HOLLAND MECHANICS WHEELBUILDING SYSTEMS

HM Today

Vol. 3 No. 1
september 1999

International Newsletter from Holland Mechanics Wheelbuilding Systems

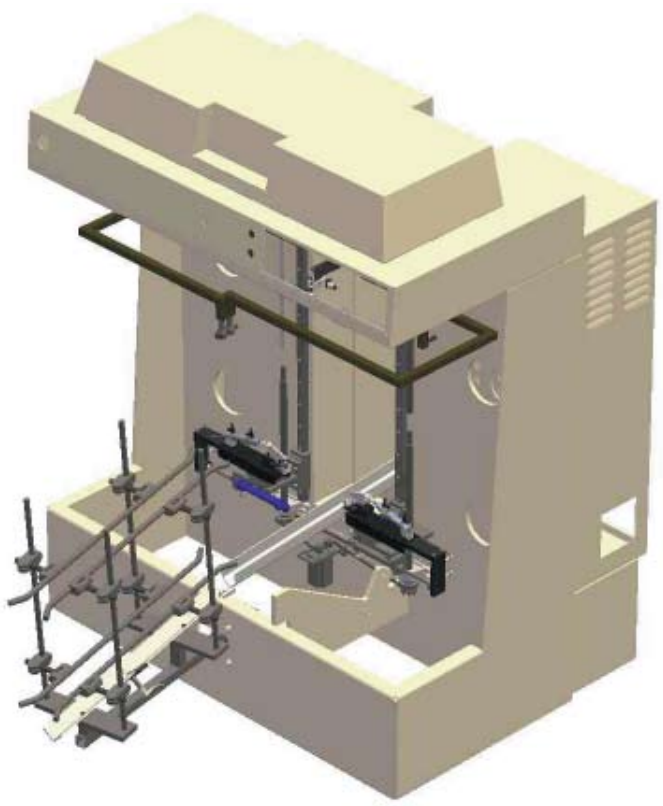
Published by HM human resources division - Purmerend, The Netherlands

A NEW TRUEING MACHINE WITH IMPRESSIVE TECHNICAL POSSIBILITIES

The Robot DTI

Holland Mechanics recently developed a new trueing machine, called the Robot DTI (TI stands for: Teach-In). The DTI fits in between the highly-sophisticated SG and the Robot DC. Its technical possibilities are impressive, but slightly less extended than with the existing SG machine. The machine itself has been developed with Solid Edge 3D-tecnology. In software, the DTI is a real state-of-the-art machine, being a further development of the proven DC concept.

One of the assets of this programme is that it has a multi-language function, including Chinese. Like the ISL lacing machine, every type of wheel will, once programmed, be stored ("Teach-In") in the DTI's memory for future use. Thus, the operator can simply choose a known wheel type from the machine's memory, which can contain up to 1000 wheel types. A new wheel identity will have to be taken only once, and the wheel will be defined by a series of parameters such as: the wheel diameter, torque, number of trueing rounds, height-, side- and center tolerances, etc. Of course, the spoke angle is automatically adjustable. The vertical and lateral tolerances can be given in, and the machine will detect any black spokes mixed up with metal-coloured spokes. The machine is PMCS*-ready, it has an optional double in-going track and optional triple out-going track. 12.5 inch wheeltrueing is equally possible on the DTI. Holland Mechanics hopes to fill the gap



between the most versatile and the simplest machine with this trueing machine, a good value-for-money investment.

* Your factory's Process Monitoring and Control System.

From the editor

Any questions about issues in this magazine? Please send these to the HM Today editing team:
- Anecdotes on wheelbuilding in broadest context – historical, incidental, or in any sense instructive – will be rewarded when published in this magazine. Send your contributions to:
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HFS Hub filler in daily use

Last year, Holland Mechanics were proud to announce that their HFS Hub Filling Station was beyond prototyping and was ready to work. Since then, seven HFS machines are in daily use, and several more have been ordered. The machines delivered are working in Holland, in Germany, in Italy and in the U.S.A. The highest number of hubs filled by a single machine so far is over 160.000, but between writing and reading this amount will have grown with an average of a thousand a day. It is not exaggerating to say that about one million hubs have been filled mechanically by HFS, which means 36 million spokes. Obviously, this has something to tell about the reliability of the HFS concept.

