G I P I E M M E

1995

It is considered normal nowadays to see millions of bicycles flash past roads, mountain paths, competition circuits that only structural and technological innovation can amaze us.

The story of this important form of transport that has vastly changed the habits of many of us, is relatively new, but very profound, and it has not yet been all written.

The first basic two-wheeler was built in 1790 by the Frenchman De Sievac, who wanted to make an enjoyable toy.

It is a kind of a monobloc that was propelled by the feet pushing along the ground.

Almost 30 years later, in 1818, the German Drais redesigned the primordial model called "draisienne", applying a handle-bar which allowed easier handling and is comfortable seat for the rider. The first cycle race took place in 1820. The draisiennes were the competing machines, making it more a show rather than a real sporting competition. But this new machine was enjoyable and it was well liked.

In 1833 two French brother Michaux (some say that credit should be attributed to P. Lallement) invented a new, more effective transmission system applying two pedals to the hub of the front wheel, making it drivable. We were now in the era of the bicycle, the unmistakable machine with enormous front wheels sometimes of the diameter of 150 cm.

The first official cycle competition took place in 1865: the GRAND PRIX D'AMIENS were bicycles competed.

The following year there were more and more bicycle races in France, which were only side shows.

The first classical bicycle race took place in 1869 between Paris-Rouen. In the same year cycle shows took place also in the rest of Europe: Germany, Great Britain and Italy where in Padova the first track race took place, at the end of a horse race meeting and in Udine a race took place of 2 Km distance.

In 1870 the French Serget used two similar wheels and a chain which connected the front wheel to the rear wheel to achieve a further distance.

In the same year the Firenze-Pistoia track race took place and the "Velocipedistico Club Milano" was established.

People took more and more interest in bicycle shows.

In 1872 the Milano-Novara took place; in 1876 the big classic race between Milano-Torino took place.

By the end of the 80's the bicycle was well established.

It is important as well to remember that in 1879 Lawson introduced for the first time, the frame, the freewheel and chain transmission, but only in 1884 was the frame connected to the handlebar, the front fork, the saddle, the pedals and the wheels.

In 1888 Dunlop altered the wooden and steel wheel by introducing the first rubber tyre with tube which allowed better traction and stability of the wheels especially due to the type of roads at the time.

And it was actually this year that the first records for the various cycling events were established.

In 1890 the bicycle acquired ball bearings on the transmission.

From 1896, the year in which the modern Olympics began, there were at least six cycling events.

It was by now a definite sport and not just a side show.

From the end of the 1800's until now there have been innumerable inventions that have seen cycling become the phenomenon that it is today.

To get straight to the point, and as an obligation to complete the various

competitions introduced before the Great War, and which are still found in sports programs today, we wish to state that in 1903, road racing's most famous event, the TOUR DE FRANCE, took place:

in 1905: the Giro di Lombardia,
in 1906: the Giro del Piemonte
and the Milan-Modena,
in 1907: the Milan Sanremo,
the Giro del Veneto
and the Giro dell'Emilia,
in 1908: the Giro d'Italia,
in 1910: the Giro di Romagna,
in 1911: the Giro della Campania.

World War I slowed down the ardent activity of cycling, but did not stop it completely, and it got back into full swing in 1919, to go right on up to our times, as every cycling enthusiast knows.
Incredible progress has been made, not just with the shape and structure of the vehicle, but also in the materials used. This, of course, has come about through the development of research over the last decades.
The bicycles of our grandparents were of course made from iron, and they did their job perfectly well as a means of transport or for sport, though perhaps they were not as comfortable as the ones we see on our roads today. The history of technological progress is the history of perfecting construction materials.
The development of new technologies and modern engineering since World War II until today, was possible thanks to the unbreakable close connection that exists between design and materials.
The first supplies the planning and drawings of the project to be realized, and the examples are boundless: from those of Leonardo Da Vinci's machines, to those for the construction of bridges, aircraft, spaceships, automobiles, or those of a bicycle or a new saddle.
The design stage is certainly the most important in technological innovation

that thus remains sterile if it is not combined with the second: the materials.
Some of these are fibers, alloys and composite materials. The more common fibers are those of carbon, glass, aramides, titanium and magnesium.

