# ROBIT® EVOLUTION SERIES

Further. Faster.


Robit®

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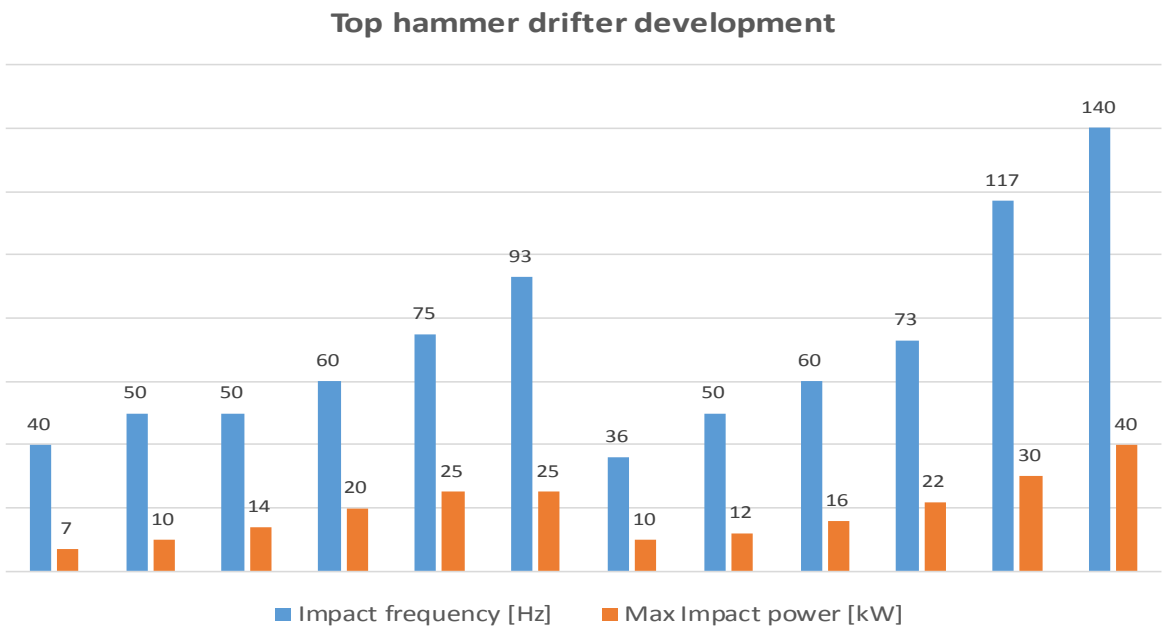
5 / 2019

# Applying the most advanced technology to the toughest drilling applications across the globe

Over 30-year history of Robit has only seen one thing constant – the ever-increasing need for the connection between hammer and rock to endure more severe forces. In recent years, top hammer performance development has not only been linear but exponential, as maximum impact powers in e.g. tunneling and drifting applications rise above 40 kW and impact frequencies steadily reach beyond 100 Hz. The Robit Button Bits, now used across the globe in a vast variety of rock formations, have witnessed masses of improvements during the journey.




The Evolution bit series is the result of a systematic approach towards crafting the world's best button bits. Our level of sophistication is growing, trial and error has ages ago been surpassed by simulation and analytics based development. We know how our materials behave, how rock fractures, how to harness the immense forces traveling within the drill string. We have the answers to where the Evolution performance comes from and what it means to your drilling process.

The Evolution series scope of improvements share multiple aspects across the size range, drawing from the simulation and analytics based approach exemplified by advanced fluid dynamic simulation being used among other tools.

## Drifting & Tunnelling

In the small end, development focused especially on the specific needs of high power and high frequency drilling in tunneling and drifting applications.