Electromagnetic Compatibility (EMC)

Electromagnetic fields in today's compactly-built electronics may influence each other. When radios used to be so big that one could see the separate components, it was easy to understand why the sound from te speaker was spoilt by a 50Hz hum. The source was easily detected as the sparks at the collector of the home coffee grinder or the vacuum cleaner. But the source could as well be an internal one: once a separation screen (in aluminum) had been placed between the power supply (mains transformer and rectifier) and the tuner section, the sound became pure again.

Today's electronics are so densified and complicated that the sources of an unwanted effect often cannot be easily detected. Still, it is absolutely necessary to eliminate unwanted electromagnetical influences. Electromagnetic compatibility has become a science of its own. In fact, electromagnetic compatibility means the elimination (or prevention) of electromagnetic interference. The word compatibility is just a more positive approach.

The influences are less predictable than in the valve radio era, and their screening-off is more of a technical problem. Your mobile phone will still work in the basement of a ten-story concrete building with a 100-ton reinforcement mesh Faraday's cage.

Even within a microprocessor tiny fields can inflence other components.

Holland Mechanics has the expertise and has invested in the tools to detect and prevent electromagnetic interference, and to make a complete factory setup electromagnetically compatible. Of course, all mutual influences within our machinery have been taken into account and have been eliminated or rendered innocious for troublefree performance.

Winterberg: *real* mountainbiking

Last winter, everybody who works for Holland Mechanics was invited to join the party, and travel to the German winter sports resort Winterberg for a weekend of physical activity and fun. For many, it was an opportunity to do some real mountainbiking: Holland lacks the slopes to test your climbing skills, and Dutch mountainbikes often are used for beach racing and dike-climbing only. Besides the sports, one could visit a real coal mine and experience, several 100 meters down the pit, the life of the colliery men. Back on the surface, Holland Mechanics visited a beer brewery, and of course there was glorious food, and drinks in all grades in abundance. Some put in an impressive performance.

The Art of Wheelbuilding

Mechanized wheelbuilding means knowhow, hardware and software and lots of dedication and experience for the machine builder. For the operator, it's routine. How different from the craftsmanship of the hand wheelbuilder. Dutchman Jan Oskam takes the honours for setting fastest speed: his top performance was lacing no less than 14 front wheels (36 spokes) in an hour, after which he took a refractory period of a couple of days in which he didn't touch a spoke. At normal speed, Jan could lace 6-8 wheels in an hour.

Uncrowned world champion for handbuilt race wheels is Gerd Schraner, who once was an anonymous mechanic in the basement of the Oerlikon race track in Zürich. He built wheels for all famous track racers, and for road racers as well. His wheels won track races, classics, stage races and world championships. World records were set with Schraner wheels, although he never publicly shared the honours. Schraner got his spokes from Swiss DT in Biel, and the wireworks* were eager to have Gerd Schraner in their neighborhood to show their customers how a quality wheel was built. Schraner now travels with DT to shows around the world, where he sets up his jig and polishes his spoke wrench to finetune expert wheels in front of the amazed eyes of the show visitors. Gerd Schraner even wrote a book about wheelbuilding. It is edited in both German and English, and the ISBN-number is 3-85681-440-X. It is edited by DT, and can be found under www.dtswiss.com.

* DT stands for: Drahtwerke/Tréfileries, which means as much as Wireworks in two of the four official Swiss languages.

Never gets tyred!

Anything particular about this picture? A girl operating a TMC tyre mounting unit- nothing special, that is, if she were just fitting one tyre for the pretty picture. But she operates the machine all year around, at the Giant works in Lelystad, the Netherlands. And never has a back ache, never gets – ergonomically – tired. Of course, she's a good girl. But her machine enhances her well-being. It works in a vertical plane, which has everything to do with ergonomics. Everything on the TMC (and on all other HM machinery, for that part!) has been laid out with optimal ergonomics in view. All tools at hand, short reach, straight back all the time. Because just building another tyre mounting station is not difficult. But building one that is best suited for the operator who has to use it all day, without stretching, without reaching, without back-bending, that's a concept which only jumps one's mind when you have real concern for the well-being of the man (or woman) who operates it. Think what it will save you if your operators never have physical complaints.

