile der kleinen Poren fordern regelrecht den Einsatz der ESP Mikro Perforationsmethode heraus, da Erfüllungen zur Atmungsforderung und Wasserdampfdurchlässigkeit z.B. nach der ASTM E96-80 oder E96-84 Messmethode mit 100 – 800 g/m²/Tag mit anderen Perforations oder Prozessverfahren nur äußerst schwierig machbar, zu teuer, zu unwirtschaftlich oder bei derart hohen Lochdichten technologisch nicht erreichbar sind.

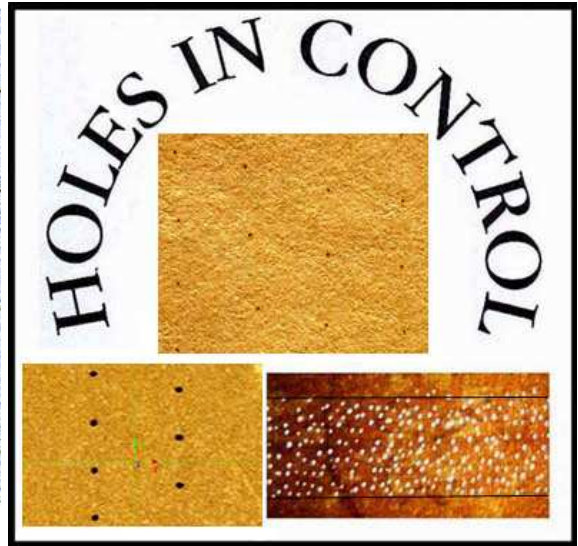
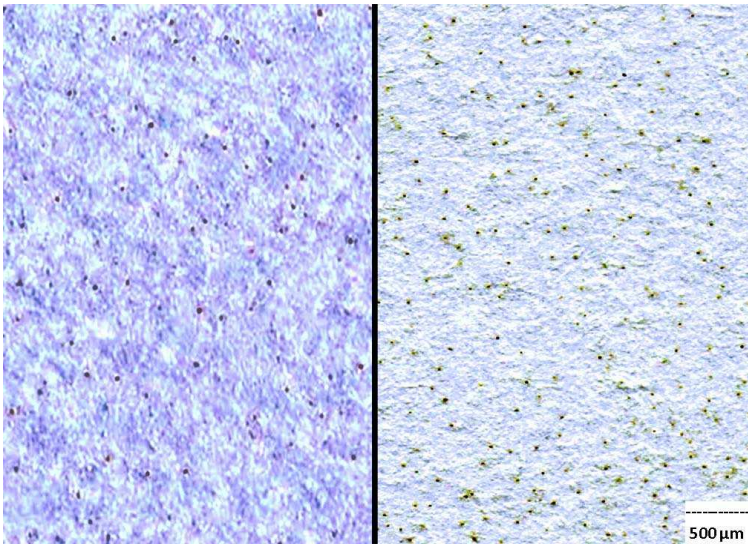


Produktanwendungen

Nachstehend die mögliche Produktpalette mit Eigenschaftsangaben.

Verbundstoffe, Packmittel oder Folienverbunde verschiedener Art lassen sich mittels Mikroventilation, Mikroperforation beispielhaft verwenden für :

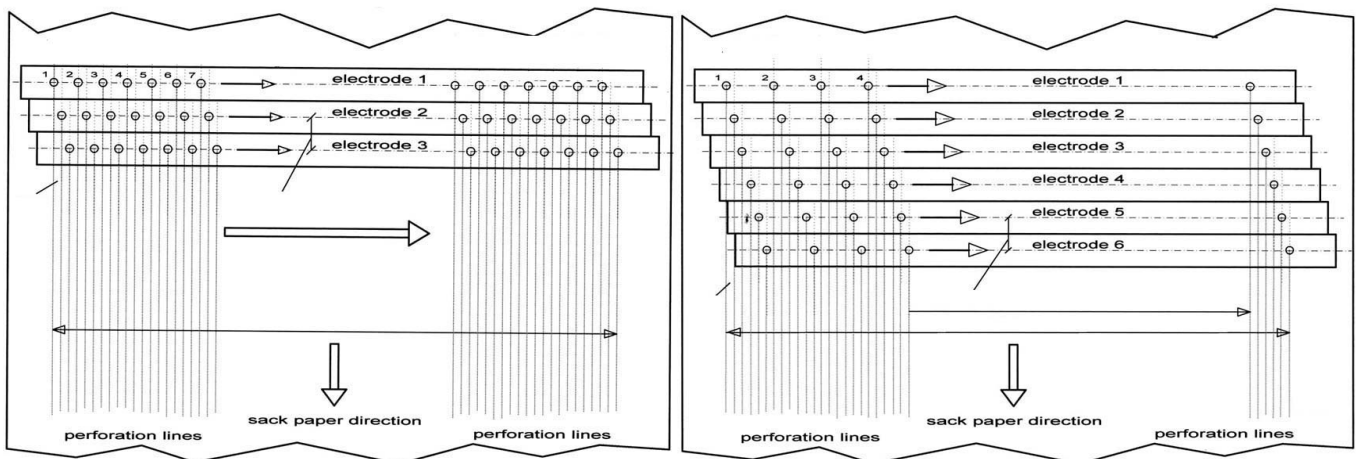
- atmungsaktive Dekorationen mit Beschichtungen oder PVC Verbunde, Vinyl, Dekore mit PE Beschichtungen
- Fugen oder Kanten Kraftpapier Kleinrollenstreifen zum Verkleben von Gipsplatten für Innenausbau zur Luftblasen Diffusion des aufgetragenen Kleber, Vliesverbunde mit dünnen PE-Schichten zum Außengebäudeschutz und Gasaustausch von Holzhäuser
- Gewebeeinlagen mit Gasaustausch zur Vermeidung von Kondenswasserbildung
- Zigarettensfilter Ventilation, Tipping, Plug-Wrap, Papier zur gesteuerten Reduktion von Nikotin, Teer und anderen Schadstoffen
- atmungsaktive Overalls oder Einmalberufskleidung aus PE Vliesen
- beschichtete Papiere für Füllgut, Säcke, Granulate, Gipstüten, Zementsäcke, Tierfutter oder andere Verpackungseinheiten zum verstärkten Luft Auslass zur Befüllung oder Warengut Belüftung Lagerung benötigen
- Biotope, Gewässer mit Sauerstoffanreicherung
- Bekleidungseinlagen, Echtleder, Leder, Kunstleder oder inlet mit komfortablen Trageeigenschaften
- Seifen, Deo, Hygiene, Hautpflegemittel, Babypflege oder body care Produkte mit Duftstoff Suggestierung, Indikator als Marketing Instrument
- Gemüse oder Blumen Verpackungen aus Papier oder Ersatzstoffen mit Gasaustausch
- Brot, Brötchen, Früchte, Lebensmittel, Nahrungsmittel zur Erhaltung von Frische und Aroma
- technische Verbundfolien für industrielle, medizinische, biologische Filtration Zwecke
- Nano Filtration, Mikrofiltration, Mikromembrane, Batterie Separation
- Bioanalyse, Alkohol Filtration, Flüssigkeitsfiltration, Medizintechnik, Analysetechnik, Labortechnik, Agrarwirtschaft
- Produktvorteile mit Reduktion von Sack oder Beutel Befüllungszeiten mit attraktiven Luftdurchsatzbereichen bei 200 bis 500 Coresta oder 14 bis 4 Gurley
- unveränderter Außenschutz des Verpackungsproduktes
- Luft Auslass ohne Beeinträchtigung verpackter Produkte und Eigenschaften
- Erhaltung der Barriereeigenschaften, Duft Indikation und Suggestierung für Käufer ohne die Packung zu öffnen
- Atmungsaktivität von Wandtapeten, Wandverkleidungen zur Vermeidung von Schimmelbildung oder Fäulnis
- Brotpapier für längeren Haltbarkeit, Aroma und Frischeerhaltung
- Haltbarkeitsverlängerung, Pflanzenabdeckungen, Förderung oder Verlangsamung von Wachstumsprozessen
- Gemüse, Früchte, Produkt Geschmack Entwicklungen innerhalb atmungsaktiver Außenhülle
- Tragkomfort von Bekleidung Einlagen, Sitzpolster, keine Schweißbildung bei Einwegbekleidung, Lackier overalls oder Kesselanzüge
- Unterdachspannbahnen zum Luftaustausch zur Blockierung von Tropfsteinhöhle Effekt
- Reinigung und Abscheidungsprozesse mit Membrantechnik, Blutkörper
- Partikel und organische Filtration für medizinische, biotechnische und industrielle Analysen



beispielhafte Produktvorteile und Anwendung Felder

- signifikante Reduktion von Sack oder Beutelfüllzeiten um bis um 100 %
- attraktive Luftdurchlässigkeit Bereiche bei 200 - 350 C.U. = 6.5 bis 3.5 Gurley bzw. 14 - 6 Gurley s/100ml
- vollständig nach außen erhaltener Schutz des Verpackung Produkts
- Luft Auslass ohne Beeinträchtigung verpackter Produkte und deren elementar Eigenschaften
- Erhaltung der Barriere Eigenschaften
- Duft Übertragung und Suggestion an Produktkäufer ohne die Packung zuvor zu öffnen
- Atmungsaktivität von Wandtapeten oder Wandverkleidungen um Schimmelbildung und Fäulnis zu vermeiden
- Brotpapierverpackungen zur längeren Haltbarkeit
- Atmungsaktivität und Tragkomfort von Bekleidungseinlagen oder inlets
- Einwegbleidungsindustrie, Lackier oder Kesselanzüge, usw.
- Unterdachspannbahnen zum Luftaustausch von Innen nach Außen zur Verhinderung von Tropfsteinhöhleneffekte

Anordnungen von Perforationselektroden



Berechnungen für Flächenperforationen

Grundformeln zur praktischen Auslegung einer Anlage

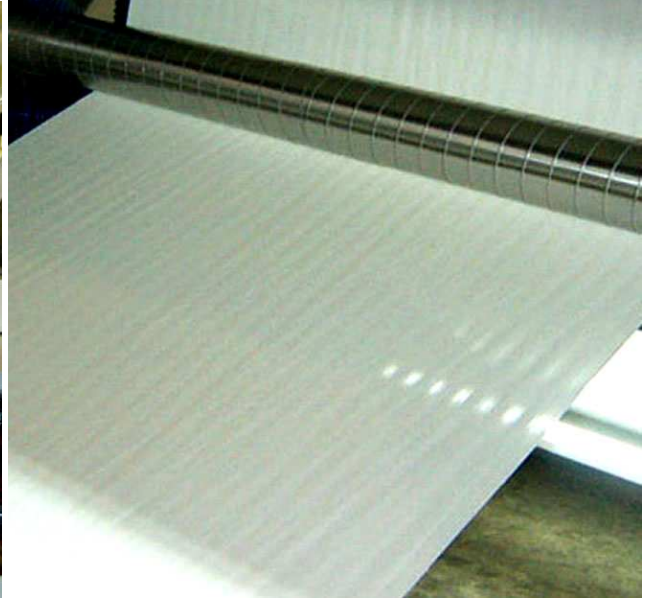
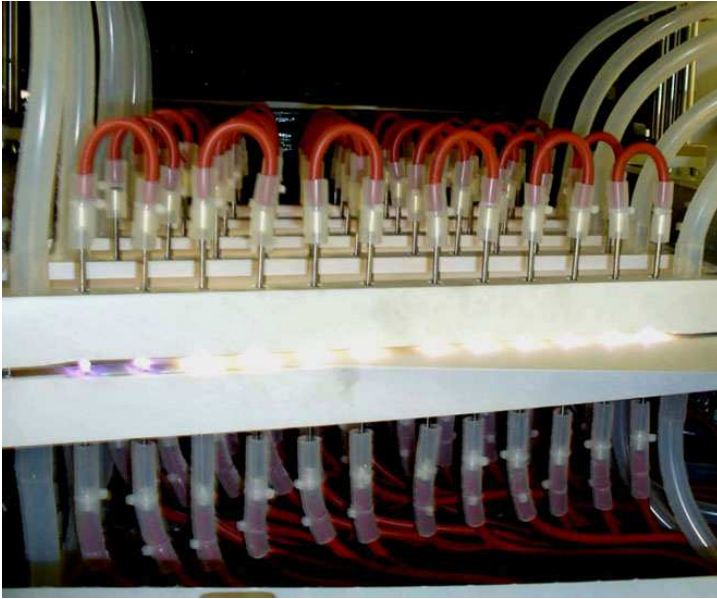
- (1) Anzahl der Elektrodenpaare : $\text{INT} (\text{Bahnbreite (m)} / (\text{K-Ab} * \text{n-Stifte-E}))$
- (2) Porendichte : $(\text{Summe-Estifte} * f) / (\text{BB (m)} * \text{Vb (m/s)})$
- (3) Porenabstand in Laufrichtung : $\text{Vb (m/s)} / f (1/s)$

Formelzeichen

- K-Ab = kleinster Lochreihenabstand in Bahnquerrichtung, z.B. 0.8 mm
 n-Stifte-E = Anzahl der Elektrodenstifte pro Elektrodenpaar, z.B. 12, 24, 32, 48
 Vb = Bahngeschwindigkeit in m/s
 F = Repetitionsfrequenz der Funkenstrecken in Hz, z.B. 4000 Hz, 6000 Hz, 10000 Hz
 BB = Bahnbreite in Meter

