



## The Wheel

### Which wheel to choose?

The choice of wheels varies a lot and depends on many factors. Top skaters change their wheels from race to race to get the best combination of wheel type, sizes and hardness for maximum roll, grip and overall performance.

The **wheel size** of speed skates varies between 80mm and 110mm (accepted by the rulebook of the FIRS).

#### **Notes concerning the size of wheels:**

Bigger wheels are slower in the acceleration, but faster in the top speed. Smaller wheels react vice versa. There are no facts yet regarding the trade off for acceleration of 84mm vs. the roll of 110mm.

The **hardness of wheels** is measured in durometer “A”. Fitness and speed wheels are offered in a middle range hardness of 82-83A and higher range hardness of 85-86A. The hardness of a wheel has a lot of influence on the rolling performance.

#### **Notes concerning the hardness of wheels:**

Soft wheels absorb impacts better but do not roll as fast. Harder wheels are faster but do not absorb impacts as good as the softer ones.

The profile of the wheel is flat-to-pointed related to the use of the skates. Speed skating wheels are pointed.

#### **Notes about the wheel profile:**

The more pointed the wheel, the less the rolling resistance (= higher speed), but smaller the stability.

#### **Rules for the hardness of wheels:**

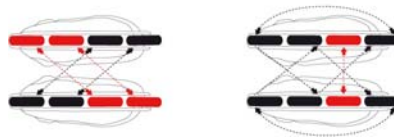
- The smoother the surface → the harder the wheel
- The harder the wheel → the more durable the wheel (wear off)
- The softer the wheel → the better the shock absorption and grip
- Extreme rough surface → 78A – 80 A (fitness)
- Normal surface → 80A – 83A (fitness / speed)
- Smooth surface → 83A – 90A and harder (fitness / speed)

## Tips for maintenance of wheels

Noisy or out-of-round wheels are caused by uneven wear. The inside of the wheels wears off faster than the outside. Regular rotation of wheels helps to maintain the life and to stabilize the wheel during skating. Please follow the steps to maintain your wheels:



Picture on right demonstrates the exchange of 4 wheels in equal size – for example 4x100mm



Picture on left demonstrates the exchange of 4 wheels in in-equal size – for example 3x110mm/1x100mm

### **Skating on 3 wheels**

Position 1 left to position 3 right  
Position 2 left to position 2 right  
Position 3 left to position 1 right

### **skating on 4 wheels**

Position 1 left to position 3 right  
Position 2 left to position 4 right  
Position 3 left to position 1 right  
Position 4 left to position 2 right  
And vice versa. The print of the wheel should face to the outside.

### **Skating on 4 wheels with different diameter (e.g. 3x110mm/1x100mm)**

Position 1 left to position 4 right  
Position 2 left to position 2 right  
Position 3 left to position 3 right  
Position 4 left to position 1 right

### **Skating on 5 wheels**

position 1 left to position 4 right  
Position 2 left to position 5 right  
Position 3 left to position 3 right  
Position 4 left to position 1 right  
Position 5 left to position 2 right  
And vice versa. The print of the wheels should face to the outside.

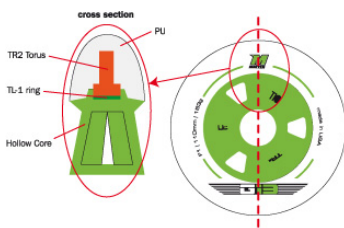
## Matter Race Wheels

Matter is the No. 1 race wheel brand. Matter wheels out perform other wheels due to their perfect mix of fast roll combined with an excellent grip at top speed. An additional feature is the lifetime of the wheel which is much longer than any other wheel in the market. Matter is known as THE innovation leader of the wheel industry. Various hub constructions, different layers of the polyurethane (PU) as well as unique chemical compounds lead to the result that Matter is able to offer specific wheels for each individual purpose – no matter if it refers to indoor racing, track or road racing. Matter is always the No 1 choice of the top athletes.

## **Tecnology – The Hub**

The hub or core is the heart of a wheel. Matter offers 4 different cores which will be used depending on the purpose and price point of the wheel.

### **TR3 – Injection Moulded Torus**

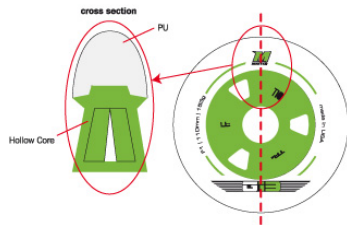


All our wheels featuring the TR3 system contain our uniquely formulated **injection molded torus (TR-3)** and the TL-1, a unique elastomer ring between the Slip Joint hollow core and the TR-3, providing necessary rigid support and additional rebound. All together this makes any wheel with TR3 part of the very first four component wheel generation. We have now combined four separate and distinct components (Hollow core, TL-1, TR3 and the outer PU) in one wheel to deliver optimal track performance to the world class skating community. This combination provides the wheels with an incredible combination of grip and roll. Without a doubt, TR2 is where the future of inline speedskating begins.

This technology gives the wheel incredible grip at top speed. The TR-3 has set a new standard in speedskating without any doubt.

Another advantage of the TR-3 hub is its aerodynamic construction. Air turbulences become a factor the bigger the wheel size gets. High turbulences decrease the performance of a wheel. The almost closed hub of the TR-3 hub is very aerodynamic and helps to reduce the air turbulences.

