

# HWBOINTS REVISION 7

Revision 7 is designed in response to community feedback with the intent of awarding points more accurately as a reflection of overclocking result quality. The new revision re-balances the weight of benchmark applications and awards points based on result quality relative to the top result.

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# BACKGROUND INFORMATION

At the core of the HWBoints concept, invented by Mtzki from Finland, lie two distinct parameters: the weight of a ranking as determined by the amount of participants, and the quality of the result as determined by its position within the ranking. This concept is now being stretched to the end of its scaling capabilities due to two primary reasons: 1) the increase of global and hardware rankings, and 2) the direct submission capability of benchmark applications via our Open API.

To explain the first point, consider the following comparison of the database state in 2006 with 2016. As you can see below, the amount of data our servers need to process has grown spectacularly.

- Submissions: 20,000 vs 1,644,000
- Users: 1,270 vs 72,000
- Teams: 200 vs 2,200
- CPUs: 400 vs 3,000
- GPUs: 230 vs 1,650
- Benchmarks: 14 vs 102

To explain the second point, we need to shed some light on the cooperation with Intel since June 2013. Using the Open API functionality we developed for HWBOT Prime, the benchmark integrated in the Intel Extreme Tuning Utility allows enthusiasts to directly submit to the HWBOT database. Its inception turned out incredibly successful as almost 370,000 submissions have been made since. As a result of its popularity among general enthusiasts, the XTU Global rankings have the highest participation ratings among all benchmark applications. For example,

the 4xCPU ranking for quad-cores has 37,000 users participating. Since points are awarded based on the popularity of a given ranking, XTU submissions generate the most amount of points.

This conflicts with the overclocking community's desire to have the Overclockers League and submission points reflect the skill and effort required to achieve the position. Revision 7 addresses these concerns.

## PREVIOUS HWBOINT REVISIONS

Below an overview of the HWBOT revisions which feature HWBoint changes.

- R1.0 – Nov 3, 2006: [http://hwbot.org/news/150\\_](http://hwbot.org/news/150_)
- R2.0 – Feb 11, 2007: [http://hwbot.org/news/414\\_](http://hwbot.org/news/414_)
- R3.0 – Jan 1, 2010: [http://hwbot.org/news/how\\_to\\_survive\\_rev3\\_a\\_walkthrough\\_guide](http://hwbot.org/news/how_to_survive_rev3_a_walkthrough_guide)
- R3.1 – Jan 6, 2010: [http://hwbot.org/news/1611\\_](http://hwbot.org/news/1611_)
- R3.5 – March 14: [http://hwbot.org/news/1827\\_](http://hwbot.org/news/1827_)
- R4.0 – Jun 4, 2011: <http://forum.hwbot.org/showthread.php?t=26812>
- R4.3 – Nov 19, 2011: [http://hwbot.org/newsflash/1512\\_](http://hwbot.org/newsflash/1512_)
- R5 – Jan 4, 2013: <http://forum.hwbot.org/showthread.php?t=62047>
- R5.5 – Mar 1, 2013: [http://hwbot.org/news/9115\\_](http://hwbot.org/news/9115_)
- R5.6 – Jul 3, 2013: [http://hwbot.org/newsflash/2113\\_](http://hwbot.org/newsflash/2113_)
- R5.7 – Feb 27, 2014: [http://hwbot.org/newsflash/2468\\_](http://hwbot.org/newsflash/2468_)
- R5.10 – Jun 24, 2014: [http://hwbot.org/news/10961\\_](http://hwbot.org/news/10961_)
- R6.0 – Oct 1, 2014: [http://hwbot.org/news/11389\\_](http://hwbot.org/news/11389_)
- R6.1 – Aug 25, 2015: [http://hwbot.org/newsflash/3026\\_](http://hwbot.org/newsflash/3026_)

## R7 MAJOR GOALS

The major goals set out for Revision 7 include addressing community concerns, as well as addressing server constraints. The major goals are to:

- Re-assess the impact of benchmarks with API submissions
- Re-assess the value of 3D benchmarks
- Reduce the server impact of point calculations
- Shift the importance for competitive overclocking from World Record focus to overclocking competition focus