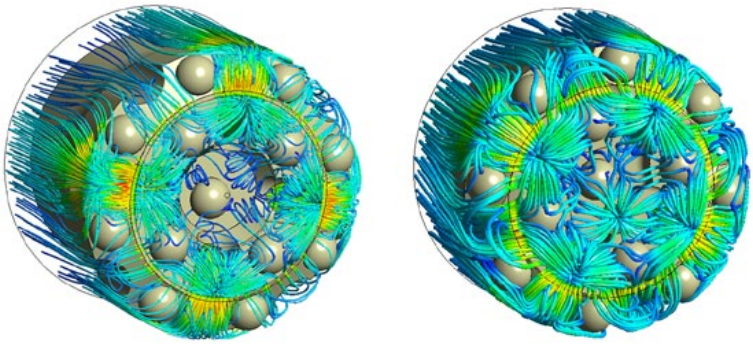
Different variants were extensively tested with our customers and set against conventional hard rock bits. In the end the best results were gleaned from modifications and optimization to face design, but particularly from increasing both gauge and face button numbers as well as increasing the number of flushing holes.

The test results of the Evolution bit in hard Scandinavian granite were very impressive, with grinding intervals up to 60 % longer and lifetime 20 % higher compared to conventional hard rock button bits.

# Bench & Production Drilling

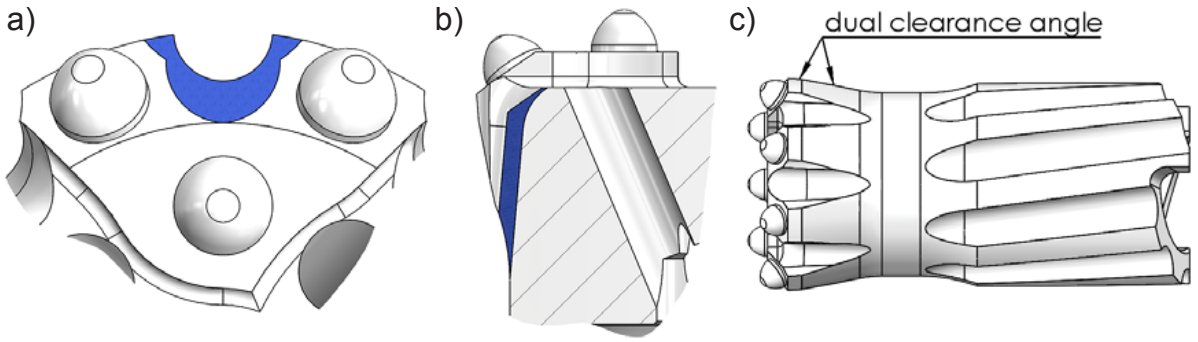
In the medium to large sizes significant performance strides were taken by diving deep into flushing properties. Here in particular, the computational fluid dynamics (CFD) simulations proved their strong added value as they drove the pre-test phase for fast finding of optimal solutions and truly significant impacts.

The 76-mm Retrac button bit superbly exemplifies the new design aspects. The Retrac body itself has the signature Robit curving grooves and the sleek geometry flows through to the new face design. The simulations clearly show that the new model isn't just easy on the eye. The flow pattern is more even, which reduces bit erosion. The pressure distribution is more uniform, and the smoother side channels along larger main grooves increase airflow ensuring efficient flushing. Dead-space across the face is significantly cut by introducing an extra flushing hole in the middle, clearing the center area better of cuttings.



*Computational Fluid Dynamics (CFD) simulation images showing how the conventional model (left) has a dead space in the center of the bit where airflow velocities are low. Evolution model (right), with a more even flow pattern, has increased airflow at the center of the bit and through the secondary side channels.*

All in all, field tests confirmed what the technical simulation background work had already proven. Our partner drillers were happy with the excellent performance and noted better flushing and longer grinding intervals. Across sizes, the Evolution designs have systematically excelled. The 102-mm bits were tested in extremely hard and abrasive rock formations in Pennsylvania, USA, where we had been facing a common challenge with a customer to find the perfect bit for those conditions. The new formula allowed us to out-perform competition and more than double our achieved meters compared to our previous model.