Let's take a look at them separately:

• Carbon and carbon fiber:
Carbon is a chemical element that is present in nature both in the free state and in the form of many compounds. It gives rise to several inorganic compounds, and is the base element of all organic compounds. Its uses are many: for example, in making steel; in preparing electrodes it is used in the form of graphite; or in the form of diamonds (apart from gem stones) for abrasives, etc.
Carbon fibers usually consist of amorphous carbon with a varying percentage of graphite which, through various kinds of processing, determines fibers having different properties.

• Glass and glass fibers:
Glass is composed of silicates of alkaline metals, alkaline-earth metals and other heavier metals, and is obtained by melting siliceous sand with oxides and carbonates. Glass fibers are obtained by melting quartz beads and extrusion in gravity dies.
They are the most common and well-known, even though they are mechanically the "poorest" of all the fibers and for this reason they are little used in the production of structural components.

• Aramides and their fibers:
The aramidic fibers, these are obtained by reaction between polyamide particles and special aromatic rings. Among the most important are: KEVLAR 49 (Dupont) which is characterized by low density, an elastic modulus that is almost twice that of Aluminum, and high tensile strength.

• Titanium and its alloys:
A chemical element present in nature in the form of several different minerals: rutile and ilmenite.
Its characteristics are:
high resistance to corrosion;
high melting point (1668°C);
low volumetric mass to weight ratio: 4,5 Kg/dm³;
making it one of the lightest and strongest materials.

• Magnesium and its alloys:
This metal is present in nature in large quantities, in the form of mineral salts and as chlorine in sea water.
There are two methods for producing magnesium: by electrolytic reduction of magnesium chloride and by silicothermic reduction of carbon monoxide.
It is an extremely light metal, but on its own it is also very weak. For this reason, in metallurgy, mostly used are its alloys which have the following characteristics: - very light weight, easy to work, good castability, good resistance to heat, atmospheric and chemical corrosion, and moderate mechanical properties.

• In addition to these new materials there are the Composite Materials or "Advanced Composites" which are made by combining two materials having different characteristics, one having greater mechanical performances but not usable on its own from the operative standpoint, which acts as a strengthener, and the other which is easy to work but having poor mechanical properties.
The resulting material is strong, malleable, lightweight, etc.
Thus, the applications for these composite materials are many due to their properties (here are just the main ones):
- high specific mechanical properties;
- low specific weight (density);

- possibility of realizing monolithic structures or, in any case, composed of few parts;
- possibility of obtaining practically any rigidity/strength value independently in various directions (anisotropy);
- resistance to corrosive chemical agents.

As we have already stated, these new materials immediately found wide application in aircraft and spacecraft, while diffusion in the large industrial market was slowed down because of little information, and by scepticism and strong attachment to traditional materials.

The composite material included in the mechanical design of a machine enables the lightening of other parts, especially if these are moving masses, and the relative kinematic motion rings big advantages, in terms of higher speeds and reduced starting and stopping time.

The part's reduced inertia, compared to equal performances, reduces the active and passive forces of motion as well as reducing wear, vibrations and, last but certainly not least, wear on transmission mechanisms.

These new composite materials still have advantages that remain to be discovered, and this is what enables the high costs involved in the realization of prototypes to be borne. Through rational planning and mass production, these costs can be beaten and can become competitive with traditional metal materials.

The most commonly used aluminium alloy in **Tecno** wheels is 6082, which has a minimum tensile strength of 31 Kg/mm² and minimum hardness of 95HB both for the hot forged parts (hubs, lugs) and the extruded parts (rims, spokes).

The latest versions of **Tecno** spokes (944, 1944), use a new alloy having better mechanical properties: minimum tensile strength of 34 Kg/mm², minimum hardness 145 HB, while maintaining the same degree of elasticity as alloy 6082, about 10%.

This allowed thickness to be reduced from 0.9 mm to 0.8 mm for a considerable reduction in weight.

All aluminium parts used in **Tecno** wheels undergo heat treatment.

This consists in an homogenizing treatment for two hours, hardening in water followed by ageing treatment for 8 hours in a furnace. Only in this way can we obtain maximum mechanical strength from aluminium alloys while maintaining a good degree of elasticity at the same time.

The aluminium hubs and lugs are obtained by hot forging and, after heat treatment are worked by numerical control machines to create the right couplings which determine the wheel assembly.