Share ideas

One of our consultants visited Micmo works in Machecoul in southwestern France, where he saw the solution Micmo built from bicycle hubs and chains to supply the operator in a convenient way with rims. It's not the thing to get a patent on, but its, well, just a clever solution for your particular factory layout. And the thought could be useful for others as well. Being partners in wheelbuilding solutions, we discussed the idea of building this helpful tool for others as well. That's another aspect of being partners rather than suppliers; instead of pinching the idea, you share it.

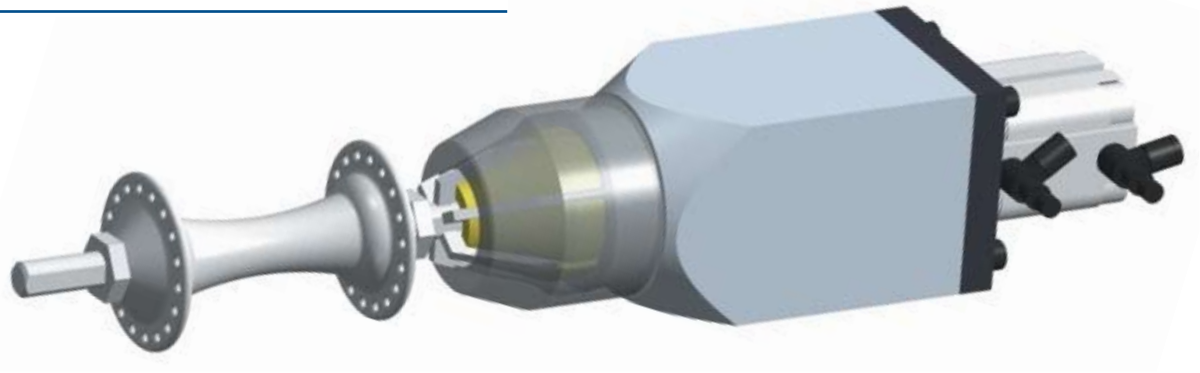
New Feature: backup kit

First generation Holland Mechanics lacers and trueing machines were all- electromechanical. The computer as a controlling device was introduced in second-generation machines. The third generation machines operates under the Industry standard Windows NT software.

Holland Mechanics now offer a software backup-kit which makes all data about any wheels previously built with a second-generation machine available for future use in other applications. The backup kit is not only a safety module. It also means, for instance, that switching over to a new machine does not mean each wheel has to be programmed again. (Some factories have stored data about 400 different types of wheels in the second-generation machine's memory). It means for instance that an additional machine leased for peak season can immediately join the factory production programme. Improvements in the factory's processing is the first practical application, but it may equally come in handy in liability cases. Documentation often is the best tool when it comes to proof.

Business partners

Holland Mechanics developed – with the aid of Solid Edge technology – a set of clamps for their trueing machines which accommodate the flat-sided axles of Nexus hub gear. Being a leading manufacturer in wheelbuilding machines, HM has frequent contacts with parts manufacturers like Araya, Shimano, SRAM, Sturmey Archer, Mavic, Van Schothorst, Sapim, DT, Hoshi, Alpina, Alex and many others about the specifications to enhance mechanical wheelbuilding. Some parameters in the design of a component are not very critical when it comes to mechanized processing, but for other measures and tolerances there are practical limitations. For instance, it can easily be understood that filling a hub mechanically becomes more and more difficult when the hub flanges are closer to each other, and when the distance between the outer flange circle and the spoke hole increases. It is the awareness of this kind of consequence in a new design, which Holland Mechanics discusses with its business partners. When mechanical processing is impossible or requires difficult and expensive adaptations of the machinery, the component itself will be a less attractive proposal for the wheel builder/ bicycle manufacturer. Thus we try to make components match each other, and the possibilities of mechanical wheelbuilding.