*Simulation analysis identified flushing as a key performance factor for the medium to large end button bits. Picture highlights these development aspects of the Evolution bit, where (a) the side flushing grooves are deeper and give space for a smoother transition region, and (b) the overall side channel volume is increased. In addition, the (c) dual clearance angles were tweaked for even more flow over the sides and extra support for the buttons.*

Considering all the above, it is safe to say the reality of drilling has not changed. We are going deeper with more speed and force, driving the development of the entire drilling consumables industry. As an established global company, we continuously need to reinvent ourselves. Across the globe our cases are more versatile, our knowledge base wider, our questions and tools for finding answers smarter. We want to show we are better than anyone else and explain why. In the end, we fight hard every day to be the strongest and smartest when it comes to the space between drill and rock. That is the spirit of **Robit® Evolution**.

FURTHER. FASTER.

# Bit Specifications

| Bit Model | Diameter | | Gauge | Buttons | | Flushing | | Weight |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | [mm] | [in] | ⊱ | [No. x mm] | [No. x mm] | [No.] | [No.] | [kg] |
| HTG 32R45Se | 45 | 1 ¾ | 35 | 4 x 8 | 8 x 9 | 5 | 2 | 0,7 |
| HTG 32R48Se | 48 | 1 ⅞ | 35 | 4 x 9 | 8 x 10 | 5 | 2 | 0,9 |
| HTG 32R51Se | 51 | 2 | 35 | 4 x 9 | 8 x 10 | 5 | 1 | 0,9 |
| HTG 32R64DRe | 64 | 2½ | 35 | 5 x 9 | 8 x 10 | 5 | - | 2,0 |
| HTG 34RR45Se | 45 | 1 ¾ | 35 | 4 x 8 | 8 x 9 | 5 | 1 | 0,7 |
| HTG 34RR48Se | 48 | 1 ⅞ | 35 | 4 x 9 | 8 x 10 | 5 | 2 | 0,9 |
| HTG 35R48Se | 48 | 1 ⅞ | 35 | 4 x 9 | 8 x 10 | 5 | 2 | 0,9 |
| HTG 35C57SRe | 51 | 2 | 35 | 4 x 10 | 8 x 10 | 5 | 1 | 1,3 |
| HTG 38C64De | 64 | 2 ½ | 35 | 5 x 9 | 8 x 10 | 5 | - | 1,6 |
| HTG 38C64DRe | 64 | 2 ½ | 35 | 5 x 9 | 8 x 10 | 5 | - | 1,9 |
| HTG 38CT64DRe | 64 | 2 ½ | 35 | 5 x 9 | 8 x 10 | 5 | - | 2,0 |
| HTG 38C70De | 70 | 2 ¾ | 35 | 5 x 10 | 8 x 10 | 5 | - | 1,9 |
| HTG 38C70DRe | 70 | 2 ¾ | 35 | 5 x 10 | 8 x 10 | 5 | - | 2,6 |
| HTG 38C76De | 76 | 3 | 35 | 5 x 11 | 8 x 11 | 5 | - | 2,4 |
| HTG 38C76DRe | 76 | 3 | 35 | 5 x 11 | 8 x 11 | 5 | - | 3,2 |
| HTG 38C89De | 89 | 3 ½ | 35 | 5 x 12 | 8 x 12 | 5 | - | 3,2 |
| HTG 38C89DRe | 89 | 3 ½ | 35 | 5 x 12 | 8 x 12 | 5 | - | 4,3 |