# HWBOINTS ALGORITHM: THEORY

The algorithm is,

- If  $\frac{P_1}{P_x} \geq P_{min}$ , then
- $Base\ Points = \left\{ \left[ \left( X \times \ln \frac{P_1}{P_x} \right) + Y \right] \times [A \times \ln(MIN(U; U_{max}) + B) + C] \right\}$
- $Points = APP_{mp} \times (MAX(Base\ Points ; PT_{min}) + PT_{bonus})$

With,

- A, B, C, X, Y, Z = Scaling parameters
- P1 = Top score in ranking
- PX = Score in ranking
- U = Users in ranking
- Umax = Limit for users in ranking
- Pmin = Minimum required performance for points
- PTmin = Minimum points for a type
- PTbonus = Bonus points for a type
- APPmp = Application multiplier

The point algorithm is used to determine the value of a submission on three different levels (or types):

- HP = Hardware Points, based on benchmark, CPU or GPU (per core count)
  - I.e. 3DMark05 with 2x GeForce GTX 480
- GP = Global Points, based on benchmark per core count
  - I.e. 3DMark05 with 2xGPU
- BP = Benchmark Points, based on benchmark

Each type of points has a different set of parameters and restrictions. Find the details below:

Type	Points							Users	Min Perf
BP	A	B	C	X	Y	Max	Min	Umax	Pmin
	31	25	-95	14.0875	0.6	189.4	1	5000	0.9
GP	A	B	C	X	Y	Max	Min	Umax	Pmin
	30	35	-100	2.3	0.8	161.6	1	1000	0.5
HP	A	B	C	X	Y	Max	Min	Umax	Pmin
	32	35	-120	2.772	0.8	53.8	0.1	200	0.75

Type	PTbonus (U > 10)					PTbonus (U <= 10)*				
BP	#1	#2	#3	#4	#5	#1	#2	#3	#4	#5
	75	50	30	20	10	15	10	6	4	2
GP	#1	#2	#3	#4	#5	#1	#2	#3	#4	#5
	75	50	20	10	5	15	10	3	2	1
HP	#1	#2	#3	#4	#5	#1	#2	#3	#4	#5
	10	5	2	0	0	2	1	.4	0	0

\* PTbonus (U <= 10) is 1/5th of the points of PTbonus (U > 10)

## HWBOINTS ALGORITHM: PRACTICAL

For those less familiar with mathematics, a bit more information below. On our test environment you can find the R7 algorithm in action. The link is: <http://uat.hwbot.org/>.

### IMPROVE YOUR POINTS

Just like in all previous revisions, the best way to improve your Benchmark, Global and Hardware points is by improving your overclocking result. Because the R7 algorithm is based on your performance relative to the top score, improving your result will always improve the points contributed to the score. Regardless of a change in position within the ranking.

As the leader of a ranking, you can extend your lead over the competition by improving your score. As you create a wider gap between your top score and the others, the points of other results will decrease.

## MAXIMUM POINTS

The maximum points for each Benchmark, Global and Hardware ranking is governed by three arbitrary parameters: Umax, APPmp and PTbonus. Umax determines the cut off for the amount of participants impacting the points. APPmp is a multiplier which affects the final base points and can be used to increase or reduce weight of certain benchmarks. PTbonus is used to offset the top scores from the algorithm as it adds points to the top-5 places.

The maximum points for each ranking is:

- Benchmark Points: 176.5 points
- Global Points: 161.6 points
- Hardware Points: 53.8 points

## MINIMUM POINTS

The minimum points for each Benchmark, Global and Hardware ranking is governed by four arbitrary parameters: Pmin, PTmin, PTbonus and APPmp. Pmin is the minimum performance percentage required to score points in the ranking. If your score is less than this performance cut off, it receives no points. PTmin determines the lowest points awarded in a ranking. APPmp is a multiplier which affects the final base points and can be used to increase or reduce the weight of certain benchmarks. A special table of PTbonus is used for low participation rankings and defines

the points awarded in cases where the number of the amount of participating users is less or equal to ten.

The minimum points for each ranking is:

- Benchmark Points: 1 point
- Global Points: 1 point
- Hardware Points: 0.1 point

## COMMUNITY DECISIONS

The algorithm allows for the community to increase or reduce the emphasis of specific aspects of overclocking. Although all parameters are arbitrarily set, it is recommended to only change the following parameters:

- BP/GP/HP: enable/disable points
- APPmp: percentage of base points, affects all rankings of a benchmark
- PTbonus: offset top-5 bonus points
- Pmin: adjust minimum performance required for points

In the current implementation, the APPmp is configured to 1.00 for all benchmarks except for the CPU benchmarks which are configured to 0.80.