W H E E L - L O G I C

Crossmax UST Tubeless The well-known Mavic Crossmax wheels come in a tubeless version. The main breakthrough of this wheel (Americans would call it revolutionary) is the rim. Get this: the spoke holes are made from the inside, and they only pierce the inside wall of the rim. That means that on the outside, in the tyre bed, there are no spoke holes at all. Which means no rim tape and no possible air leaks along the spokes.

How does Mavic manage to produce these rims? The technique is neither drilling nor punching, in fact it's pure deformation of the heated material. That means no chips or rustler on the inside of the rim. When the rim is pierced, the surrounding material is upset, and it is threaded in the process.

The building of the wheel within this rim is slightly different: the spoke has a head on each side, and the nipple supports the outside head. The nipple screws into the inner wall of the rim. An important asset of these wheels is that, should a spoke break, it can easily be replaced without even taking the tyre off.

Michelin and Hutchinson both developed a range of tyres for the new Mavic Crossmax tubeless wheelset. With a tubeless tyre, the valve being torn from the inner by the torque on the outer no longer exists, like snake-bite leaks in the inner. For off-the-road the new tubeless certainly have a practical advantage.

Brakes Two distinct developments in the field of brakes:

• Rim brake pressure is steadily increasing, and brake pads get more and more aggressive. V-brakes and hydraulic rim brakes can apply enormous pressure on the rim and the stays. This necessitates a strong and wear-resistant rim wall. Breaking with rim brakes does not apply any stress on the spokes.

• More and more disc brakes can be seen on off-the-road bikes. The assets are, that that they are less prone to get dirty. The rims can be made lighter and their sidewalls thinner, they do not have to be lathed and they can be used decoration. On the other hand, the spoking has different requirements: the space needed by the disc brake means a narrower spoke pattern, which has to transmit braking force from the hub to the rim. With disc brakes, for instance, a radial spoke pattern is impossible, the tangents being necessary to transmit the braking torque.

Rims To accommodate for wide gear cassettes or disc brakes, various manufacturers like Bontrager come with asymmetric rims, which allow for a shallower spoke angle and hence a wheel which is laterally stronger. All Holland Mechanics machinery will process asymmetric rims flawlessly.

Spokes Today's fashion is black or coloured spokes. Although the coating is very tough, it is not entirely scratchproof. This means that the wheelbuilder has to take this risk into account and match his procedure accordingly. For Holland Mechanics the black spoke fashion meant that new sensors to detect black spokes had to be developed for the trueing machines. With the new sensor, the machine will even indicate when various spokes are mixed up in one wheel.

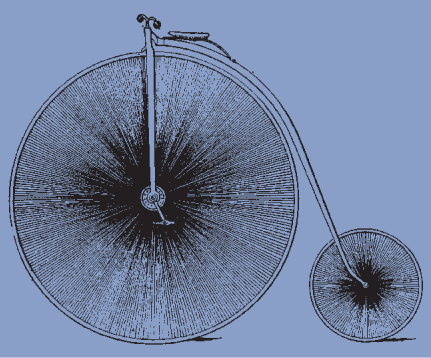
W H E E L - L O G I C

Wheel assembly methods There is not one single method or sequence to lace a wheel. Hand lacers often begin with all 36 spokes inserted in the hub, start lacing from the spoke hole on with a screen of nine consecutive spokes on one side, the tenth on the same side in the other direction, turn the wheel around, do another 9-spoke round, turn around, and fill up the gaps.

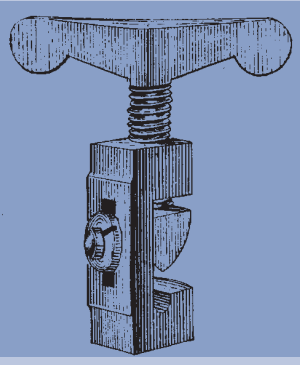
A variation on this method is starting with a half-filled hub, on both sides 9 from-outside-to-inward spokes. The first inside-out spoke comes after the first half screen, and the other 17 after the second half-screen has been laced. This method takes more time, but the risk of scratching the rim or other spokes is less.