The spokes and rims are formed with special dies in various operations.

To protect surfaces, all aluminium parts undergo treatments such as cleaning, polishing where a bright surface is required, followed by anodizing in the various colors. Whereas the cast black parts undergo cleaning and so-called "hard and thickness anodizing".

Due to the countless requirements of cycling, both for sport and pleasure, **GIPIEMME** has prepared new projects for wheels in materials like magnesium alloy and composite materials.

Magnesium alloy, already tested in the military, space and automobile sectors, has the advantage of weighing 60 % less than aluminium, and with equal mechanical strength.

The components of magnesium wheels are obtained by casting in special moulds, then worked on numerical control machines to form the perfect geometries for assembly.

Like aluminium parts, even those in magnesium undergo special heat

treatment which consists in sealing the parts in a container where a reducing atmosphere of sulphur dioxide is created, and brought to 410 degrees for 24 hours. With this treatment, we raise the mechanical properties of magnesium to those of a good quality aluminium.
For surface protection, all parts in magnesium undergo passivation treatment which consists in several dippings in acids at fixed temperatures, which gives it the yellow-gold color that remains even after further protection with clear varnish.
The composites formed mainly of carbon fiber and resins, have been used for decades in missiles and in the aircraft sector, and subsequently in sport (fishing, car racing, tennis, golf, boating, archery) and even in motor parts and other mass produced parts. The constant broadening of the fields of application for this material is due to its mechanical properties (double that of a good quality steel), its high degree of elasticity and its weighing 33% less than aluminium.
Tecno wheel parts in composite material are produced with "wrapping" technology, which allows the carbon fibers to be distributed in the directions along which the main forces develop.
Therefore, both in the rims and spokes, the fibers are arranged in special directions to obtain rigidity and flexure, and are crossed at special angles to supply the necessary strength and elasticity.

Some of the great advantages of **Tecno** wheels with carbon fiber components include:
- lighter weight
- higher rigidity and resistance of wheel to stress applied by the cyclist
- possibility of exploiting pedal power to a greater degree because of the lower dispersion of forces due to correct elasticity of the materials.

BONDING AGENT
An important note regarding the adhesive which holds all the wheel parts together: it comes from the aircraft sector and is specially designed for joining lightweight parts; it is made to polymerize in a specific cycle inside special furnaces.
Its special properties include: does not age; its mechanical properties are even better than those of the materials it joins!

PLUMA
TITANIUM

• *Saddle designed according to criteria of aeronautical engineering. The choice of the titanium as monocoque (which takes inspiration from the "stressed skin" used in the airplane construction) ensures the max lightness together with a high torsional strength and a very good modulus of elasticity.*

• *Thin allows the PLUMA to bear any stress with no problem without undergoing permanent deformations and by ensuring an optimum comfort also after long and non-stop uses.*

• *A pressurized chamber filled with an inert, argon atmosphere is used in order to fully guarantee the weld integrity between rods and body.*

• *Rails:* tubular Titanium
• *Body:* Titanium
• *Padding:* two-part Polyurethane
• *Cover:* selected leather

• ***Weight:*** **155 gr.**
• *Length:* 270 mm
• *Width:* 132 mm

Plus TITANIUM

• *A result of complex research and development has combined comfort, reliability light weight and pleasing aesthetics all in this new saddle.*

• *The rear seat rails are independent from the main body allowing the saddle to absorb rough terrain shocks.*

• *The PLUS saddle is a high quality product suitable for all cycling disciplines.*

•*Rails:* Titanium.
•*Body:* high impact Polythene
•*Padding:* two-part Polyurethane
•*Cover:* selected leather

•**Weight: 170 gr.**
•*Length:* 270 mm
•*Width:* 140 mm

Sintra TITANIUM

• *This new saddle is the result of anatomic and structural research.*

• *The revolutionary shock damping system of the monocoque construction gives optimal absorption of vibrations caused by rough terrain and guarantees incomparable comfort both on- and off-road.*

• *The stringent testing this saddle has undergone has proven it can offer the maximum in safety and reliability.*

- *Rails:* Titanium
- *Body:* high impact Polythene
- *Padding:* two-part Polyurethane
- *Cover:* selected leather

• Weight 165 gr.
- Length 278 mm
- Width 135 mm

DAKAR
TITANIUM

• *The aerodynamic design of the new "DAKAR TITANIUM" is the outcome of research on the dynamics of the athlete's position in action.*