## Hollow Core Technology (HTC)



Matter wheels staked its reputation on **Hollow Core Technology**. While travelling through a treacherous product development cycle, MATTER has been able to combine **light weight with stiffness**, necessary ingredients for a successful Road, track and Indoor wheel. The Matter Superjuice wheels furthermore feature the dome, that piece that sits right under the urethane has tremendous rebound and is the reason for the outstanding roll as it's characterized by the Matter Road and Matter Indoor product. For all TR2 wheelks the dome was replaced by the TR2 system, and the two pieces of the hollow core are now jooint together by the socalled. **slip-joint**, making the core even more stable and performing.

The holow core re duces the weight of the wheel quite a bit. Matter wheels are the most lightweight wheels in the market – an advantage that a lot of skater appreciate knowing, cause they do not get tired as fast as with heavier wheels.

Another advantage of the TR-2 hub is its aerodynamic construction. Air turbulences become a factor the bigger the wheel size gets. High turbulences decrease the performance of a wheel. The almost closed hub of the TR-2 hub is very aerodynamic and helps to reduce the air turbulences.

## Energy Management Technology (EMT)



During the development of Hollow Core Technology, it became apparent that Hollow wasn't the answer for ALL surfaces and all conditions. Clearly, there are certain styles of skating and certain terrains where **additional flex** is required to allow the skater to **better manage energy**. So, back to the lab we went and the end result is the two-piece, **EMT flex technology**. EMT has road and track applications and one will find the EMT option throughout the Matter line.

## Offset Technology (OT)



Our OT hub follows the same idea as EMT. The advantage is our ability to manage the energy to give specific foot prints and flex without sacrificing roll, grip and wear. **The difference of OT vs. EMT is the hub construction.** The EMT is based on a hollow core constructions vs. the OT is based on a solid hub construction. The EMT has some advantages compared to OT such as better rebound, improved flex for better power transfer and lighter weight. Yet there are quite some skaters that prefer a solid hub system, and for them the OT core offers the perfect solution. The OT hub can be found in the IMAGE wheels series. For 2012 the IMAGE was stiffened up a bit more, to improve the overall performance of the wheels.

Some skater prefer a solid core. The OT core is the perfect solution for them. An additional plus point are the lower production costs for this core which reduces the overall costs of the wheel featuring the OT core.

## Ultrasonic Welding



Sonic Welding (USW) was incorporated is the method of joining two parts by converting electrical energy into heat energy by high frequency mechanical vibration and is suitable for plastics or metals. One part of the assembly is set in motion in order to cause intense friction between the two pieces, one of which remains held in place. This movement is provided by a vibrating component called a sonotrode which is applied at right angles to the surface of the part to be welded.

Friction is localized at the interface of the assembly. The resulting heat quickly melts the plastic which flows and causes a chemical bond. After it has cooled, a solid homogeneous weld between the two components is formed. The vibration frequency of the sonotrode is 20 to 40 kHz which is outside the perception limit of the human ear.

Ultrasonic plastics' welding has advantages:

One piece Hollow Core Technology (HCT) promotes a stiffer more consistent roll. In addition, USW allows us to keep our HCT while developing an entirely new Energy Management Technology system (EMT). This is a breakthrough for elite inline racing because it is the first ever hollow core with energy management control, giving back nearly all the energy put in. Not only does Matter have superior urethane, we also understand the importance of making the urethane and core work coherently in order to optimize roll, grip, wear and overall performance for indoor, road, track and marathon racing.

## Convertible Wheel Technology (CWT)



CWT (Convertible Wheel Technology) was developed specifically for the Track. While EMT allows the skater to manage energy, **CWT provides additional footprint on the track for better grip.** Combined with XG, Code Red, Nuclear or now also Defcon, the skater will have the opportunity, **NO MATTER THE SURFACE**, to find the suitable track setup. See the Matter track wheel Matrix for suggested wheel setups based on surface type.

## Why do Matter Race Wheels come up with Footprint?

The footprint system was developed as Matter wheels understood that despite urethane durometers, there are other factors that affect the feel of the wheel to the skater.

The critical element affecting the feel is the footprint, **the larger the footprint, the softer the wheel.**

Therefore, we believe its more important to measure the footprint of the wheel relative to the other wheels in a sequence. **Matter uses an F – scale rating system.**

F0 being the hardest, F1 the next hardest, and so on. This footprint scale is relavent only to each individual family or sequence, meaning that an F1 Juice will not have the same traditional hardness rating as an F1 XG wheel.

## Can I convert the Footprint into Durometer A Hardness?

There is no mathematic formula that allows you to convert the footprint into a standard hardness of durometer A as most wheel brands use it. The footprint of Matter wheels has been designed for its specific needs for road- track- or indoor racing. This means that for example a certain footprint for an track wheel is different from a footprint of a road wheel.

This means that for example the F1 Superjuice wheel which has been specifically designed for road racing has a different hardness than a G13 track wheel with the same given footprint.

Usually it should not matter if the hardness is given in durometer A or in footprint. It also doesn't matter to convert the footprint into durometer hardness. Its more important to know the general change of a hardness towards the footprint. The higher the number of the footprint the softer the wheel.



### **Does Matter offer wheels for Mini bearings?**

No, Matter only offers wheels for 608 standard bearings. You have to use special bearing sleeves if you want to skate your mini bearings on Matter wheels.

### **G13 and MaxG**

In 2013 Matter released their new MaxG wheel. After several months of testing the insert system they developed the MaxG. The main difference between MaxG and G13 is that MaxG offers more grip, so it may be better for technical and slower tracks.