A completely different method is to hang the hub with one left-hand and one right hand spoke in the hub (opposite positions in both directions), meeting at the valve hole) and work your way around from there on, of course in a vertical plane. This method works fast, but unlike a machine-laced wheel the chance of an offset hub (needing lots of height-trueing) is bigger.

In mechanical lacing there isn't one single best way either. Today's standard is spokes that not only cross, but actually lace; inside-out spokes crossing over the first and second adjacent but under the third. The sequence to do this can vary. For instance, Cannondale has its own sequence which is not slower, but gives a slightly superior tension-buildup and is less likely to scratch spokes or rims. With today's fashion for black spokes and colored rims this is an asset. Of course, it is senseless to patent the Cannondale method, because nobody can see which sequence was used once the wheel is finished.



Truffault Frenchman Louis Truffault invented the hollow rim back in 1876! The brilliant inventor used his rim to build a penny-farthing type bicycle with no less than 304 forged steel spokes! Each spoke was thin as a pin, and the resulting spoke-screen had a fabric-like appearance. The bike only weighed 12 kilos, and Truffault rode it twice from Paris to Tours and back without any spoke trouble. In a system in which the cost of labour apparently did not count, Truffault could build and sell these bicycles of which, unfortunately, not a single one has survived. The story and the engraving can be found in the most famous of all bicycle history books: *Le cyclisme* by L. Baudry de Saunier.



Key This spoke wrench is typical for the high bicycle of the 1870-1880 era. Remember that the spokes were threaded into the hub flange: there were no nipples. A severe drawback was, that a spoke which broke had to be extracted from the hub. As long as there remained some flesh outside the hub flange, it could be gripped and screwed out. But far more often, the breaking point was just where the threading on the spoke ended. Extraction then required a tiny hole to be drilled in the spoke end (no simple exercise with a hardened-steel spoke) and the remainder then had to be extracted with a left-hand tap. The trueing of the wheel was done with the spoke wrench as shown, which had to be gripped around each spoke, fastened and turned an estimated number of turns, etc. No wonder the spoke nipples with their square flanges (the earliest had hexagonal flanges) were soon invented.

An etymologists'* view of the lacing pattern of a spoked wheel

What's lacing?

We call the work done by the operator of one of our lacing machines lacing, meaning that he (or she) is the one who guides the spoke towards the correct hole in the rim, and determines whether a spoke crosses over or under the adjacent spokes. Most operators can perform this routine blindly.

Lace, our Oxford and Webster dictionaries tell us, is "a delicate, ornamental open-work fabric of threads". Thus, lacing is the art of handweaving such lace. Lacing is still practiced in Europe as a traditional handcraft, mostly by elderly ladies who, like with knitting, can still perform their art when their vision is diminishing. Lacers invariably are depicted with tiny spectacles.

In the European Golden age (15-17th century) the wealthy dressed in lace collars (tippets). They can be seen on numerous contemporary pictures by Frans Hals, Vermeer and Rembrandt. Today's saucy ladies' underwear is often in a lace pattern, albeit laced by a machine. The traditional lacemaker starts by fixing the ends of the number of threads (which may come to over 30 at a time) she's going to use with pins at the end of the lacing-cushion. By inserting strategic pins all over the cushion and wiggling the thread bobbins under and over each other from the left to the right of the pillow and back, she gradually sees the lace grow. The penny-farthing bicycle in the picture was hand-laced in the historic city of Bruges, Belgium where the lacing tradition is held in high esteem.

A derivation of this basic meaning of lacing is tying a shoe-lace or any other lace:

*There was a young lady in Thrace***
Whose corsets grew too tight to lace.
Her mother said: "Nelly,
there's more in your belly
than ever went in by your face."

* studying the origin or derivation of words.

** Southeastern part of the Balkan peninsula shared by Greece, Turkey and Bulgaria, but it could have happened elsewhere as well.