# LEAGUE ALGORITHMS

## SEASONAL WORLD RANKING

# World Ranking

Road To Pro  
Division  
Points

10 Top  
Ranked  
Competitions

15 Best  
Benchmark  
Results

In Revision 7, the World Ranking is introduced to accommodate the competitive current-gen overclocking community. In contrary to the Overclockers League the focus shifts from points accumulated via benchmark submissions to the performance in overclocking competitions.

The World Ranking is based on three performance metrics: the annual Road to Pro Challenger Division series, ranked competitions and HWBoints with current-gen hardware. The combination of the three metrics ensures that everyone who participates in HWBOT is ranked. In addition, it prevents “old points” from determining the top ranked contestants as the majority of the points is based on the overclocking achievements throughout the year.

$$\text{World Ranking Points} = A \times (\text{RTP}) + B \times (\text{RC}) + C \times (\text{MAX}(\text{BP}; \text{GP}; \text{HP}))$$

Where,

- A = Points from the Road to Pro competitions
- B = Top 10
- C = Top 15
- RC = Ranked Competitions
- BP = Benchmark Points
- GP = Global Points
- HP = Hardware Points

The algorithm ensures continuity for overclockers who want to curate their HWBOT profile as points are not reset at a specific time every year.

## ROAD TO PRO: PRO OC + CHALLENGER DIVISIONS

The Road to Pro (Pro OC and Challenger Divisions) are the main competition series throughout the year. The benchmarks and hardware are chosen by the Community Competition Task Force (“CCTF”).

	CPU	GPU	Other
Pro OC	Open	Open	
Division I	Core i7 DT	All except Titan	1xGPU only
Division II	Core i5	All except Titan, 1080 (Ti)	1xGPU only
Division III	Core i3	All except Titan, 1080, 1070	1xGPU only
Division IV	FX -> SR7	All AMD	1xGPU only
Division V	APU -> SR5		1xGPU only
Division VI	“special” -> SR3		
Division VII	Old School		

- Structure
  - 7 divisions, 3 rounds, 5 stages
  - Each round lasts 2 months
  - Benchmarks and hardware specifics decided by CCTF
- Increase points
  - Points earned in the round

- Stage total = PCT of top score and round total = sum of stage points
- Maximum 500pts per round
- Restrict user to 1 division choice in user account
  - User can participate in all the competition if he wishes, but for the League only the points he gathered in the division indicated in the user profile will contribute

## RANKED COMPETITIONS

Included in the Ranked Competitions are all OC-ESPORTS competitions with competition points enabled. We distinguish three levels of competition, appropriately named Level 1, 2, and 3.

Level 1 includes online overclocking competitions such as the HWBOT Country Cup or sponsored competitions. It also includes invitational live competitions. Level 2 is for live competitions only. We include live qualifiers for a world final and regional finals. Level 3 includes only the global live competitions. Note that Level 2 and Level 3 only applies to open live overclocking tournaments.

Each of the levels has its own point structure. For winning a Level 1 competition, you receive 50 points. For winning a Level 2 competition, you receive 100 points. For winning a Level 3 competition, you receive 250 points. For participating in a Level 1, 2, or 3 competition you receive respectively 1, 10, and 25 points

The current implementation has as benefit that all types of overclockers can join the competition they like and accumulate points. Rookie, Novice, old school, low cost GPU contests, sponsored, etc. The CCTF can introduce new competitions if there is request from the community.

## HWBOINTS

The HWBoints includes the best scores in your HWBOT profile rated according the HWBoints Revision 7 algorithm. In the World Ranking only hardware released in the past two calendar years (i.e. for 2017, includes 2016 as well) are eligible for contribution. The restriction is applied to CPU and GPU models.

The best core is determined by the maximum of the three types of points used to value a submission: benchmark points, global points and hardware points.

In addition we have also addressed the issue of “double-dipping”. In the past, a single score could yield points for both BP/GP and HP, resulting in a double-dip boost. In Revision 7, a score will yield either BP/GP or HP (whichever is higher).