Berechnungsbeispiel

Bahnbreite = 1m, Bahngeschwindigkeit = 300 m/min = 5 m/Sek., $f = 6000 \text{ Hz}$,
 $K\text{-Ab} = 0.8 \text{ mm}$ (min. Abstand in Querrichtung), $n\text{-Stifte-E} = 48$
 (1) = $\text{INT} (1000 \text{ mm} / (0.8 \text{ mm} * 48)) = 26 \text{ Elektrodenpaare}$
 (2) = $(48 * 26 * 6000 \text{ 1/s}) / (1 \text{ m} * 5 \text{ m/s}) = 1.497.600 \text{ Poren/m}^2$
 (3) = $5 \text{ m/s} / 6000 \text{ 1/s} = 0.83 \text{ mm Porenabstand in Laufrichtung}$



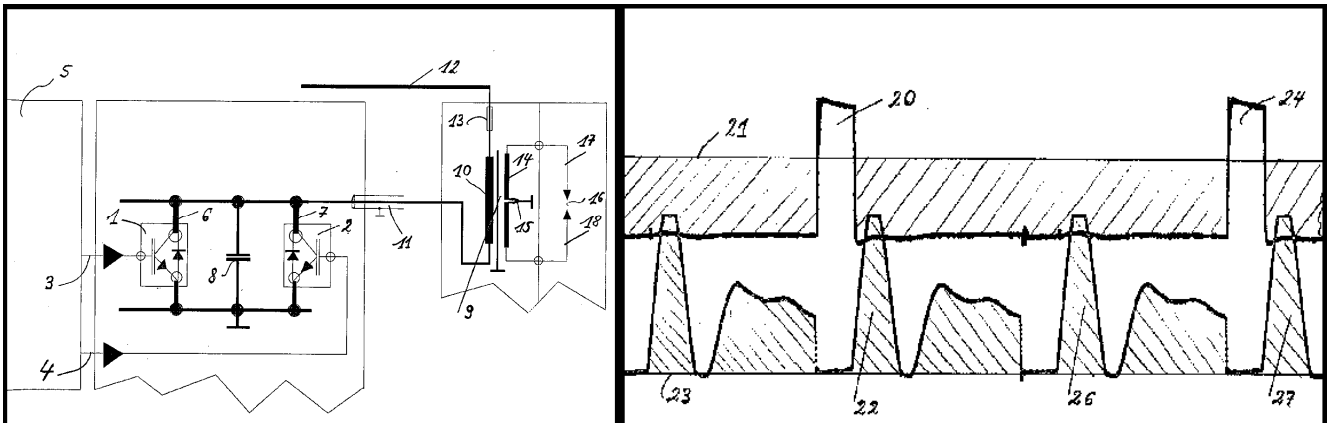
Resumee

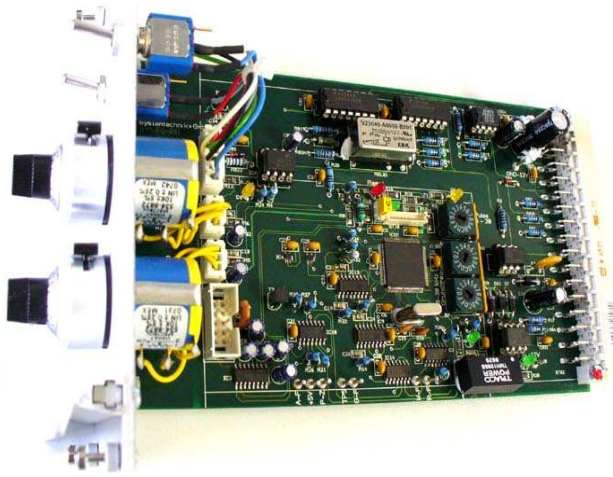
Nur die elektrostatische Mikroperforation ermöglicht durch sehr präzise Energieeinkopplung, Filamentierung, dielektrisch geförderte Mikro- und Plasmenentladung eine nano oder mikrofeine Ventilation für Packmitteln mit Barriereeigenschaften, Atmungsaktivität von Massenprodukten, industriellen oder medizinischen Nano oder Mikromembranen, Vliesstoffe und insbesondere Papierbahnen verschiedenster Art bei großen Bahnbreiten und Geschwindigkeiten.

Dieser Trend wird sich für spezielle Produkteigenschaften und Anwendungen weiter fortsetzen.

Durch Neuentwicklungen in der elektronischen Leistungsschaltungstopologie mit IGBT, BJT, MOSFET, FRETET oder HVFET zur Erzeugung sehr feiner, stromgesteuerter Hochspannungsentladungsimpulse im Zeitfenster von 10 ns bis 15 μs und einzelner Ladungsenergien von 0.1 bis 3 mJ hat die Nanotechnologie zur Submikroperforation auch im diesem Bereich der Feinpapierveredelung und Verpackungsindustrie Einzug gehalten. Patenterteilung DE10328937.

Details <http://www.microperforation.com/igbt-esp-unit.html>





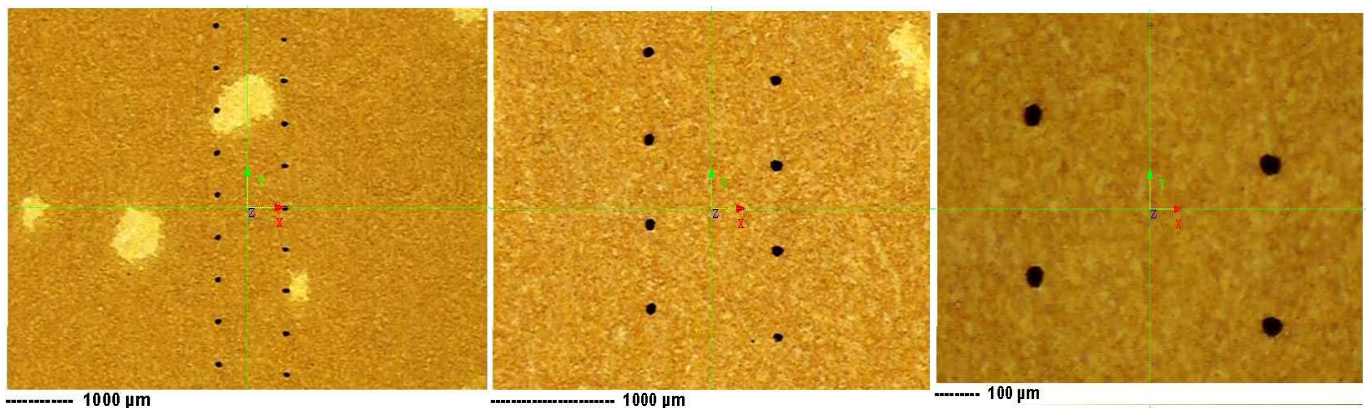
Kunststofffolien wie PE, PP, PVC, LLDPE, BOPP, EVA, MVA, FEP, HDPE lassen sich auch zukünftig besser mit hot oder micro needle oder anderen mechanischen sowie Gasendladung oder Festkörperlaser gesteuert perforieren.

In diesem weiten Applikationsspektrum ist es denkbar auch dahingehend entwickelte, angepasste Laser Perforation Systeme für Breitbahnen bis zu 2000 mm und Lochsequenzen über 3 Mil./Sek. einzusetzen.

Konventionelle Laserperforationstechnik

Durch gepulste, fokussierte Laserstrahlen sind mit im Markt angebotenen Anlagen Lochgrößen von 60 - 200 μm bei Lochdichten von typischer Weise 10 - 30 Löcher pro cm, Lochsequenzen von 100.000 bis 300.000 Löcher pro Sekunde, bei maximal 16 oder 32 Laserlochreihen über die Bahnbreite verteilt, möglich.

Deren Porositätsbereiche bewegen sich zwischen 100 – 3000 C.U., in der Regel mit Bahnbreiten von 100 – 500 mm bei Bahngeschwindigkeiten bis 600 m/min, abhängig von der Porosität und Materialkonsistenz zur Perforierbarkeit.



Laserperforationstechniken von IPM

Mit Entwicklung eines Dual Hochleistungslasermultiplexers und optischen Eingangsleistungen bis zu 8 KW (fast flow or SLAB Laser mit vorzugsweise 10.6 μm aber auch anderen Wellenlängen) ist es erstmalig gelungen, bis zu 200 separierte optische Laserstrahlausgänge zu realisieren mit denen nunmehr Papier Perforationen in breiten Bahnen bis zu 2000 mm möglich sind.

Dies jetzt mit Lochsequenzen bis zu 2 Millionen pro Sekunde, Lochgrößen von 60-100 μm , Lochdichten von typisch 10 – 30 Löcher pro cm, Porositäten im Bereich von 100 bis 1000 C.U., Bahngeschwindigkeiten bis zu 400 m/min und non stopp 25.000 Meter Jumbo Rollenbetrieb auf der Ab- und Aufwicklung, was eine jährliche Ausbringung von bis zu 2000 Tonnen von laserperforierten Feinpapieren an dieser high Automation Produktionsmaschine LPM-1 bei exorbitant geringen Papierausschuss von < 1% und QUAFÖ Qualitätszertifizierung einer jeder Produktionsrolle ermöglicht. Patenterteilung DE102004001327.

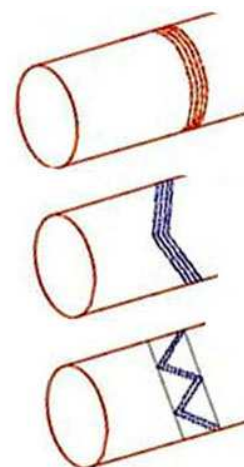
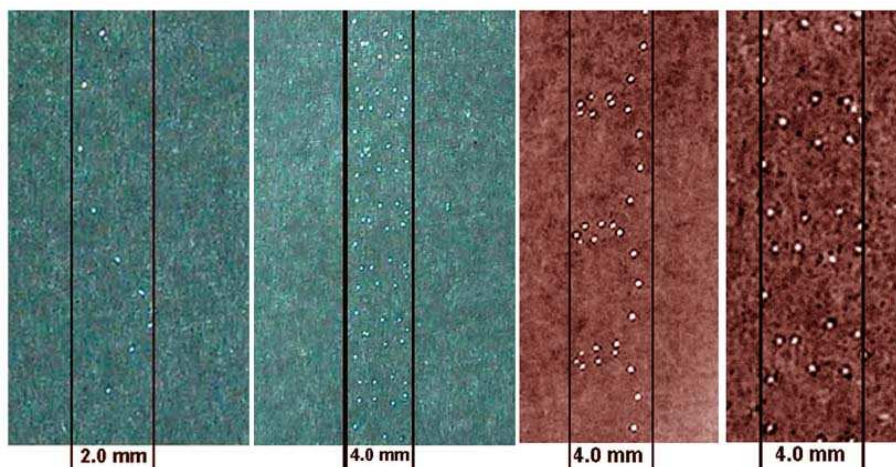
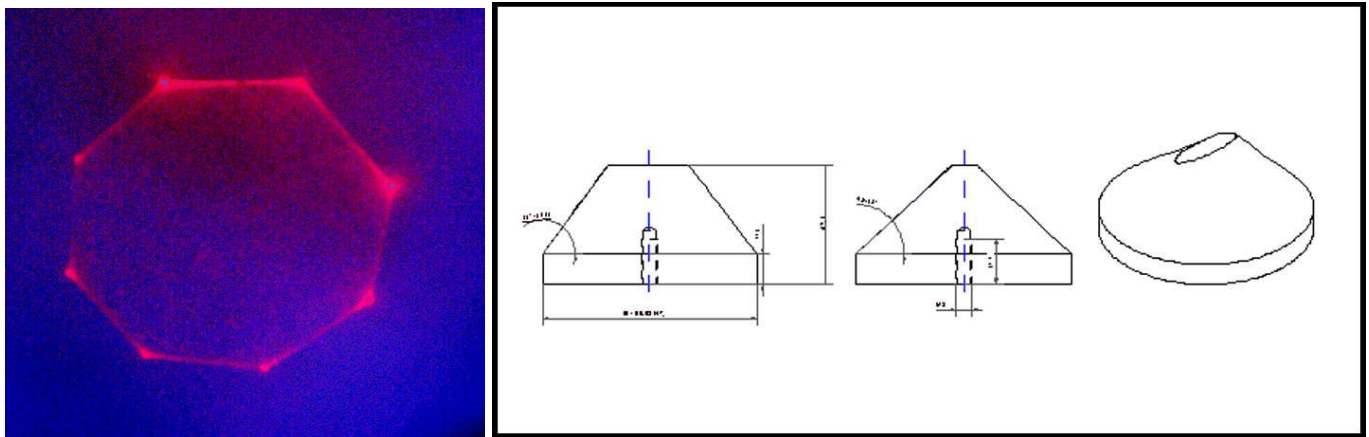
Hierbei ist das optische online Porosität POROVISION Messsystem OPSS-1 zur präzisen Positionskontrolle aller Laserperforationslinien sowie die permanente Erfassung der Porositätsprofile ein integraler Bestandteil der ISO Qualitätskontrolle und Datenauswertung zum Ende einer jeden Produktionsrolle. Patentanmeldung DE10251610 und Erteilung in China 200310104764.

Eine weitere Entwicklung der Micro Laser Line Perforationstechnologie MLL-1 generiert nicht geradlinige Lochreihenarrangierungen auf Produkte. Z.B. sind auf Mundstückbelag Papierblättchen der Zigarettenfilter, RYO, MYO usw. jetzt losgelöst von den seit 20 Jahren traditionell coaxial verlaufenden Laserperforationen, wellenförmige, Zickzack, Rechteck, Dreieck, gewundene Lochreihenlinien oder Paare, Firmenlogos, Kryptogramme, anti counterfeiting Merkmale oder andere Perforationsausführungsformen mit zeitlich sehr schnell und präzise aus gelenkten Laserstrahlen möglich. Alles dies bei Lochgrößen von 60 - 120 μm , Lochdichten von typisch 10 – 30 Mikrolöcher pro cm in einer jeder Lochreihe, Lochsequenzen von 100.000 bis 300.000 Löcher pro Sekunde bei Porositätsbereichen von 100 – 800 C.U.