Electromagnetism & Health

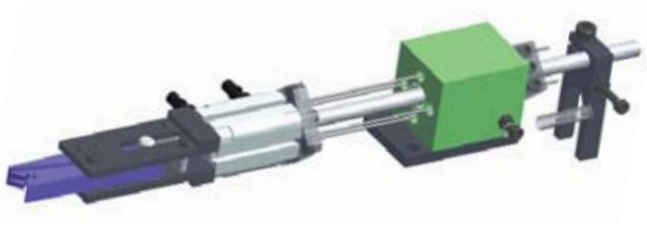
Do electromagnetic fields affect our health? Much has been said about this subject, and scientific proof isn't easy. The facts: electromagnetic fields are all around us, litterally thousands. Electromagnetism is a form of energy, like radiation. Energy can be harmful for our health, if it comes in too fast or in too big quantities. Think about burning yourself at a stove, think about electrocution, think about spoiling your eyes looking at the solar eclipse without protection, think about an overdose of sun tan. Now some forms of excessive energy impact have a direct effect (the electrocution, the smashing by a train). Some forms have a postponed effect: the day after watching the solar eclipse the mottled image in your eyes gets bigger and worse. The day after the sun tan you feel ill. Some effects of an energy impact are temporary: third, second and first degree burns will heal completely. Some are irrepairable: blindness. Some similar forms of energy impact can cause an immediate effect which will heal, and postponed effects that are permanent. Think of sound: a big explosion gives you an immediate deafness which will be forgotten tomorrow, but prolonged exposition to disco music may cause permanent damage to your hearing. Think about radiation: the effect may take years.

Speaking about electromagnetism, there are so many parameters that the long-term effects of exposure cannot be predicted. What frequency have the fields we expose ourselves to? Is my personal physiology more or less susceptible for it? (like redskin or tan skin in the sun?) How often do we get within these fields? What is their intensity? What's their density? What's their frequency? What is our personal treshold?

Do a guess, and we'd say there is a far bigger chance that electromagnetism will rather have a long-term effect on our health than not. That's why the health care in most modern countries is thinking seriously about electromagnetism as a hazard factor on the job. Also machines can influence each other. That's why there are CE-standards for such emissions.

Thinking with the man or woman on the job, Holland Mechanics has developed testing equipment for al kinds of machinery which could have electromagnetic emission. That's part of our responsibility. Our own machinery stays below the standard level. But we can cure other apparatus. With an extra Faraday's hull, or a better earth wire. Technical solutions often aren't the most difficult part. Awareness of an invisible problem can be.

New flat spoke gripper



Just to give you an idea about the complexity of the inside of a trueing machine, we show you the new flat-spoke gripper Holland Mechanics developed to keep the flat spokes in high-end aerodynamic wheels in position during the trueing process. Of course, the gripper's purpose is to prevent the flat spokes to twist, and become windmill spokes instead of windcheaters. The gripper was designed (with our new Solid Edge software) to fit in a parallel plane with the trueing arm, and operating simultaneously with the trueing hand.

Renewed Stabilizer Module

For some types of wheels it may be advantageous to stabilize the laced wheel before it is trued. In the Holland Mechanics Stabilizer two cilindrically-shaped cushions push the spoke screen just to a preset flexibility limit to make them more compliant when trueing. The stabilizer works well with 36-spoke wheels, but equally with 14-spoke wheels.

Solid Edge

As their new CAD system Holland Mechanics has chosen for Solid Edge. Solid Edge, by Unigraphics Solutions Inc. is a complete 2D&3D-Solid Modeling CAD system for high-end and complex product design. Solid Edge is Windows-based and it is intended for mid-range products in size: it will qualify for a motorcycle designer, but not for a sea-going passenger cruiser. Solid Edge is used worldwide by a variety of manufacturers. To name a few: Boeing, Mc Donnell-Douglas, Samsung, Siemens, Ericsson telephone, Kowa opticals, AT&T, Fuji, Leolux furniture, Enraf Nonius measuring equipment, Royal Dutch Navy, etc.

The choice for Solid Edge is based on the specific performances it offers for Holland Mechanics. One of its assets is the so-called stream technology, an interface due to optimize productivity and case of use. With Solid Edge, one can easily design complicated structures, drawing a profile shape in 2D and let the programme project, sweep, loft or revolve it into third dimension. It is equally easy to make virtual or real cutouts, and the programme has special modules for casting, diecasting and sheet metal processing.