## OVERCLOCKERS LEAGUE

# Overclockers League

Top-15  
benchmark/global  
points

Top-40  
hardware points

Alongside the World Ranking the Overclockers League is maintained as an “all-time” metric of overclocking ability based on HWBoints.

$$\textit{League Points} = A \times (\text{MAX}(\text{BP}; \text{GP})) + B \times (\text{MAX}(\text{HP}))$$

Where,

- A = Points from the Road to Pro competitions
- B = Top 10
- C = Top 40
- RC = Ranked Competitions
- BP = Benchmark Points
- GP = Global Points
- HP = Hardware Points

The Overclockers League includes all submissions made by an overclocker without exception. Separate leaderboard for the different classes (Elite, Extreme, Apprentice, Enthusiast, Novice, Rookie) will be available too.

## TEAMS LEAGUE

The League algorithm is identical to R6. In the equation below you can find the calculation for the point in the Teams League.

$$\textit{Team Points} = \textit{SUM}(\textit{GTPP}) + \textit{SUM}(\textit{HTPP}) + \textit{SUM}(\textit{UP})/10$$

Where,

- GTPP = Global Team Power Points
- HTPP = Hardware Team Power Points
- UP = User Points (all BP, GP and HP of team member)

## HARDWARE MASTERS

The Hardware Masters is a leaderboard based on the accumulation of Hardware points. In the equation below you can find the calculation for the point in the Teams League.

$$\text{Hardware Masters Points} = \text{SUM}(\text{HP})$$

Where,

- HP = Hardware Points

## GLOBAL MASTERS

The Global Masters is a new leaderboard similar to the style of the Hardware Masters. It is a leaderboard based on the accumulated Benchmark and Global points. In the equation below you can find the calculation for the point in the Teams League.

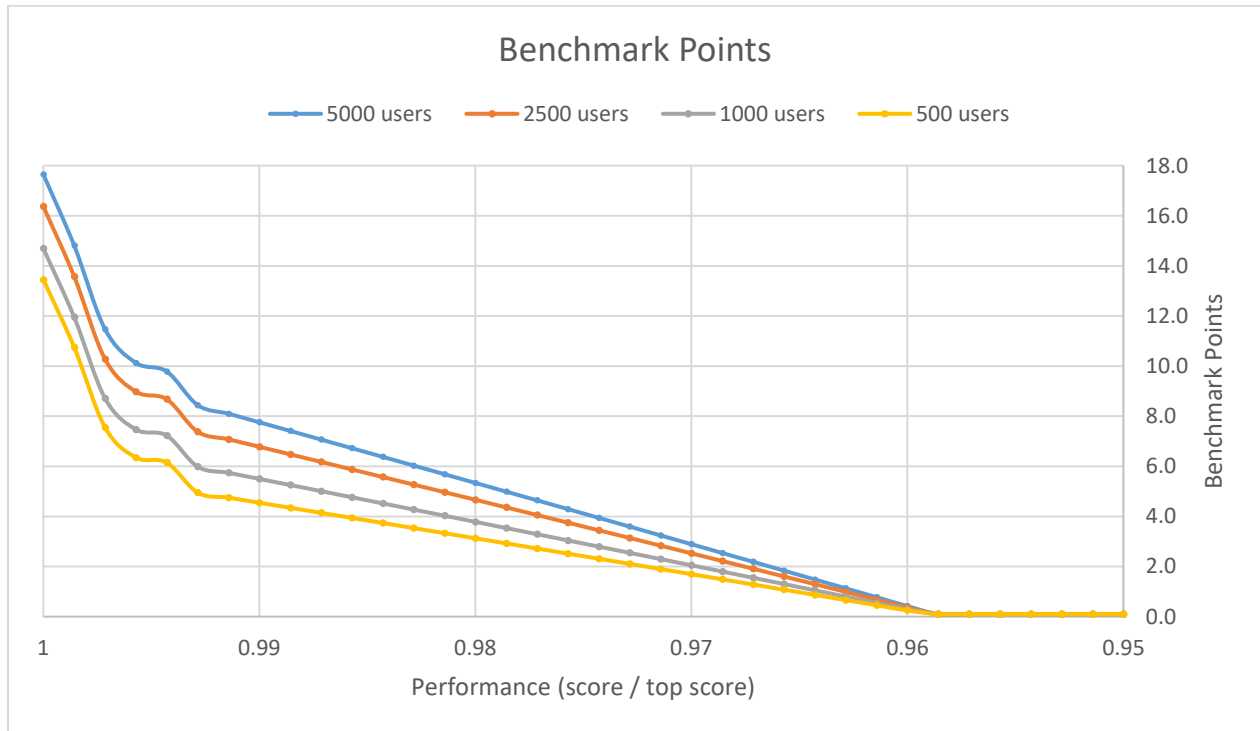
$$\text{Global Masters Points} = \text{SUM}(\text{BP}; \text{GP})$$