Verfahrens, Vorrichtung und Produkt Schutzanmeldung DE102004012081

Verpackungs und Kunststofffolienprodukte lassen sich mit dem Mikro Laserperforationsverfahren MLL-1 in gleicher Weise veredeln. Wobei sich die Anwendungen nicht nur auf das Perforieren beschränken, sondern auch für den **Einsatz vieler Industriebereiche zur Lasermaterialbearbeitung und Oberflächenbehandlungen wie schweißen, formen, trennen, vergüten, bohren, öffnen, fügen usw. übertragbar sind.**

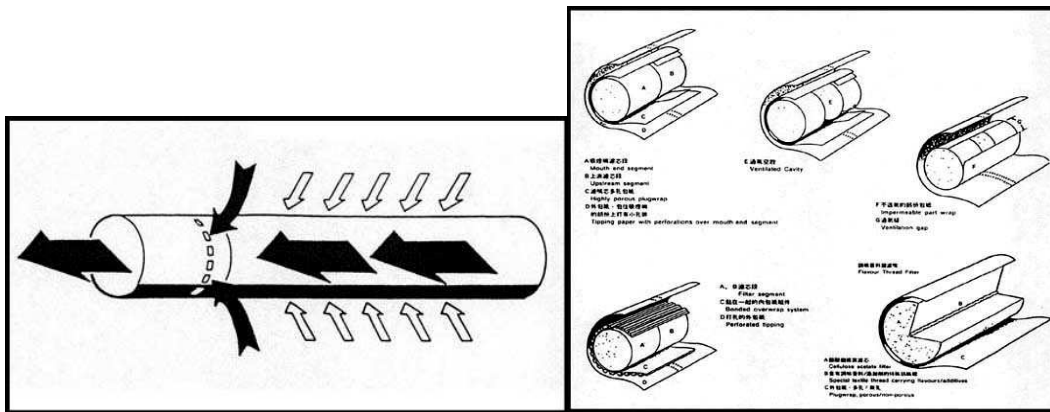
Details <http://www.microperforation.com/lpm-1.html>



Details <http://www.microperforation.com/ml-1-laser-perforation.html>

Ventilation Massenprodukte

Die elektrostatische Mikroperforation ist seit 30 Jahren zur Ventilation von wenigen Nichtfilter und jetzt für fast alle im Markt befindlichen Filterzigaretten eingesetzt, um gesteuerte Luft Bypass Eigenschaften, dem so genannten Lindströmprinzip, zu erzeugen. Hierzu wird das Zigarettenpapier für wenige Nichtfilterzigaretten z.B. auch Roll-your-own RYO und bei fast allen Filterzigaretten das Mundstückbelagpapier, dem so genannten Tipping aber auch das Plug-Wrap Papierblättchen, elektrostatisch im Offline Verfahren Zonen Mikro perforiert, um gewünschte Poren im Durchmesserbereich von 10 - 70 μm generieren.



Oder mit fokussierten Laserstrahlen in offline Verfahren Lochreihenperforationen aber auch im Online Verfahren an der Filteransetzmaschine direkt durch das Mundstückbelag Papierblättchen bis in den Zigarettenfilter gewünschte Poren im Durchmesserbereich von 60 - 120 μm einzubringen, um so Nikotin, Kondensat und Schadstoffanteile für den Raucher über die gesteuerte Ventilationskombination auf strikt vorgegebene Werte zu reduzieren.

Vor vielen Jahren hat IPM u.a. auch zur Online Mikroperforation an Zigarettenherstellungsmaschinen ein Verfahren entwickelt und seinerzeit unter EP0460369 sowie DE4018209 zum Patent angemeldet, welche das Einbringen von Mikroperforationsprofilen über die jeweilige Zigarettenlänge sowie in deren Umfang an beliebigen Stellen des Zigarettenpapiers erlaubt.

<http://www.freepatentsonline.com/EP0460369.html>

<http://www.microperforation.com/online-perforation-cigarette.html>

ONLINE LASER PERFORATION at cigarette making machines - patent granted multiplexer DE102004001327

A – laser source and IPM patent grand multiplexer with 8 optical channels

by 8 laser lines, 10.6 μm , Co2, sealed off laser, $M < 0.9$, e.g. Coherent ULR-300, 300W Synrad, PRC
by 4 laser lines, 10.6 μm , Co2, sealed off laser, $M < 0.9$, e.g. Coherent ULR-150, 200W Synrad, PRC
laser source dimensions all over approx: 1,100*200*200 mm, water cooled
output 45 grad divert mirror

IPM multiple laser beam multiplexer

center rotate twin beam splitter and high speed motor (not shown) up to 900 rpm/sec.

diameter approx. 400 mm, high approx. 200 mm

8 optical output channels, coupled special flexible hollow fibers, each in lengths 1,000-3,000 mm

B – bobbin winder and perforation heads

tipping paper from 48 up 64 mm web width

8 perforation heads, 4 on each side

each laser beam supply with special hollow fiber and auto focus devices

diameter of each focus device around 25 mm, distances in web direction around 50 mm

length of necessary perforation section approx. 200 mm by 8 laser lines

necessary width of perforation section - tipping paper width + 40 mm on both sides

C – tipping paper strips with 8 laser perforation lines

up to 10,000 cpm or 135 m/min tipping paper speed

4 laser perforation lines on each side

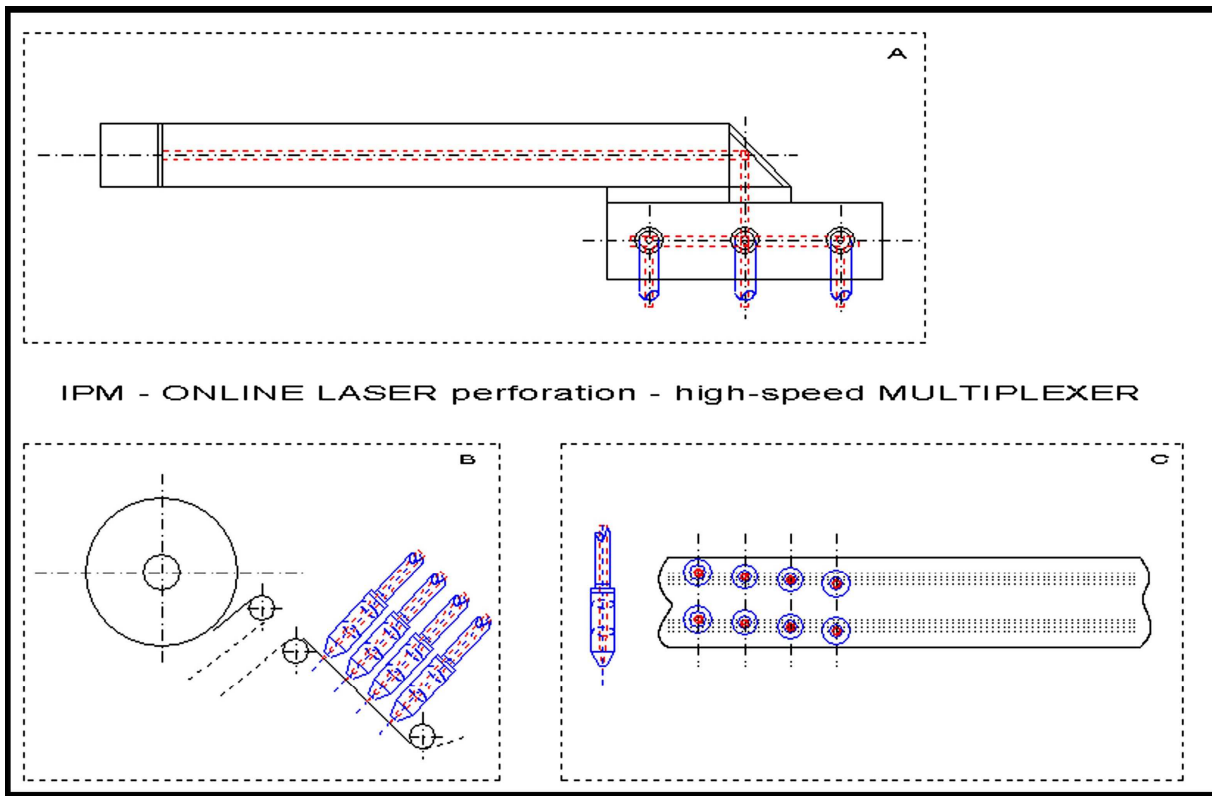
total round or oval hole sizes between 60-180 microns diameter

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 10-80% with twin or quad rows

by 8h/cm*8 holes/rows*135 m/min = 14,440 holes/s in total



Optische online Permeabilität Porositätsmessung

Da die naturporösen oder zu perforierenden Bahnmateriale sich mit Bahngeschwindigkeiten bis zu 600 m/min und in Bahnbreiten bis zu 2000 mm bewegen, gestaltet sich eine pneumatische, also Bahn berührende Porositätsmessung, exorbitant schwierig.

Hinzukommend sind diese Messmethoden mit Nachteilen der Bahnzugserhöhung, des Materialabriebs, Faltenbildung, Undichtigkeit im Messkopfbereich, starken Verschmutzungen, Nichtlinearitäten und Schwierigkeiten stets verbunden.

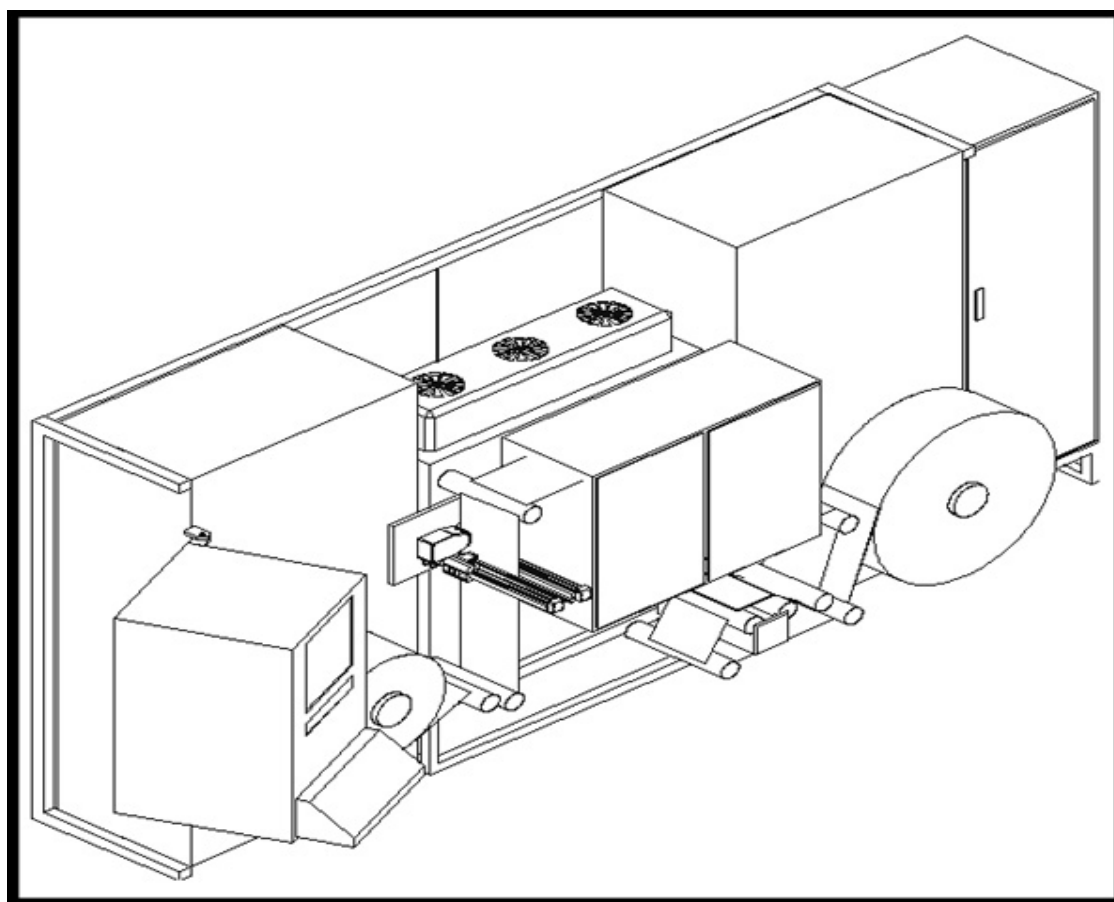
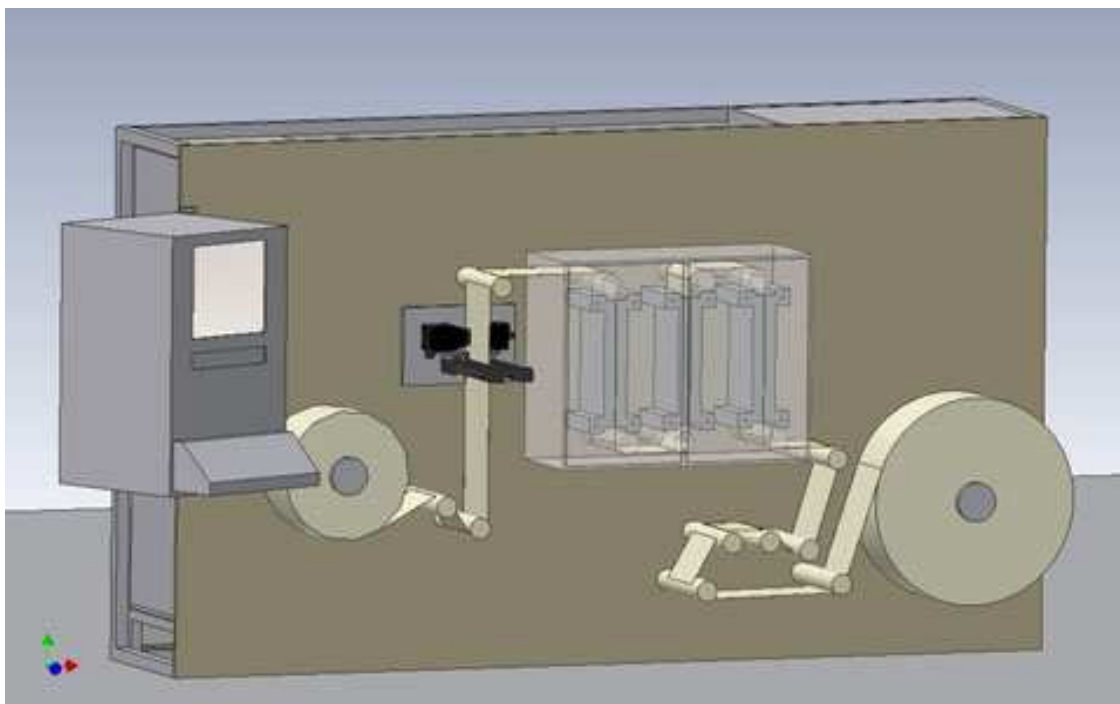
Daher bieten sich optische Messverfahren zur Transmissionsmessung als Funktion der pneumatisch, statischen Gasdurchlässigkeit für naturporöse oder Nano, Mikro bzw. Makro perforierte Bahnen an.