• *The ergonomic shaping goes together with a titanium frame which transfers stresses separately to the two terminal ends to create an independent shock absorbing effect.*

• *The use of titanium, the shell high molecular weight stabilized polythene and special padding make "DAKAR" ultra-light but remarkably strong and comfortable, whatever the bike and the type of terrain.*

•*Rails:* Titanium
•*Body:* high impact Polythene
•*Padding:* two-part Polyurethane
•*Cover:* selected leather

•***Weight:* 180 gr.**
•*Length:* 270 mm
•*Width:* 129 mm

Plus CROMOLY

• *A result of complex research and development has combined comfort, reliability, light weight and pleasing aesthetics all in this new saddle.*

• *The rear seat rails are independent from the main body, allowing the saddle to absorb rough terrain shocks.*

• *The PLUS saddle is a high quality product suitable for all cycling disciplines.*

•*Rails:* Cromoly tube
•*Body:* high impact Polythene
•*Padding:* two-part Polyurethane
•*Cover:* selected leather

•***Weight:*** **180 gr.**
•*Length:* 270 mm
•*Width:* 140 mm

Sintra CROMOLY

• *This new saddle is the result of anatomic and structural research.*

• *The revolutionary shock damping system of the monocoque construction gives optimal absorption of vibrations caused by rough terrain and guarantees incomparable comfort both on- and off-road.*

• *The strongest testing that saddle has undergone has proven it can offer the maximum in safety and reliability.*

•*Rails:* Cromoly tube
•*Body:* high impact Polythene
•*Padding:* two-part Polyurethane
•*Cover:* selected leather

•***Weight:*** **175 gr.**
•*Length:* 276 mm
•*Width:* 135 mm

Tecno C416

CARBON RIM

• *Monocoque carbon fiber rim. A new aerodynamic style has been designed to eliminate negative vortices and assist aerodynamic performance. This new technology has made it possible to achieve the lightest weight currently possible.*

• *Hub in hot forged, heat treated 6000 aluminum alloy.*

• *The aerodynamic section, sixteen spokes are secured by internal nipples easily accessible with a tubular spoke-key.*

TECNO C416 *is available with the following options:*
28" tubular rear 7 or 8 speed
cassette freewheel

Weight: rear 920 gr. - front 730 gr.

Tecno 416

• *Aluminum rim with aerodynamic shape, designed to eliminate negative vortices and assist aerodynamic performance. This shape affords a terrific weight saving over a normal rim and also makes into a much stronger, rigid and longer lasting wheel. Made from 6082 aluminum alloy, heat treated, polished, anodized and with mitered sides.*

• *Hub in hot forged, heat treated 6000 aluminum alloy.*

• *The aerodynamic section, stainless spokes are secured by internal nipples easily accessible with a tubular spoke-key.*

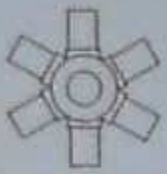
Tecno 416 *is available with the following options:*
26" or 28", tubular or 700-C, clincher.
rear 7 or 8 speed cassette freewheel.

Weight: **rear 1050 gr. - front 850 gr.**

Tecno C946

CARBON RIM & SPOKES

• *Monocoque carbon fiber rim. A new aerodynamic style has been designed to eliminate negative vortices and assist aerodynamic performance. This new technology has made it possible to achieve the lightest weight currently possible.*



• *Hub in Magnesium alloy for maximum lightness, heat treated to optimize mechanical properties and chemically treated to prevent aging.*

• *Nr. 6 spokes in carbon fiber tube. 0.75 mm gauge are unidirectional and being transversely positioned make the wheel rigid, yet still extremely elastic.*

• *Rim fixing lug in magnesium alloy. Nickel steel fixing bolts allow occasional dismantling for repairs.*

Tecno C946 *is available with the following options:*
28" tubular, rear 7 or 8 speed
cassette freewheel.