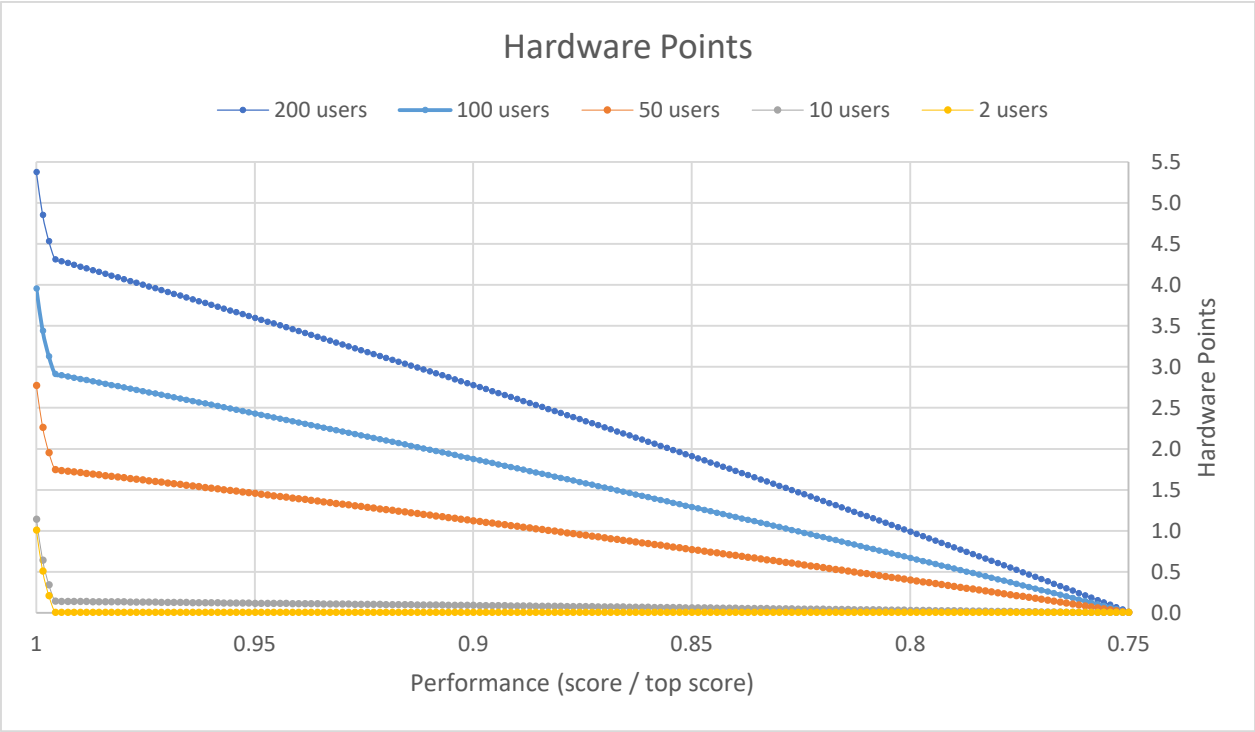
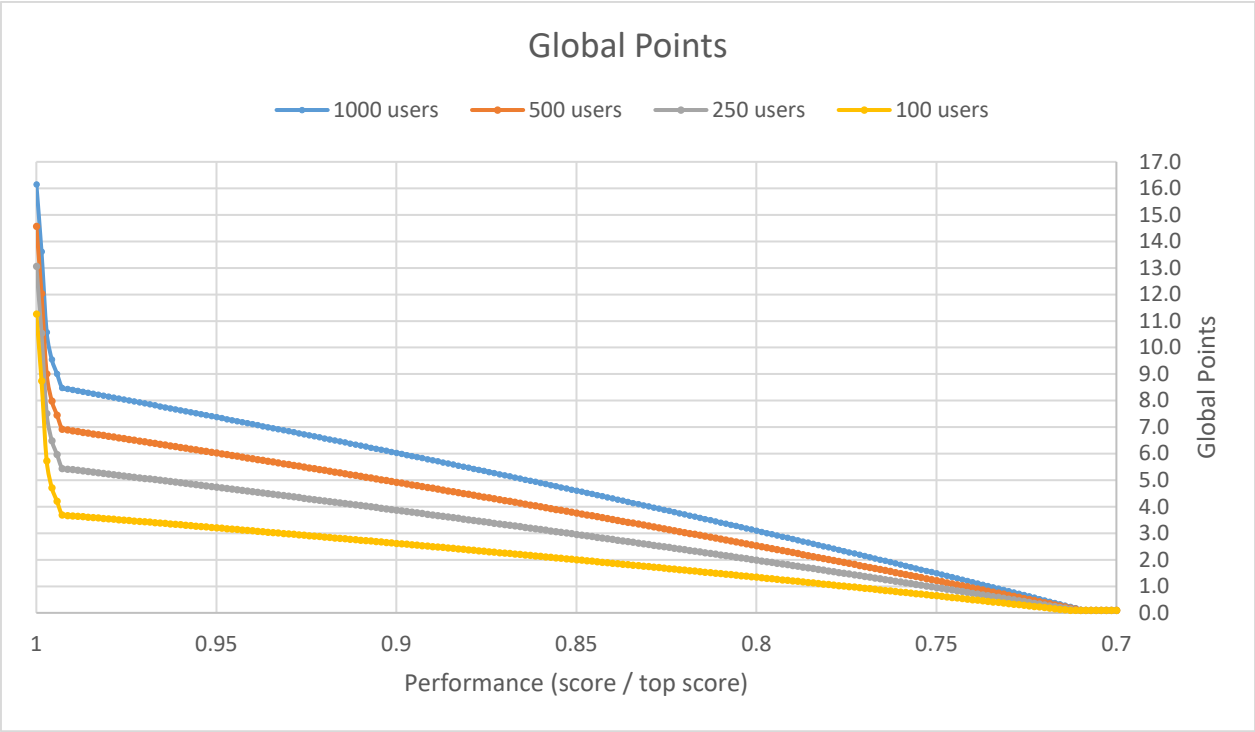
Where,