Dabei sind die gestellten Anforderungen aufgrund der eingangs genannten Produktverarbeitung und online Kontrolle, extrem kleinen geometrischen Porenabmessungen, relativ hohen Bahngeschwindigkeiten und guter Messwert Reproduktion mit der optischen Porositätsmesstechnik in idealer Weise zu lösen.

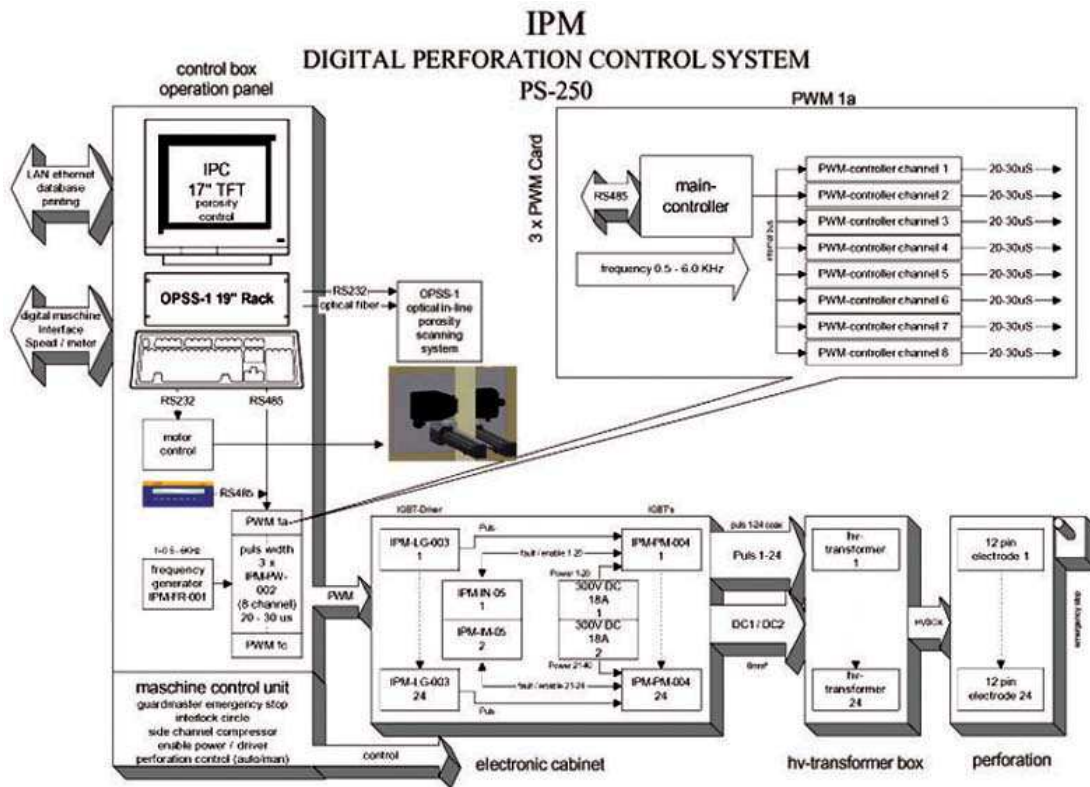
OPSS-1 online porosity sensor scanner measurement - download [OPSS-1](#)

Hierzu hat IPM eine Reihe Patent angemeldeter optischer Messverfahren und Systeme in stationärer oder travers bewegter Ausführung als OPSS-1 und OPRL-1, entwickelt, weltweit im Markt eingeführt und mit DE10251610 sowie auch in China unter 200310104764 zur Patentanmeldung geführt.

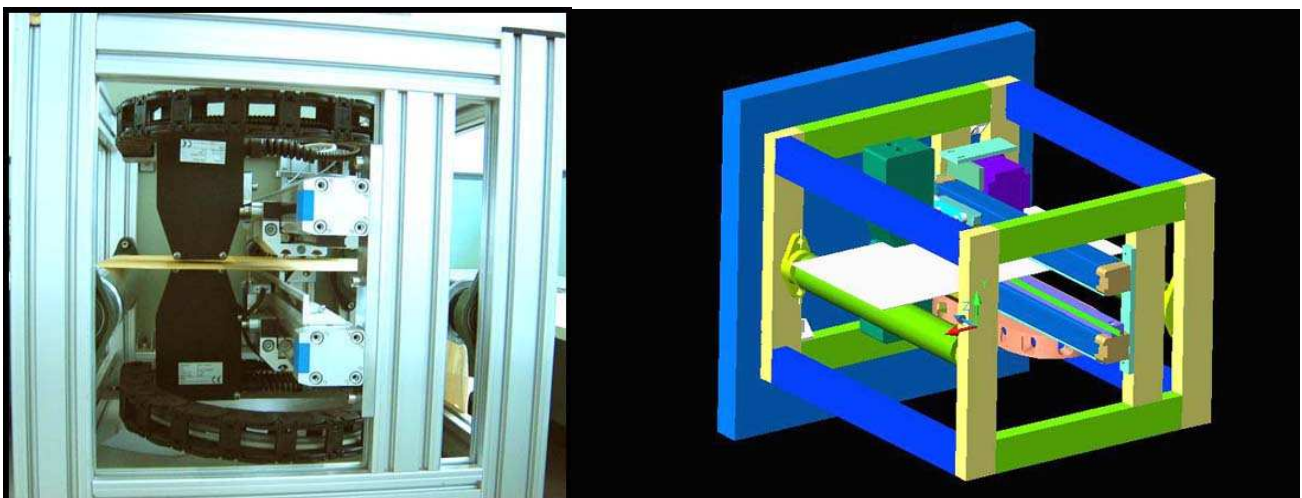
Details <http://www.microperforation.com/opss-1-optical-online-porosity.html>



PS-250-4 vierfach Bobinen Perforationsmaschine - download [PS-250-4](#)



Porositätsmessbereiche von 80 C.U. bis 5000 C.U. mit Multispektral Sensoren, Perforation Lochreihen Erfassungen mit Auflösungen < 0.1 mm mit Präzision Linienlaser, Scanning Speeds von 20 bis zum 300 mm/Sek., intelligente Multicontroller DSP Controller Elektronik im Sensorkopf, high speed RS-232 Link sowie Auswerteeinheiten sichern die qualitative, quantitative online Kontrolle nach ISO 9001/9002 an verschiedenen Produktionsmaschinen.



IPM International Perforation Management hat verschiedene Laser und elektrostatische Perforationsverfahren, insbesondere für neue Produkteigenschaften entwickelt, deren Produktionsmaschinen weltweit im Einsatz sind.

Zukunftsperspektiven

Die elektrostatische ESP Nano oder Mikroperforation findet vorzugsweise ihre Anwendung in Bereichen der Veredelung von Feinpapieren, Verpackungsbahnen, Vliesstoffen, Non-Wovens, Filter, Sack oder Kraft sowie Spezialpapiere verschiedenster Art, insbesondere bei der zusätzlichen Behandlung von Bahnmaterialien zur Erzielung besonderer Eigenschaften, welche aus physikalischen oder prozesstechnischen Gründen NICHT mit anderen Verfahrenstechniken erreichbar sind.

Die state-of-the-art, Industrie taugliche und im Dreischichtbetrieb zuverlässig arbeitende ESP Perforationstechnik, deren Integrationsmöglichkeit in vorhandene Umroller oder sonstige Bahnlaufanlagen sowie auch als völlig eigenständig arbeitende Perforationsmaschinen möglich sind, wird zukünftig neue Anwendungsbereiche erschließen und Produkte mit besonderen Eigenschaften entstehen lassen.

Electrostatic micro cluster perforation



Perforation

Web material as regenerated cellulose films, filter, cigarette, tipping, roll-your-own rolling 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 as material treatment, based at micro discharging and sparking, plasma tunnel effects with gas atomic ionization in Nanoseconds. Pores are normally statistical irregularly distributes in controlled size ranges from 0.1 up to 80 microns diameter and analogically, under laser or micro or macro perforation, arranged in diameter sizes from 60 to 200 microns, at best non inclined holes und holes rows of diverse arrangement comprehension. For the naked human eye invisible pores of electrostatic micro perforations may be arranged in areas, surface-all-over or zone bands with specific distances within its web. Controlled pore sizes in wide ranges from 0.1 up to 80 microns diameter by holes sequences up to 16 million pores per second and 0.1 to 3 mill Joule discharge energy for each pore. Processes and power electronics are patent grant with DE10328937.

Performance

Arrangements of zones are usually carried out in width from 2 to 6 mm and densities from 15 up to 250 pores per square cm whereas the perforation results of surface-all-over results up to 5 million pores per m². Electrostatic perforations allows porosity levels from 80 up to 1,500 Coresta Units (ml/min/2cm² by 1,000 Pa), equality from 40 down to 6 Gurley, by material web widths from 100 to 2,000 mm by speeds of up to 500 m/min, depending on porosity and material consistency in relation to its ability to perforate.

PS-1200 wide web perforation machine - download [PS-1200](#)



Physical Properties

Which can be applied to many application purposes and products containing bonded fabrics, bag or packaging paper, non-woven, etc. 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 sizes from 0.1 up to 80 microns up to 3 million/m². This is due to the water greater surface tension which hampers the permeation through the relatively small micro pores. These and other physical advantages of the relatively small pores necessarily demand the application of the cluster perforation method because alternative perforation or processes are not feasible, too expensive or simply uneconomical and would not lead to a successful application.

Products, applications, advantages with high-holes densities micro perforation, ventilation with unique mass product properties

- Breathable, ventilated products as cigarette, tipping, filter, packaging, plug wrap, refinish or fine paper
- booklet, bible, printing, magazine, promotion, flyers or newspaper with improved or modified surface property
- decoration, gift or wall paper with thin coatings
- thin PE contacted Kraft paper for bags, cement sacks, plaster, maize, grain, pet food, granulate or powder
- for gained air outlet during filling processes with multiple time reduces efficiency
- to keep packed products in the same barrier condition than without micro perforation
- extending storage, live time or durability of certain goods and products
- joint or corner Kraft paper tapes to avoid glue bubbles and enables material diffusion
- PVC laminates or Vinyl to eliminate one side condensation effects
- or enable gas exchanges to avoid rises of mildew or rottenness
- fleece bond material with thin film layers for outdoor, under roof protection, covering of wooden houses for oxygen exchanges
- technical textiles for gas exchanges to avoid condensation processes
- breathable overalls, heavy duty or disposable work dresses, trousers, jackets, made of thin PE fleeces or other material
- biotopes and prevention of water pollution
- leather or cloth inlets for comfortable non sweat wearing under wet, high humidity and tropical condition
- soap, deodorant, hygiene, beauty creams, baby care or other packaging products which needs smell suggestion for marketing indication and sales promotions
- vegetable, flowers or food with paper packaging replacements for oxygen exchanges
- bread, rolls, fruits or food to improve freshness and aroma with paper based packing
- technical multi layer foils for industry, medical, bioengineering or filtration purposes, surface modification or improve roughness
- micro filter, membranes, battery separation layers
- bio or lab analytics, alcohol, liquid or blood filtration, clean room, agriculture plant applications
- reduction or force growth rates of bio processes

Simultaneous multilayer micro perforation for sack, bag and other paper products

With several evaluation and test possibilities a new process solution is creates for high ventilated sacks or bags. To micro perforate simultaneously three paper layers as multiwall or multilayer in surface-all-over design or on certain area if necessary.

Single base paper weights of 70-100 g/m², by one layer of 15 g/m² PE coated, porosity ranges from 12 down to 6 Gurley, pore sizes from 60-100 microns, pore densities from 50,000-150,000 per m², speeds up to 200 m/min or e.g. 280 sacks per minute are achieve able.

With demands of high process efficiencies and economical aspects one online electrostatic perforation unit can add or embedded just behind unwind stands and rolls, at printing section or entre of sack tuber manufacturing line by web widths up to 1,400 mm.

Processes and devices are provides for international patent application.