But most of all our developers can design their ideas in 3D instead of constructing 2D-projections

First products developed by HM with Solid Edge software are a flatspoke gripper (for the trueing machines, to keep flat spokes in the windcutting direction during trueing), a new hub-clamp for flat-edge axles in hub gear like Nexus, Spectro or SA and the all-new DTI Trueing machine, as shown on previous pages.

An extra hand to tie

Whether you insert spokes by hand or with the HFS Hub filling station, at some stage you'll be handling hubs with 36 spokes dangling from the holes. Most wheelbuilders tie these spokes together in two (left and right hand) bundles, waiting for the lacing machine. Many wheelshops do this tying by hand, using cut-off rings of discarded inner tubes, tieribs, rubber bands, etc. It takes some fumbling to stretch the rubber over the protruding spoke ends. Even trained inserters have an obstinate spoke every now and then.
Holland Mechanics thought about a straightforward and cheap solution for this problem: a binder machine. This cute spoke binder will work in any given direction for ergonomic installation (left- or righthanded, even upside-down, etc.) and it will tie up a bundle of spokes with elastic material in 0.64 sec. The HM spoke binder can be operated single-handed. The machine is triggered by moving the bundle over a sensor next to the tape dispenser. It will save the spoke-inserting section of a wheelshop a lot of time with little investment. A simple arithmetic will show you how much profit the binder machine will give you.

International Show Calendar

* and the shows where Holland Mechanics will be on exhibit.

1999	
2-5 September	Eurobike Friedrichshafen, Germany
10-13 September	Interbike Las Yegas, USA*
15-20 September	EICMA, Milan, Italy*
23-26 September	IFMA, Cologne, Germany*
26-27 September	Interbike Open Air Trade Event, Vemon, NJ, USA
1-11 October	Mondial des deux roues, Paris, France
1-3 October	Bicycling Australia Show, Sydney, Australia
8-10 October	CABDA World Cycling Expo, Rosemont, Ill- USA
21-24 October	Poznan International Cycle Show,
Poznan, Poland*	
22 Oct. - 3 Nov.	Tokyo Motor Show, Tokyo, Japan
5-7 November	Japan International Cycle Show, Tokyo, Japan
22-28 November	Duas Rodas, Sao Paulo, Brazil*
2000	
3-6 March	Planet Sports, Basel, Switzerland
9-12 March	MIMBS, Moscow, Russia
18-22 June	Velo Mondial, Amsterdam, The Netherlands

Wheels on the Internet

Holland Mechanics can be found on the Internet under: www.holland-mechanics.nl.

Holland Mechanics will show you around in the world of wheelbuilding, and we have an up-to-date page with offers in reconditioned machinery now available. If you want to know about bicycle wheels and their components, there is a host of informative and attractive websites about wheelbuilding, for instance:

www.sapim.be
www.mavic.com
www.corima.com
www.rolf.com
www.fir.it
www.dtswiss.com
www.shimano.com
www.sram.com
www.sturmey-archer.com
www.campagnolo.com

Do you want to see more about complete bicycles, both modern and historical?

Try the sites of Trek, Gary Fisher, Klein, Gazelle, Batavus, Dursley-Pedersen, Cannondale, Ritchey, Giant etc.

The Dutch bicycle trade organisation has a good site: www.fietsrai.nl with lots of interlinks.

A very developed site on historic bicycles can be found under www.sheldonbrown.

A very interesting site to a Dutch collector is: www.knoware.nl/users/hgkuner. This is a site with a lot of interlinks and a huge vintage cycle's database.

www.users.aol.com/pryordodge brings you to America's foremost collector.

Various bicycle musea have a website: www.velorama.nl, www.pedalinghistory.com brings you to the Burgwardt bicycle museum in Buffalo, NY, www.ctuc.asn.au/bicycle hides the Canberra bicycle museum, or www.egeskov.com bicycle museum in Denmark.

For further bicycle history visit the sites of The Wheelmen, the pedestrian hobby-horse, bike culture quarterly, Japanese bicycle history by Ootu Yukio, Bicyclopedia, VeloNews, www.bicycle-lane, etc...

Holland, windmills and... bicycles