- BP = Benchmark Points
- GP = Global Points

# DISTRIBUTION GRAPHS: THEORETICAL EXAMPLE

In the distribution graphs below you can find the theoretical distribution of points for a ranking with evenly distributed scores.



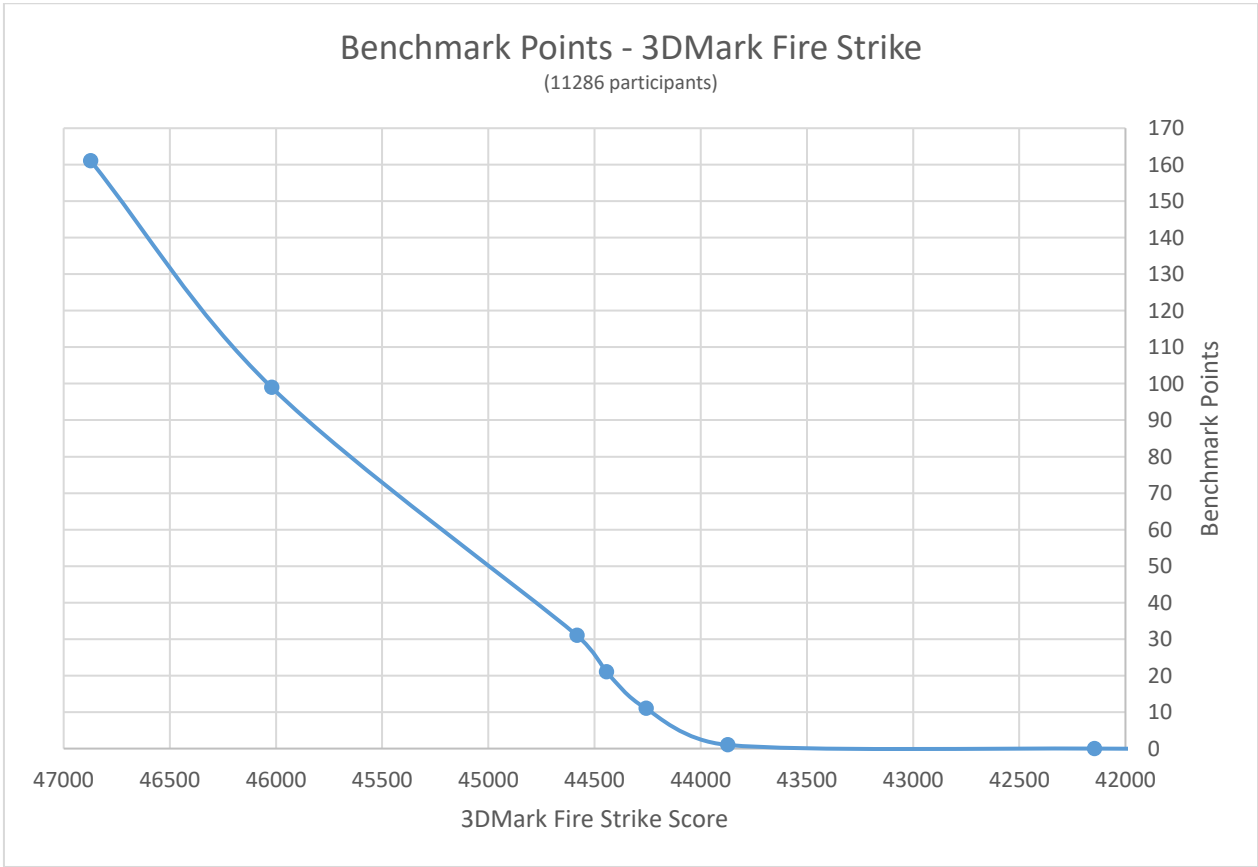




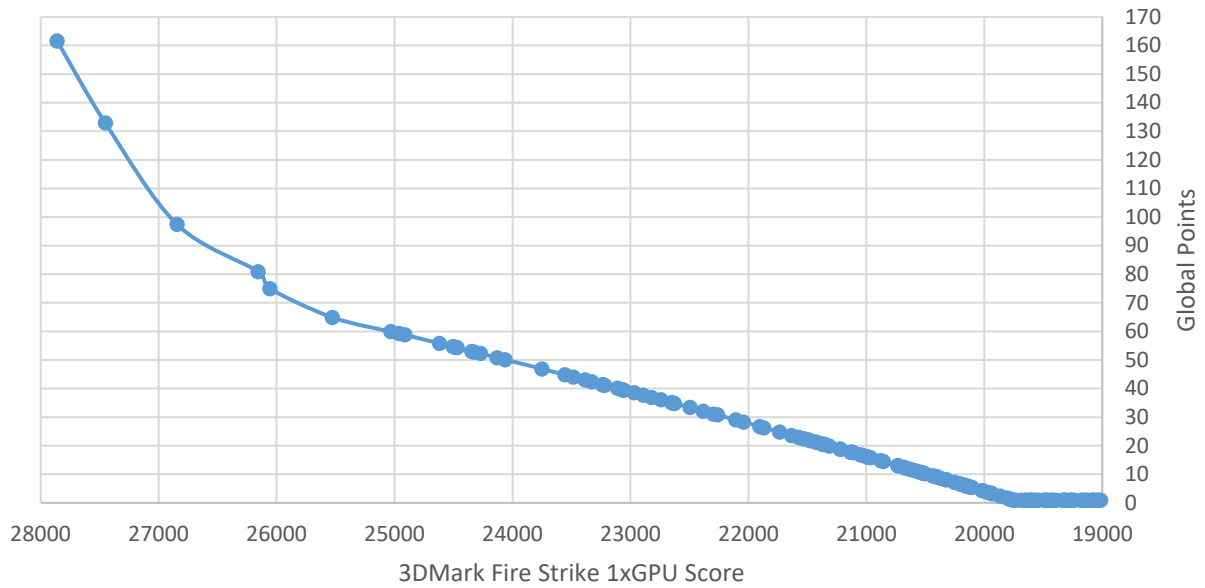
# DISTRIBUTION GRAPHS: REAL WORLD EXAMPLE

In the distribution graphs below you can find real world examples of the distribution of points for a specific ranking. The rankings used are:

- Benchmark Points: 3DMark Fire Strike
- Global Points: 3DMark Fire Strike 1xGPU
- Hardware Points: 3DMark Fire Strike 1x GeForce GTX 970



Global Points - 3DMark Fire Strike 1xGPU  
(1861 participants)



Hardware Points - 3DMark Fire Strike 1x GeForce GTX 970  
(261 participants)