Our state-of-the-art industrially approved, sophisticated, compact, multi functional, or with online sensor scanner measurement equipped, electrostatic perforation technologies operates precise and reliable 24/7, are integrate able into existing rewinding, slitting, cutting, re-spooling, spreading, printing, labeling, multilayer sack, bag manufacturing or other complex production lines, machines and processes as well.

Also, they can be used as completely independent offline surface-all-over or zone micro perforation units. Fully new ranges of applications enable total new products with special features, properties and market niches.

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 100-1,000 mm, 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 grant 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 2,000 mm 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.

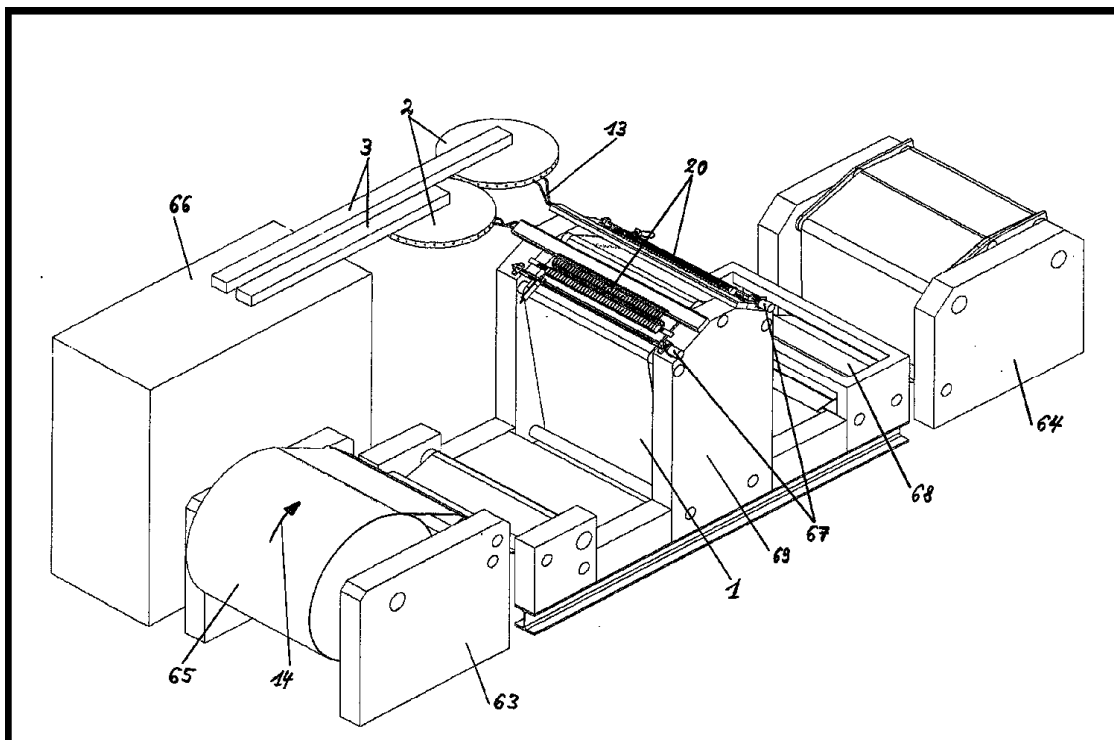
Other industry fields

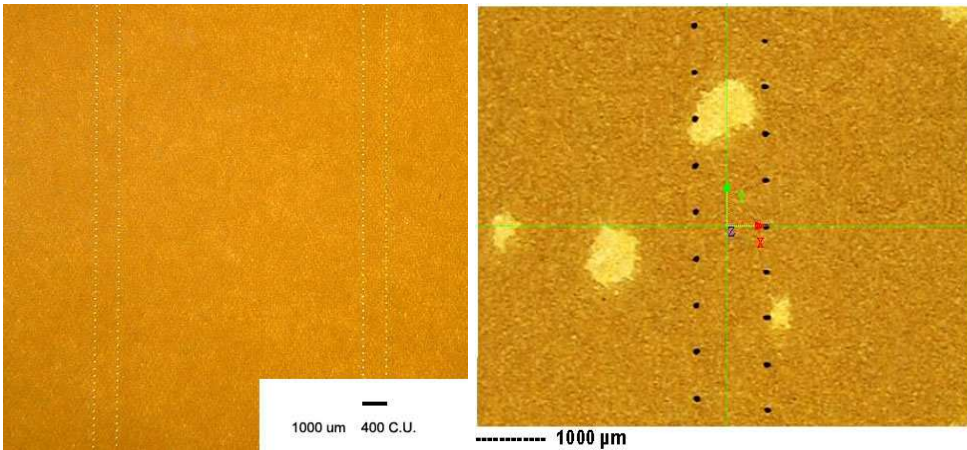
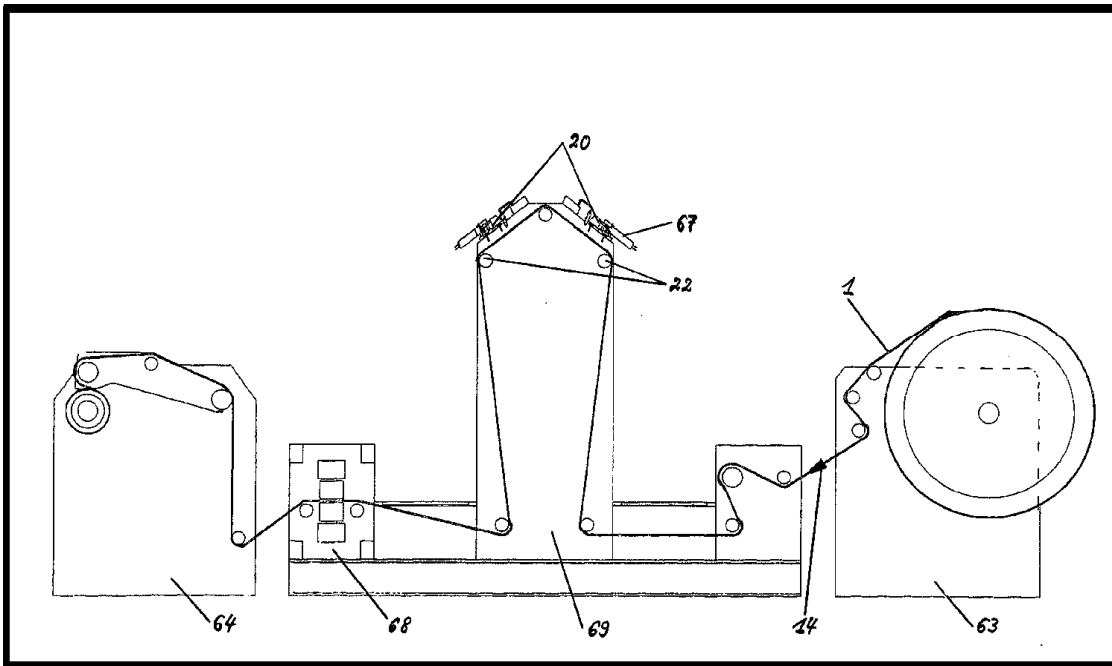
The conception of high power, twin level vacuum, high spins laser beam splitter into the multiplexer enables many other options of industry fields as cutting, cut-off, welding, surface finishing, drilling, ablation, cleaning, micromachining, polishing, forming, melting, surface treatment, roughness improvement.

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.



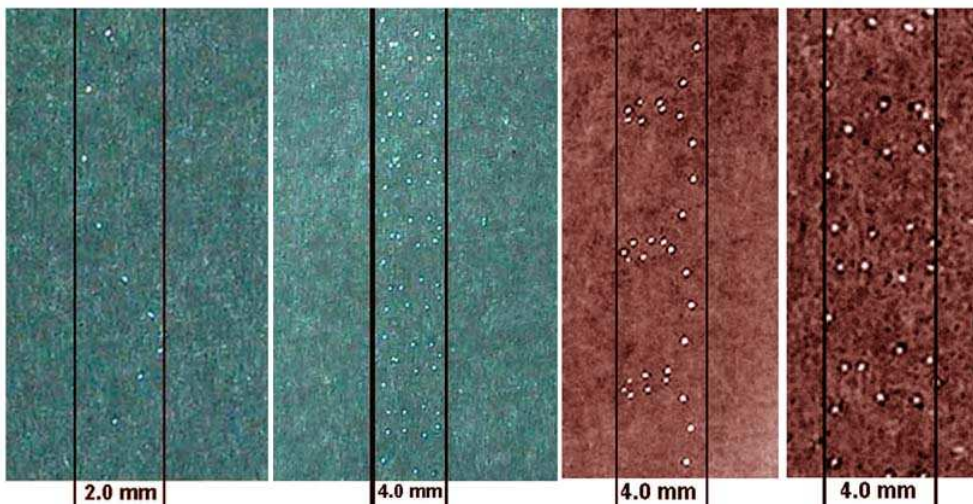


Anti piracy, counterfeiting laser design

As known off-line 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 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.



more details <http://www.microperforation.com/ml-1-laser-perforation.html>

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 holes 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.

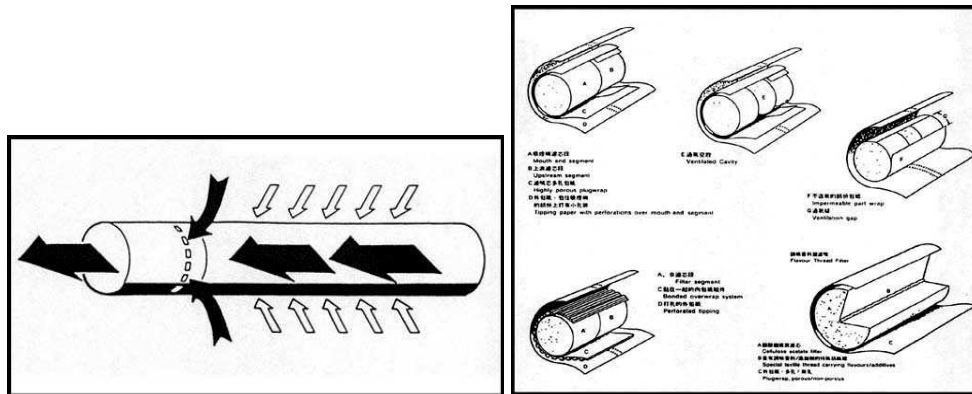
Modification with low investment, finance budget because exchanging of certain elements, complete devices are adaptable at existent offline laser perforation machines or other systems.

Capability to adapt super speed beam steering devices or units at online perforation units at cigarette making machines up 12,000 cpm.

Online micro perforation at cigarette making machines, porosity profile

Many years ago IPM had developed a multiple online electrostatic micro perforation OESP-1 units at cigarette making machines which was patent applied with EP0460369 and DE4018209.

<http://www.freepatentsonline.com/EP0460369.html>



The method and the device for electro-erosive perforation of cigarette paper basically operates with at least two pairs of electrodes which are ignited at the same time in such a manner that each perforation section is treated twice in order to provide a corresponding intensity of perforation, taking into consideration the duration of ignition and the web speed. In particular, the invention operates with at least four pairs of electrodes between which the web of cigarette paper to be perforated is moved through. The cigarette paper is moved in the longitudinal direction of the cigarette to be produced later, the width corresponding to the circumference of the cigarette plus an overlap section for bonding. Perforating is carried out transversely to the direction of movement, that is to say an accurately defined zone section is produced around the circumference of the cigarette.

The pairs of electrodes are arranged at a distance which corresponds to half the cigarette length when four pairs of electrodes are used. The first and the third pair of electrodes are ignited simultaneously. A distance dependent control causes the second and fourth pair of electrodes also to be ignited simultaneously when the previously perforated sections have traveled the distance of half a cigarette length.

Each section is perforated four times, the speed at which the web can be moved being determined not by the spacing (half a cigarette length) of the pairs of electrodes but by the spacing of the pairs of electrodes in each case simultaneously ignited (one cigarette length). This provides for uniform, intensive and very powerful perforation and the cigarette paper treated can be continuously supplied to the cigarette machine for further processing in the longitudinal direction of the cigarette.

That electrostatic perforation process enables cigarette or tipping paper while cigarette making processes to reduce nicotine and condensate levels for non-filter and filter cigarettes.

The OESP-1 device opens fully new possibilities into cigarette making machines as Max-S, Protos 80, 90, MK9, Molins, G.D.

Advantages during manufacturing

- Compact all-over-dimensions, direct mechanical integration of perforation units, easy functional interfacing and full EMI acceptance in order of CE, EN, NEC or CCC standards archiving high production efficiencies with controllable ventilation grades on highly automated cigarette making machines
- Patented, dual high frequency electronics and multiple perforation performances of the circumference of each cigarette enables problem less perforation on high-speed cigarette making machines up to 12,000 cpm
- porosity ranges from 50 up to 400 C.U.
- pore densities from 25 up to 300 pores/cm²
- holes size from 30 up to 80 micron
- cigarette ventilation grades up to 90%
- all necessary perforation, production parameters are stored and controlled by microcomputer operation, i.e. geometrical and synchronized positions of perforation lines, zones etc., pore density, perforation zones width and distributions, perforation profile and porosity ranges for each cigarette brand
- porosity profiles over the length of each non-filter cigarettes
- furthermore single, multiple, different or equal groups of single perforation zones around the circumference of each cigarette for non-filter, RYO even tipping paper for filter cigarettes
- all stored parameter sets are linked to the PLC system
- different micro perforation designs and porosities of each cigarette brand are flexible to define and controllable during all production processes
- air ventilation levels are exactly defined and, due to online feedback, can be kept constant by means of perforation system design and porosity distribution
- for non filter cigarettes perforation can be effected over the entire length and circumference of the cigarette.