***Weight:* rear 1070 gr. - front 870 gr.**

Tecno 946

CARBON SPOKES

• *Aluminum rim with aerodynamic shape, designed to eliminate negative cortices and assist aerodynamic performance. This shape affords a terrific weight saving over a normal rim and also makes into a much stronger, rigid and longer lasting wheel.*

• *Rim fixing lug in magnesium alloy. Nickel steel fixing holes allow economical dismounting for repairs.*

• *Hubs in Magnesium alloy for maximum lightness are heat treated to optimize mechanical properties and chemically treated to prevent aging.*

• *No. 6 spokes in carbon fiber tube, Ø 7.5 mm gauge are unidirectional and hung transversely positioned make the wheel rigid, yet still extremely elastic.*

TECNO 946 *is available with the following options:*
26" or 28", tubular or 700-C clincher,
rear 7 or 8 speed cassette freewheel.

Weight: rear 1210 gr. - front 990 gr.

Tecno C944

CARBON RIM

• *Monocoque carbon fiber rim. A new aerodynamic style has been designed to eliminate negative vortices and assist aerodynamic performance. This new technology has made it possible to achieve the lightest weight currently possible.*

• *Hub in Magnesium alloy for maximum lightness, heat treated to optimize mechanical properties and chemically treated to prevent aging.*

• *Rim fixing lug in 6082 aluminum alloy. The particular shape of this component assures distortion free wheels.*

• *Nr. 4 spokes in 7075 aluminum alloy, 0.5 mm gauge, suited for its mechanical performance are heat treated, calibrated, polished and color anodized. The particular shape eliminates vortices and reduces "sail" effect.*

TECNO C944 *is available with the following options:*
28" tubular, rear 7 or 8 speed
cassette freewheel.
Colors: purple, black, titanium, blue,
yellow, red, fantasy.

Weight: rear 1070 gr. - front 860 gr.

Tecno 944

• *Aluminum rim with aerodynamic shape, designed to obtain better penetration of air and to reduce negative vortices.*
This shape affords a terrific weight saving over a normal rim and also makes into a much stronger, rigid and longer-lasting wheel.

• *Rim fixing lug in 6082 aluminum alloy.*
The particular shape of this component ensures distortion-free wheels.

• *Hub in Magnesium alloy for maximum lightness, heat treated to optimize mechanical properties and chemically treated to prevent rusting.*

• *N° 4 spokes in 7075 aluminum alloy, suited for its mechanical performance are heat treated, calibrated, polished and color anodized.*
The particular shape eliminates vortices and reduces "sail" effect.

TECNO 944 *is available with the following options:*
26" or 28", tubular or 700-C clincher,
rear 7 or 8 speed cassette freewheel.
Colors: purple, black, titanium, blue, yellow, red, fantasy.

Weight: rear 1190 gr. - front 1050 gr.

Tecno C934

CARBON RIM

• *Monocoque carbon fiber rim. A new aerodynamic style has been designed to obtain better penetration of air and to reduce negative vortexes. This new technology has made it possible to achieve the lightest weight currently possible.*

• *Rim fixing lug in hot forged 6082 aluminum alloy, machined, calibrated heat treated, polished and color anodized. The particular shape of this component ensures distortion free wheels.*

Tecno C934 available with the following options:
28" tubular, rear 7 or 8 speed
cassette freewheel

Weight: rear 1280 gr. - front 1090 gr.

• *Hub in hot forged, heat treated 6082 aluminum alloy, precision machined to guarantee perfect fit and security of the lugs.*

• *N° 4 spokes in 6082 aluminum alloy, have a gauge of only 0.9 mm due to the design of a special profile. Subsequently heat treated, calibrated, polished and color anodized. The particular shape eliminates vortices and reduces "sail" effect.*

Tecno 934

• *A new aerodynamic shape has been designed to eliminate negative vortices and reduce air resistance. This shape affords a terrific weight saving over a normal rim and also makes into a much stronger, rigid and longer lasting wheel.*

• *Hub in hot forged, heat treated 6082 aluminium alloy, precision machined to guarantee perfect fit and security of the legs.*

• *No. 4 spokes in 6082 aluminium alloy, have a gauge of only 0.9 mm due to the design of a special profile. Subsequently heat treated, calibrated, polished and color anodized. The particular shape eliminates vortices and reduces "sail" effect.*

• *Rim fixing lug in hot forged 6082 aluminium alloy, machined, calibrated, heat treated, polished and color anodized. The particular shape of this component assures distortion-free wheels.*

TECNO 934 *is available with the following options:*
26" or 28", tubular tyre
rear 7 or 8 speed cassette freewheel

Weight: rear 1480 gr. - front 1280 gr.