Liability and system investment

The ESP process OESP-1 has a high liability and realizable with low investments and low running costs when compared with online macro or micro laser perforation processes.

An online porosity control system OPSS-1 monitor continuously the air permeability, called optical online porosity measurement with a state-of-the-art technology to obtain a close-loop feed-back to the perforation unit to keep ventilation grades constant.

Online micro perforation processes are possible to use for other mass products and application fields with full system integration in entire production lines as bag, sack, packaging manufacturing etc.

ONLINE LASER PERFORATION at cigarette making machines, high speed multiplexer DE102004001327

A – laser source and IPM patent grand multiplexer with 8 optical channels

by 8 laser lines, 10.6 μ m, Co₂, sealed off laser, M<0.9, e.g. Coherent ULR-300, 300W Synrad, PRC
by 4 laser lines, 10.6 μ m, Co₂, sealed off laser, M<0.9, e.g. Coherent ULR-150, 200W Synrad, PRC
laser source dimensions all over approx: 1,100*200*200 mm, water cooled
output 45 grad divert mirror

IPM multiple laser beam multiplexer

center rotate twin beam splitter and high speed motor (not shown) up to 900 rpm/sec.

diameter approx. 400 mm, high approx. 200 mm

8 optical output channels, coupled special flexible hollow fibers, each in lengths 1,000-3,000 mm

B – bobbin unwinder and perforation heads

tipping paper from 48 up 64 mm web width

8 perforation heads, 4 on each side

each laser beam supply with special hollow fibres and auto focus devices

diameter of each focus device around 25 mm, distances in web direction around 50 mm

length of necessary perforation section approx. 200 mm by 8 laser lines

necessary width of perforation section - tipping paper width + 40 mm on both sides

C – tipping paper strips with 8 laser perforation lines

up to 10,000 cpm or 135 m/min tipping paper web speed

4 laser perforation lines on each side

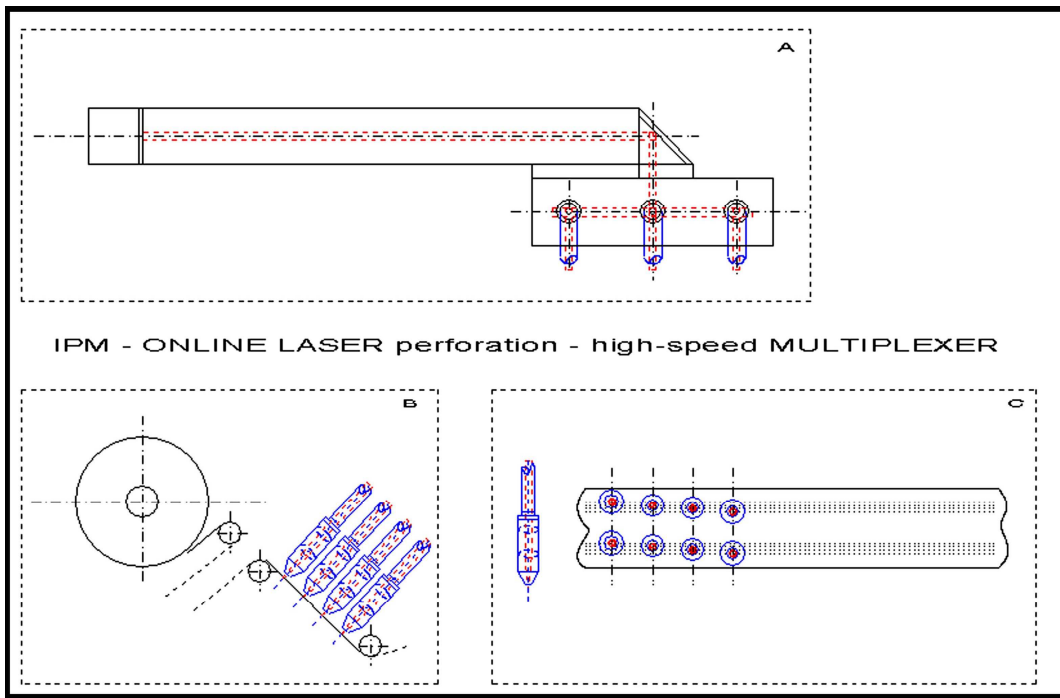
total round or oval hole sizes between 60-180 microns diameter

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 10-80% with twin or quad rows

by 8h/cm*8 holes/rows*135 m/min = 14,440 holes/s in total



Online porosity sensor scanner measurement

Patent pending DE10251610, patent grant 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 20-500 mm per second, flexible material web widths up to 5,000 mm, measuring gaps 2.0-5.0 mm, inline detection of permeability, porosity, spectral transmission, opacity, extinction, particle absorption, porosities 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.

OPSS-1 online porosity sensor scanner measurement - download [OPSS-1](#)



Working principle

The online quality control technique is performed to detect and scan zones, generated nano micro pore areas or lines in using multiple color sensors and a precise tiny line laser which are linked to sensor internal DSP controller units.

It controls roll or bobbin formats as stand along or mechanical coupled devices on existent scanning units which measure material weight, thickness, formation, smoothness, roughness, opacity, etc. in web widths up to 6,000 mm.

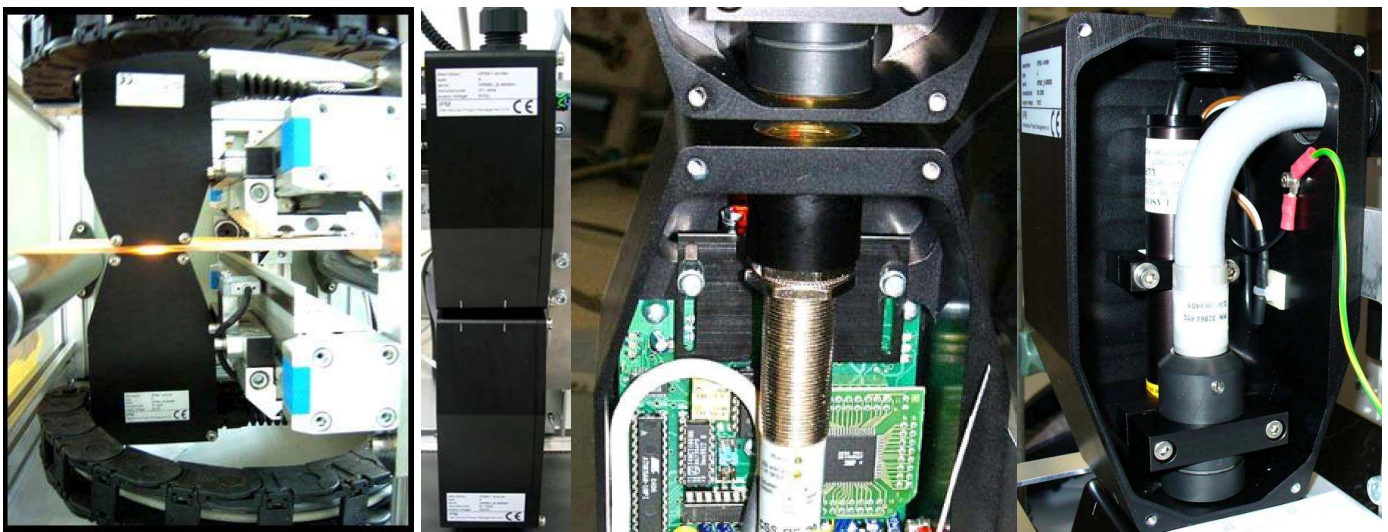
For lasers or electrostatic perforation in bobbins and wide paper webs online measuring procedure and their devices are indicated, with which same transverse movement and simultaneously collections of perforation positions, perforation profile quality and porosities with two different sensor systems and locations.

Zone or line position detection by accuracy of 0.1 mm with a laser line unit, scanning speeds up to 300 mm/s, DSP controller firmware, high-speed serial link up to 230,400 bit/s, industry PC performance, C++ process visualization software for production quantity, quality, statistics, LAN to quality control centre, etc. With transverse movements of both measuring systems across the web width, consisting of line laser to detect the quality and position of micro or macro holes in ranges of 0.50 up to 200 microns, groups of holes or determined perforation zones and in the same time as the light transmission sensor unit monitors the porosity profiles and determined their integrals continuously. Thus direct feedbacks to the perforation or machine system enable the trend compensation of arising changes that production rolls without intermediate stops are high quality and quantity controllable.

Applications

Jumbo roll by roll production for offline micro laser or electro static perforation machines for web widths from 100 mm up to 2,000 mm, porosity ranges from 80 C.U. up to 5,000 C.U. with feed backs to each perforation channel and automatic production control. The OPSS-1 system enables a production networking for laser or electrostatic perforation machines in quality and quantity aspects in order of ISO certifications.

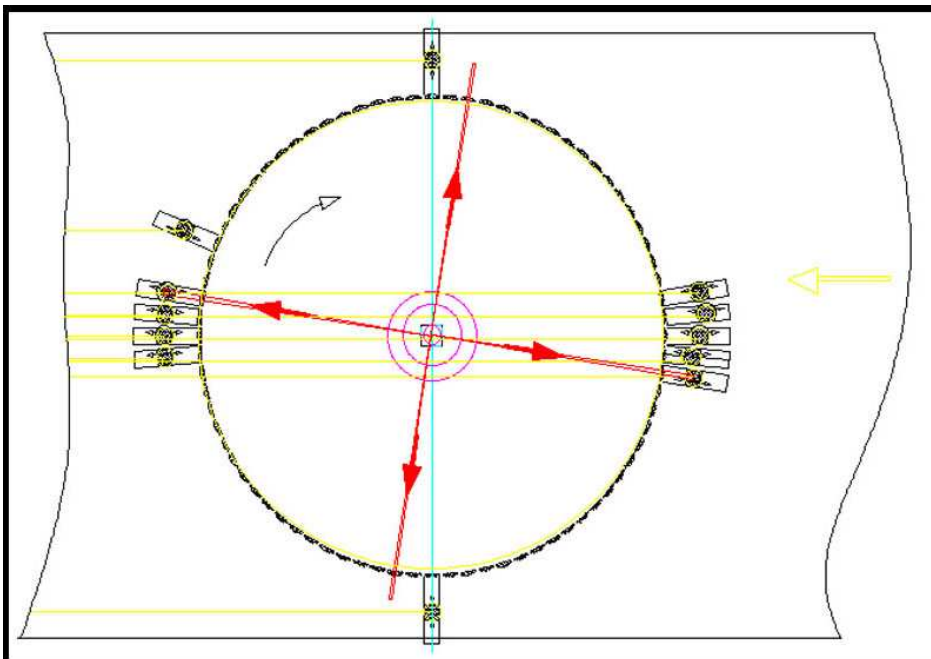
As well for porous, filter, permeable paper, packaging, sack, fabrics or other webs at making, finishing, refining or other industry machines or processes.



OPSS-1 - download [OPSS-1](#)

more details <http://www.microperforation.com/opss-1-optical-online-porosity.html>

Laser for sheet material treatment or perforation at wide web material, Patent granted DE102004001327



Patent download <http://www.microperforation.com/englishengineerreport.html>

Laser micro perforation

Laser perforation in general, possible to perforate by pulse or enlarge, focus laser beams are holes sizes 60-200 microns 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 100-1,000 mm, by web speeds up to 600 m/min, depending on porosity and material consistency in relation to its ability to perforate.

IPM micro laser cluster perforation

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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.

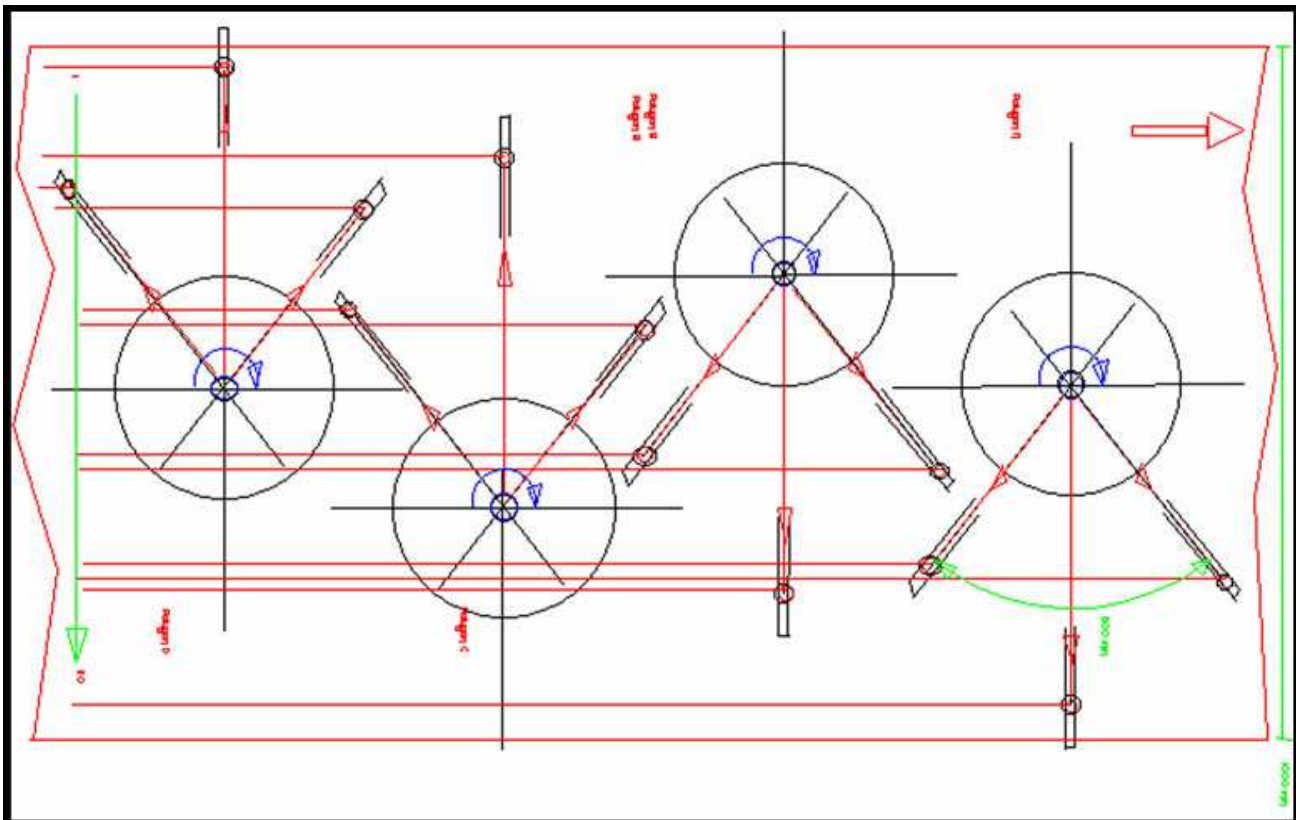
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To position easy fast in X-cross and Y-down web direction or exact location at static placed sheet material.

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.

more details <http://www.microperforation.com/lpm-1.html>



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 8-14mm 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.

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

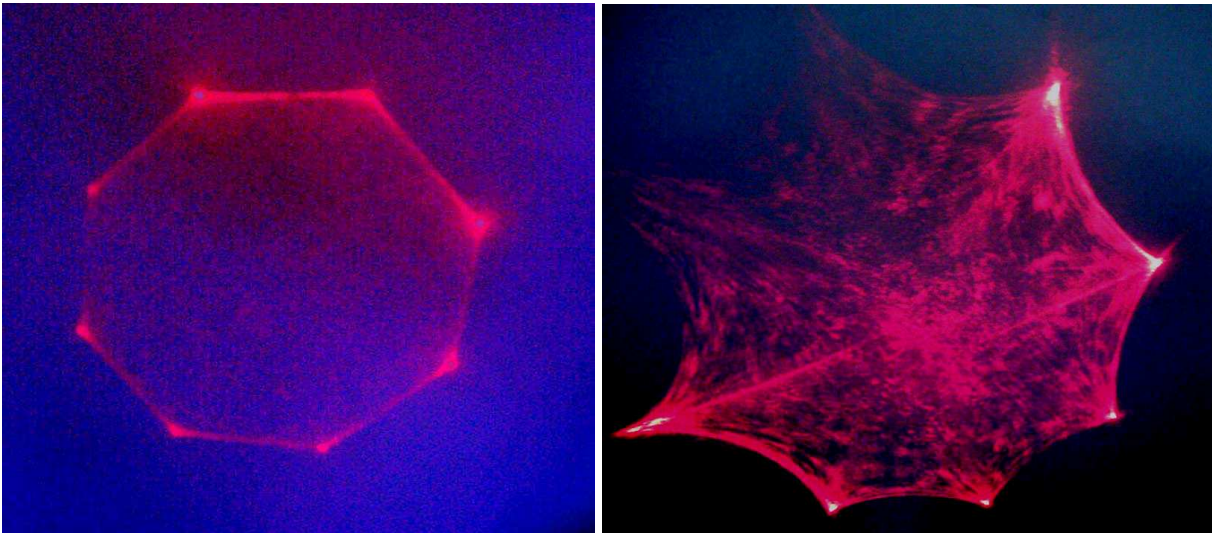
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Several pattern or wave line design for different brands, number of holes or pattern per cm length are constant e.g. 10-20, total porosity 100-1,000 C.U., hole sizes by 50-120 microns, densities 100,000-500,000 holes per second in total, 1-6 perforation 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.



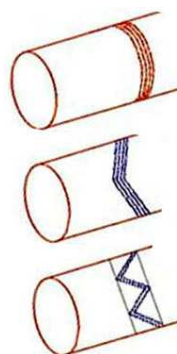
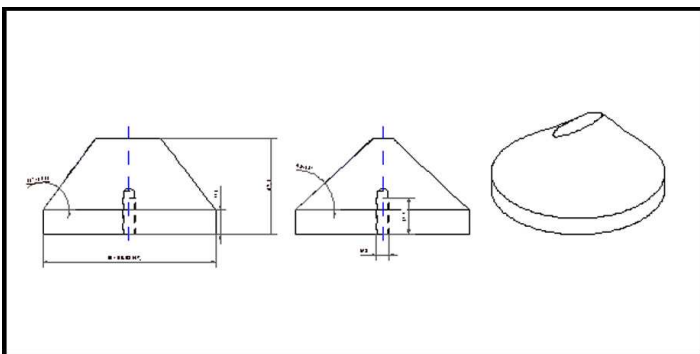
Outstanding applications

For web or sheet material, metal, isolation, foil, plastic, substrate, film, 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. optimized air distribution characteristics in cigarette filters, unique anti counterfeit indications and other product advantages.

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

Specific indication of brand names what is recognizable for everyone and even for product buyers, if micro designs, holes, patterns, holograms are to see with magnified views only.

Or sensitive touch able as Braille scripts as micro cluster perforation cryptograms or holograms.



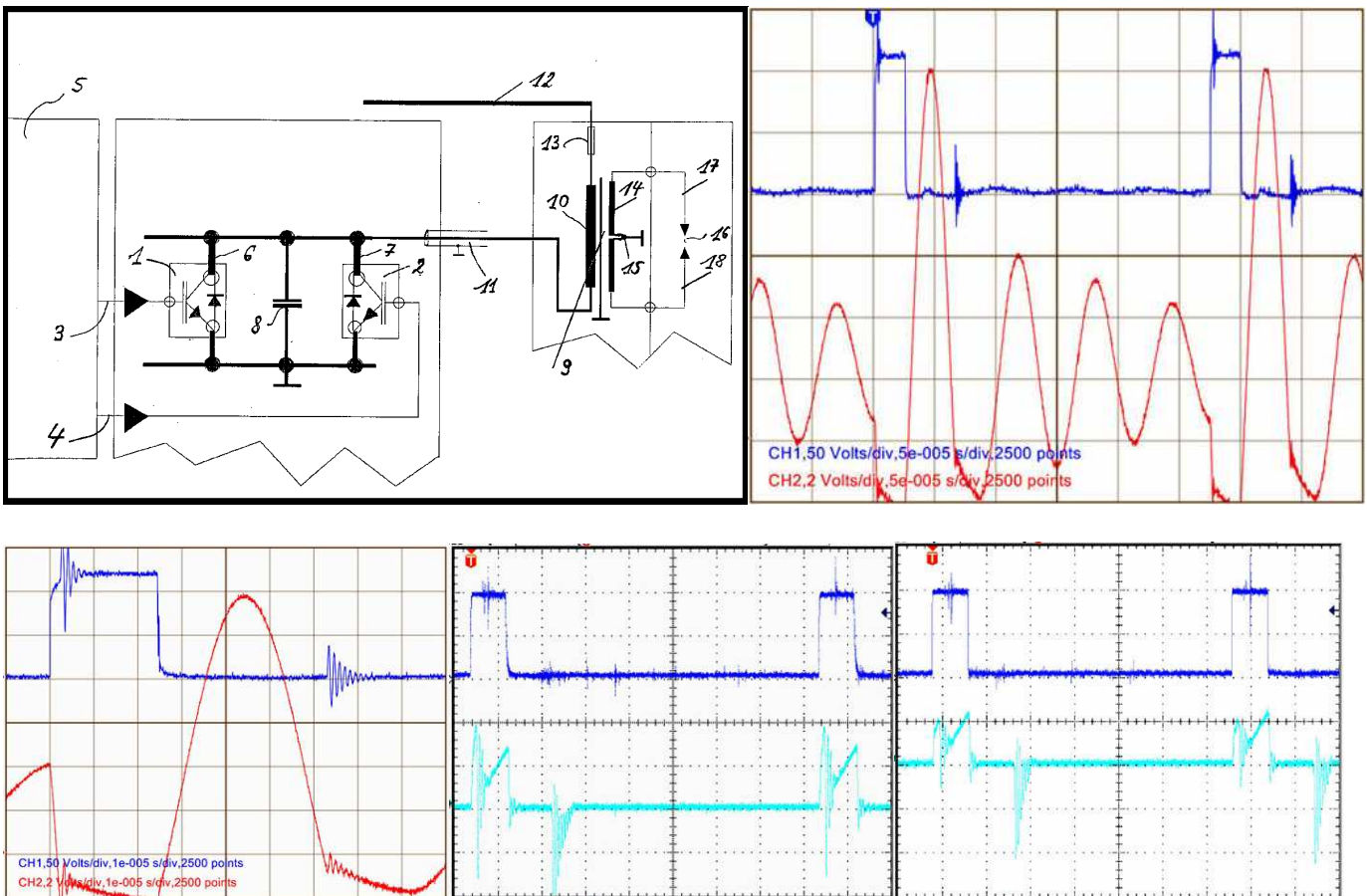
MLL-1 targets many new applications with laser beam diverts in horizontal or vertical position. Uses of sophisticated divert elements allows easy, low budget modifications at existent systems and production machines.

MLL-1 micro laser processes means real alternative for high speed galvanometer scanner, cluster micro perforation technology, pattern design, waves, zigzag or packages lines, cryptograms, company logos, holograms, anti counterfeit contours, security paper, safety, bank note, 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, bar or matrix code, marking, scribing, jewelry, automotive, pharmacy, smoking, chemical or medical products, electronics part, chips, indicators, porosity, writing contours or profiles, embossing, bioengineering, focus, holographic.

The patent and product properties are pending as DE102004012081

more details <http://www.microperforation.com/ml-1-laser-perforation.html>

IGBT, MOSFET, HVFET rf hv frequency, power electronics, supply converter



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 grant as DE10328937.

Advantages are based on uses of standard circuits with extended semiconductors for e.g. micro perforation applications, corona treatments, ac/ac, ac/dc converter, drives, etc.

IPM is looking for science or industrial partners who are interest on license agreement and/or technical cooperation for other wide application fields.

Working principle

Industry application of electrostatic perforation or AC/AC, AC/DC converting, drives, etc. IGBT, MOSFET, HVFET semiconductor power stages. The circuits are working as upward converters with extremely short time power pulses in ranges from 200 ns up to 15 micro second, high current peaks up to 300 Amps by du/dt of 1,500 Volts/ μ s on a serial connected inductivity and loading condenser that the secondary ferrite transformer coils supply the sparking electrodes up to 50 Kilovolt as a permanent open loop and short circuit.

A safety circuit logic and two hybrid drivers allows a alternately switching of semiconductor A/B which generating higher operation frequencies and power levels meanwhile the electrical and thermal conditions remains on each in the same range as a single switching unit.

In conclusion the approximately double frequency and power level operation obtains higher switching efficiencies, more perforation power or higher corona treatment level, depend of the industry application.

Advantages

Dual IGBT, HVFET or MOSFET semiconductors in high power, high current, high voltage circuits obtains in electrostatic micro perforation, surface treatment, surface modifications, corona treatment, converters, drives or other switching application frequencies up to 250 KHz, 1,400 V/ μ s, power levels up to 30 KW and more. Higher power efficiencies and worse switching periods are further advantages.

Control pulse timing into a certain time window with a constant or variable frequency generates holes sizes and hole sequences with high voltage sparking through the material webs.

The repeating frequencies of the entire circuit can up to the double switching frequency of each semiconductor.

For example by electrostatic perforation porosity range from 80 C.U. up to 2,500 C.U., paper web speeds up to 450 m/min and web widths up to 2,000 mm are archive able.

Other applications

Corona treatment units, surface treatment, high power switching devices, power supplies, AC/DC power drives, AC/DC or AC/AC converters, laser diode power supplies, compact switching converter systems.

The new dual semiconductor allows applications to build hybrid drives, semiconductor high level stage, upward, downward or other converters or generators which operating with supporting capacitors, high voltage ferrite transformers in an extremely compact and modular way.

Several advantages are the high efficiency of pulse/power transmission and energy ratios.

Traditional corona or other medium frequency generators up to 30 KHz operation range are easy to modify to double frequency and power levels. Patent granted for process and device DE10328937 of IGBT power switching unit.

Future prospects

The electrostatic ESP micro perforation in pore ranges from 0.50 up to 100 microns usually applies within ranges of the refinement of fine paper, packaging webs, bonded fabrics, non-woven, filter paper, bag or booklet paper webs of most diverse kind especially when additionally treating course materials for achieving special characteristics which for physical or process reasons cannot be achieved by other process technologies.

Our highly modern, industrially approved ESP perforation technology operation which even can be relied on when operated 24/7 can be integrated into existing rewinding course devices or other course devices.

Also, they can be used as completely independent perforation devices.

more details <http://www.microperforation.com/igbt-esp-unit.html>

In-situ dyne surface tension measurement at fast moving plastic films, foils or other substrate

Patent download <http://www.microperforation.com/englishengineerreport.html>

DE19543289 download [ODSTM-1-PATENT](#)

The former patent application DE19543289 concerns a method and device for optical dynamic, i.e. a non-contact, inline surface tension, surface energy, wettability measurement for running substrates whereby the detection can be in the transverse-direction or in the running-direction of the web. In the context of this invention, running substrates or moved web material is to be especially understood as being plastic films like PE, PP, LLDPE, HDPE, BOPP, LDPE, EVOH, PTFE, MOV, PET, FEP, PS, PMMA, PBMA, PVC, PA and also laminated or coated film or paper webs which still show a measurable optical transmission in the wavelength range of 1,200 to 2,200 nm.