Tecno 948

CARBON SPOKES

• *6000 aluminum alloy series rim, heat treated, extruded, satin finish on sides, with black anodized center*

• *Rim fixing lug in hot forged 6082 aluminum alloy, heat treated and color anodized. The particular shape of this component assures distortion-free wheels*

Tecno 948 *is available with the following options:*
26" or 28", tubular or 700-C clincher
rear 7 or 8 speed cassette freewheel.

***Weight:* rear 1280 gr. - front 1090 gr.**

• *Hub in hot forged, heat treated 6082 aluminum alloy. The particular shape of this component assures distortion-free wheels.*

• *Nr. 8 spokes in carbon fiber, 1.0 mm gauge with unidirectional fibers give the highest degree of flexibility. By particularly positioning each spoke and by inclining each alternate spoke by three degrees a perfect relationship of strength and elasticity has been achieved in a wheel which is highly efficient on all kinds of terrain.*

Tecno 935

• *6000 aluminum alloy series rim, heat treated, extruded, satin finish on sides with black anodized center.*

• *Rim fixing lug in hot forged 6082 aluminum alloy, heat treated and black anodized.*
The particular shape of this component assures distortion free wheels.

• *Hub in hot forged, heat treated 6082 aluminum alloy.*
The particular shape of this component assures distortion free wheels.

• *Nr. 3 spokes in 6082 aluminum alloy have a gauge of only 0.9 mm due to the design of a special profile.*
Subsequently heat treated, calibrated, polished and color anodized.
The particular shape eliminates vortices and reduces "sail" effect.

Tecno 935 *is available with the following options:*
26" or 28", tubular or 700-C clincher.
rear 7 or 8 speed cassette freewheel.
Colors: purple, black, titanium, blue, yellow, red, fantasy.

Weight: rear 1300 gr. - front 1100 gr.

Tecno M935

• 6000 aluminum alloy series rim, heat treated, extruded, satin finish on sides with black anodized center.

• Disc fixing lug in hot forget 6082 aluminum alloy, heat treated and black anodized.
The particular shape of this component assures distortion-free wheels. Nickel steel fixing bolts allow occasional dismantling for repairs.

• Hub in hot forged, heat treated 6082 aluminum alloy. The particular shape of this component assures distortion-free wheels.

• N° 3 spokes in 6082 aluminum alloy, have a gauge of only 0.9 mm due to the design of a special profile. Subsequently heat treated, calibrated, polished and color anodized. The particular shape eliminates vortices and reduces "sail" effect.

Tecno M935 is available with the following options:
26" MTB, rear 7 or 8 speed
cassette freewheel.
Colors: purple, black, titanium, blue, yellow, red, fantasy.

Weight: rear 1390 gr. - front 1180 gr.

Tecno R 416

ALUMINUM RIM

• *The distinctive vertical beam section is extruded from 6082 aluminium alloy, calendered and heat treated to ensure best mechanical performance. Its specially engineered shape has allowed a reduction in thickness without loss of strength and thus achieved a very light weight (approx. 350 gr.). Requiring fewer spokes than a conventional rim, it builds into an extremely light, yet rigid wheel.*

• *Hidden nipples supported by the internal beam section optimize its incredible aerodynamic performance and reduced weight. The polished surface is protected from corrosion and abrasion by a hard anodized layer.*

Tecno R 416 *is available with the following options:*
26" or 28", tubular 700-C clincher
Number of holes available: from 16 to 36

***Weight:* 350 gr.**

Tecno RC 416

CARBON RIM

• *This new carbon fiber rim of monocoque construction uses the latest "wrapping" technology to arrange fibers along calculated stress lines. Fibers are arranged along the circumference for rigidity and flex then crossed at precise angles to obtain strength, torsion and side flex. The fibers are connected using a unique mould which uses internal and external pressure to form the rim.*

• *A computer controls the temperature and duration of the polymerization cycle which takes place inside a controlled atmosphere. Its shape has evolved to eliminate negative vortices and improved aerodynamics.*

Tecno RC 416 *is available with:*
28" tubular.
Number of holes available:
from 16 to 36

Weight: 400 gr.

Creative: HR STUDIO - PD
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GIPIEMME

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