A higher material wetting capacity, respectively, a higher material adhesion capacity, which can be achieved by increasing the surface tension, is demanded in many application cases for better printability, coating ability or

adherence capacity during the manufacture, finishing, printing and processing of running substrate webs. Described is a method and device for optical dynamic online surface tension measurement in ranges from 30 dyne up to 60 dyne in which a substrate web running vertically through a measuring gap is subjected to a chromatic light transmission from two optical channels displaced by 90° to each other. This light transmission is detectable by two optical detection systems located on the other side of the web.

Material specific wavelength selection, light transmission angle changes, polarization, slot diaphragms and transverse displacements of the light beam feeder along the optical X-axis result in extreme scattering and diffraction of the IR light photons in the boundary layer area on both sides of the sub nano layer within the substrate web. Their transmitted light intensity enables, after detection and evaluation, the determination of a direct relationship to the absolute surface tension.

And this entirely independent of the material-specific influences like: material and surface consistency, crystallinity, thickness, density, structure, polar grouping, temperature and type of pre-treatment.

Introduction

Non-contact, real time and inline operation surface tension or surface energy dyne - measuring systems for running webs as like plastic films in general, coatings, laminates etc. does not exist worldwide. Due to the broad application field of surface treated, flame, corona, plasma, primer etc. or surface non treated webs of plastic film, non-woven fabrics, laminates or coated paper, there is unimaginable market potential here in respect of the online process measuring of the surface tension dynes an inline control of the dynes treatment level and moderate quality control.

Various companies from the abroad are seriously interested in project cooperation, system development, prototyping and test, manufacturing and world-wide sales, system purchasing and license in respect of the ODSTM-1 Process Measuring System.

ODSTM-1 project

Further information concerning publications, patents and engineering reports are specified in the above mentioned applications. Several spectral measurements as well the feasibility study with well known optical institutes are positive done. Furthermore some significant modifications and breakthrough of the base ODSTM-1 measuring process with the using of state-of-the-art monolithic spectrometers and PC support.

Specific information about project development and further results on request.

Concerning the actual ODSTM-1 development and project status

certain developments with known optical institute with large numbers of measurements with a monolithic spectrometer in a wave range between 1,200-1,600 nm are positive done

measurement where based on the detection principle which is described in the former patent application

uses are non-treated LDPE films in 70 and 90 µm thicknesses and 28 mN/m

the comparison is used the same LDPE films with one side corona treated with 38, 48, 52 and 60 mN/m

test results where positive with a good prospect to going further in that way

Base data of in-situ Dyne Surface Tension Measuring system ODSTM-1

- web width: up to 6,000 mm
- web speed: up to 600 m/min
- substrate PE, PP, HDPE, LLDPE, MOV, FEP, PET, EVA, BOPP, etc.
- surface-tension measuring range: 30 - 55 mNm
- resolution, respectively, reproduction: +/- 0.5 mNm
- single-sided or double-sided measurement of the treated or untreated sides of the films
- IR wavelength range: 1,200 nm – 1,800 nm
- operation: dual scattered-light, multiple-sensor system with variable wavelengths in transmission mode
- measuring method: similar to ellipsometry
- measuring gap: approx. 5 - 20 mm
- stationary and/or web traversing measuring head
- optical fiber waveguide feed to measuring head system
- remote control, highly stable IR light source with beam processing
- wavelength variation via a monolithic optical converter
- industrial PC, multiple-processor system, data recording, data analysis, product documentation, statistics, etc.
- output: analogue 0 - 10 V, optical fiber, high speed serial RS 232, Ethernet, Profibus, Canbus, etc.

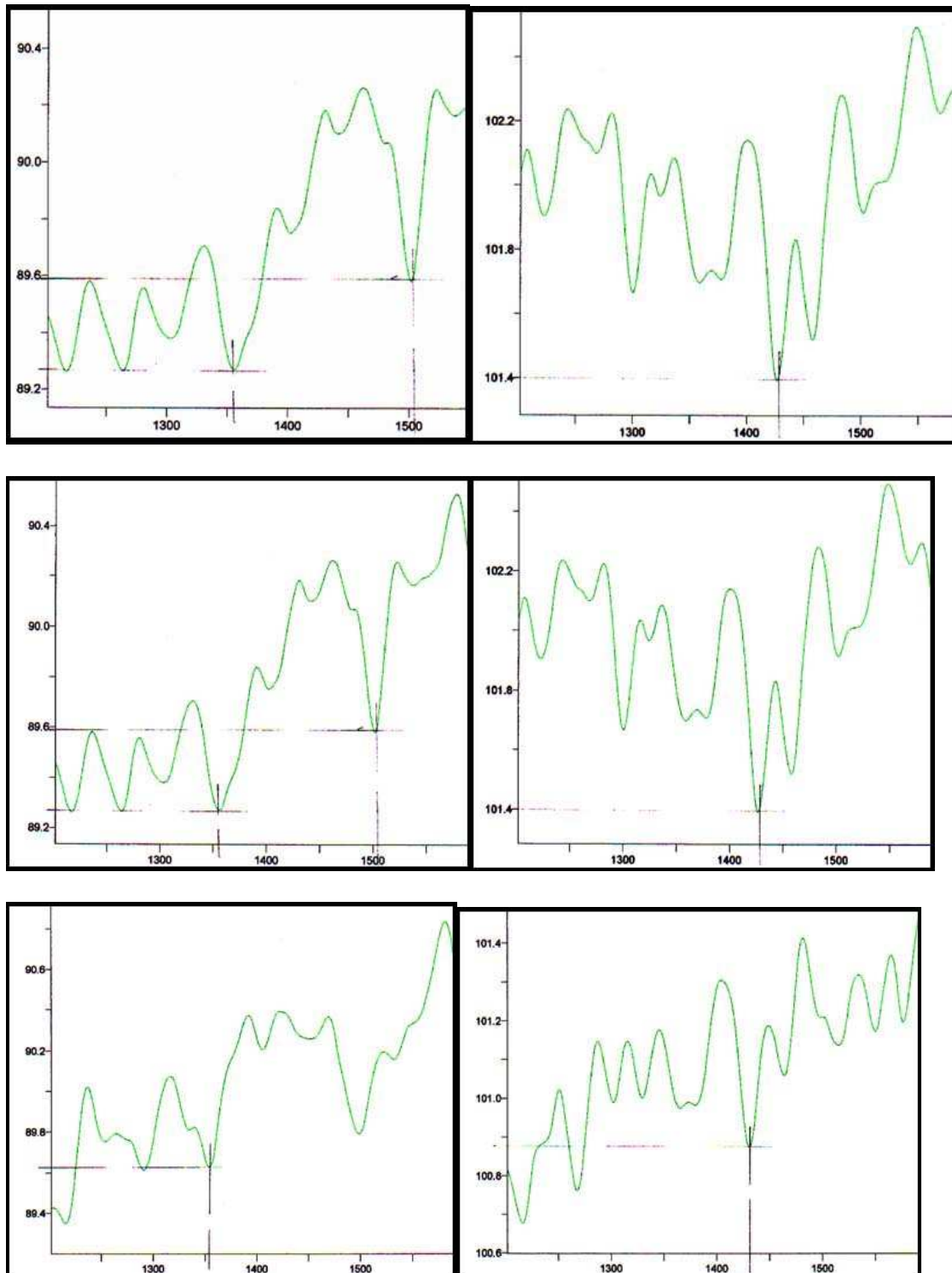
Conclusion

Described is a method and device for optic dynamic inline surface tension measurement in which a substrate web running vertically through a measuring gap is subjected to a chromatic light transmission from two optical channels displaced by 90 grads to each other. This light transmission is detectable by two optical detection systems located on the other side of the web.

Material specific wavelength selection, light transmission angle changes, polarization slot diaphragms and transverse displacements of the light beam feeder along the optical X-axis result in extreme scattering and diffraction of the IR light photons in the boundary layer area on both sides of the sub nano layer within the substrate web.

Their transmitted light intensity enables, after detection and evaluation, the determination of a direct relationship to the absolute surface tension.

And this entirely independent of the material-specific influences like material and surface consistency, crystallinity, thickness, density, structure, polar grouping, temperature and type of pre-treatment.



more details <http://www.microperforation.com/odstm-1-optical-dyne-control.html>

Portfolio - IPM International Perforation Management

IPM is a hi-tech company based in Germany, Asia, with specialized with highly skilled engineers and firm partners in Germany, China, Indonesia and Thailand to develop, design, tailor-made, manufacture, install, commission electrostatic micro cluster, laser perforation systems or machines for high speed webs, other material treatment or mass products.

As well sophisticated, intelligent sensor scanner porosity quality measuring units for global sales and potential clients as ready-to-use projects.

Strong hands-on engineering, necessary time at client side, qualification, trainee, technology transfer for maintenance or operation staff at high level of quality, quantity control are an essential part of our services for prosperous long term cooperation.

The founder of IPM, Mr. Werner Grosse, has been working since 1979 as application engineer, project, operation manager, technical director in the field of applied electrostatic and laser processes as well in online porosity sensor scanner measurements for tobacco, fine paper, refinement, packaging other industries.

During his professional career and collaboration in research assignments he initiated more than 46 inventions, more than 34 patents, outside of Europe and in China as well. Thanks patent grant technologies, production processes, new products properties, machines and sensor control systems has been developed. It includes worldwide new in-situ dyne control 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 micro electrostatic perforation ventilation technology for filter, cigarette, tipping, packaging, printing, cement sack, bag, food, 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 on the end of 2001 in order to enhance innovations with his own company IPM in January 2002 to design production machines which among other qualities have specific and outstanding product characteristics in cooperation with partners and relatively large clients, particular in Asia and USA.

Apart from this business, he has joined national, international organizations whose aim is to enhance innovative, creative, patent conforming and 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 Mr. Werner Grosse has given many lectures, published a great number of technical papers and reports which are available in German, English, Spanish, Mandarin, French and Italian.

He received government honors from China and other countries for his expertise as foreign entrepreneur for added values of innovative hi-tech, achieved by transfer of knowledge and successful cooperation with large industry Groups in China.

Honor China Yunnan Government

<http://bfe.vxrs.gov.cn/article.asp?id=2005092011030968>

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<http://tobaccoreportermagazine.com/china/2004/Dec04China/Industry%20Briefs%201204.htm>

IPM with Mr. Werner Grosse and his team operates as technology experts for project management in tobacco, cigarette supplier, paper, packaging, printing, material treatment, automotive and other hi-tech industries.

In mechanical, electrical engineering, manufacturing, delivery of entire perforation electronics and long term spare part guarantees we are working many years with German suppliers.

For twin or quad bobbin, electrostatic wide web or laser micro perforation machines we are cooperating with partners and large cigarette, machine manufacture groups in China.

IPM – Technologies - Production Machine – Product - Services

Electrostatic micro perforation machines 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 by base weights 30 up to 160g/m², material web widths 50 up to 2,000 mm, porosities from 80 up to 2,500 C.U. or down to 6 Gurley, hole sizes from 10 up to 100 microns, hole densities from 120 up to 260 holes per cm², zone widths from 2.0 up to 6.0 mm, up to 16,000,000 holes per second, up to 3 Million/m² in surface-all-over design by speeds up to 500 m/min. Multiple web path, up to 54 perforation channels, electrodes pairs or 27 final bobbin sets, jumbo roll-by-roll production up to 25,000 meters, S7-PLC- controlled hi-tech automation, OPSS-1 porosity sensor scanner position, simultaneously porosity measurement and trend feedback by industrial PC automated control. Annual production output e.g. 4000 tons of tipping paper by 220 C.U. with multiple 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 up to 1,500 C.U., holes sizes from 80 up to 150 micron, densities from 10 up to 20 h/cm by up to 150,000 holes per second. Annual production output up to 30,000 bobbins by 300 C.U.

Quad bobbin tipping paper electrostatic micro 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 no stop, with or without integrated slitting, flying-splice unit for simultaneously quad bobbin set production, OPSS-1 online porosity sensor scanner control with close loop, perforation feedback, quality and quantity control of each perforation zone, porosity ranges from 80 up to 800 C.U., deviation CV <3 % by 260 C.U., tipping web width up to 300mm, speeds up to 600m/min. Holes densities from 120 up to 260 h/cm², zones from 2.0 up to 6.0 mm width, holes from 10 up to 70 microns, up to 7,000,000 holes per second, annual output up to 120,000 bobbins by 300 C.U. High automation level with S7-PLC and industrial PC automation control. Patent granted DE10328937.

Porosity sensor scanner measurement OPSS-1-A/B, OPRL-1-A/B for electrostatic or laser perforation machines, porosity from 80 up to 5,000 C.U., feedback of each perforation zone, porosity with multi colour sensors, zone and line position control, accuracy 0.1mm with precise laser line, own sensor controller firmware, hi-speed serial link up to 230,400 Bit/s, RS-232, RS-485, Ethernet, USB, industry PC, C++, process visualization for quantity, quality, statistics, fibre linked to PCC/QCC. Patent pending DE10251610, China patent granted 200310104764.

IPM service

Technology expertise, project management, consulting, international engineering, industrial proofed improvement, modification, retrofit, overhauling, manufacturing, sales, installation, commissioning, service for tailor made, turn-key electrostatic or laser micro perforation machines, online porosity sensor scanner systems and production lines worldwide.

Press releases and reports are published at websites: engineering and manufacturing par excellence for client satisfaction, disciplined competence for long lasting partnership with cigarette making, supplier, paper refiners, packaging and other worldwide industry groups.

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 unsymmetrically mirrors, cones for laser beam steering, up to 240,000 rpm, holes sizes from 60-150 microns, densities 10-30 h/cm, porosities 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 fibres, 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, porosities 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 grant 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.

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>

Link <http://www.microperforation.com/ipm-technology.html>

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