| HTG 45C70DRe | 70 | 2 ¾ | 35 | 5 x 10 | 8 x 10 | 5 | - | 2,5 |
| HTG 45C76De | 76 | 3 | 35 | 5 x 11 | 8 x 11 | 5 | - | 2,6 |
| HTG 45C76DRe | 76 | 3 | 35 | 5 x 11 | 8 x 11 | 5 | - | 2,9 |
| HTG 45CT76DRe | 76 | 3 | 35 | 5 x 11 | 8 x 11 | 5 | - | 3,0 |
| HTG 45C83DRe | 83 | 3 ¼ | 35 | 5 x 12 | 8 x 12 | 5 | - | 3,8 |
| HTG 45C89De | 89 | 3 ½ | 35 | 5 x 12 | 8 x 12 | 5 | - | 3,4 |
| HTG 45C89DRe | 89 | 3 ½ | 35 | 5 x 12 | 8 x 12 | 5 | - | 4,9 |
| HTG 45CT89DRe | 89 | 3 ½ | 35 | 5 x 12 | 8 x 12 | 5 | - | 4,8 |
| HTG 45C102De | 102 | 4 | 35 | 5 x 14 | 8 x 14 | 5 | - | 4,6 |
| HTG 45C102DRe | 102 | 4 | 35 | 5 x 14 | 8 x 14 | 5 | - | 6,7 |
| HTG 45C115DRe | 115 | 4 ½ | 35 | 4 x 14, 2 x 12 | 8 x 14 | 5 | - | 8,4 |
| HTG 51C83DRe | 83 | 3 ¼ | 35 | 5 x 12 | 8 x 12 | 5 | - | 3,4 |
| HTG 51C89De | 89 | 3 ½ | 35 | 5 x 12 | 8 x 12 | 5 | - | 3,7 |
| HTG 51C89DRe | 89 | 3 ½ | 35 | 5 x 12 | 8 x 12 | 5 | - | 4,3 |
| HTG 51C102De | 102 | 4 | 35 | 5 x 14 | 8 x 14 | 5 | - | 4,5 |
| HTG 51C102DRe | 102 | 4 | 35 | 5 x 14 | 8 x 14 | 5 | - | 6,3 |
| HTG 51C115De | 115 | 4 ½ | 35 | 4 x 14, 2 x 12 | 8 x 14 | 5 | - | 5,7 |
| HTG 51C115DRe | 115 | 4 ½ | 35 | 4 x 14, 2 x 12 | 8 x 14 | 5 | - | 7,6 |
| HTG 51C127De | 127 | 5 | 35 | 4 x 16, 4 x 12 | 8 x 16 | 5 | - | 8,1 |
| HTG 51C127DRe | 127 | 5 | 35 | 4 x 16, 4 x 12 | 8 x 16 | 5 | - | 10,2 |
| HTG 58CT89De | 89 | 3 ½ | 35 | 5 x 12 | 8 x 12 | 5 | - | 3,9 |
| HTG 58CT89DRe | 89 | 3 ½ | 35 | 5 x 12 | 8 x 12 | 5 | - | 4,5 |
| HTG 58CT102DRe | 102 | 4 | 35 | 5 x 14 | 8 x 14 | 5 | - | 6,5 |
| HTG 60RG95DRe | 95 | 3 ½ | 35 | 5 x 13 | 8 x 13 | 5 | - | 6,2 |
| HTG 60RG102De | 102 | 4 | 35 | 5 x 14 | 8 x 14 | 5 | - | 6,7 |
| HTG 60RG102DRe | 102 | 4 | 35 | 5 x 14 | 8 x 14 | 5 | - | 7,4 |
| HTG 60RG115DRe | 115 | 4 ½ | 35 | 4 x 14, 2 x 12 | 8 x 14 | 5 | - | 9,5 |
| HTG 60RG127DRe | 127 | 5 | 35 | 4 x 16, 4 x 12 | 8 x 16 | 5 | - | 12,0 |
| HTG 60RG140DRe | 140 | 5 ½ | 35 | 4 x 16, 4 x 14 | 8 x 16 | 5 | - | 14,7 |
| HTG 60RG152DRe | 152 | 6 | 35 | 4 x 16, 4 x 14 | 8 x 16 | 5 | - | 13,2 |
| HTG 68CT102De | 102 | 4 | 35 | 5 x 14 | 8 x 14 | 5 | - | 4,0 |
| HTG 68CT102DRe | 102 | 4 | 35 | 5 x 14 | 8 x 14 | 5 | - | 5,7 |
| HTG 68CT115De | 115 | 4 ½ | 35 | 4 x 14, 2 x 12 | 8 x 14 | 5 | - | 6,0 |
| HTG 68CT152De | 152 | 6 | 35 | 4 x 16, 4 x 14 | 8 x 16 | 5 | - | 10,7 |
| HTG 68CT152DRe | 152 | 6 | 35 | 4 x 16, 4 x 14 | 8 x 16 | 5 | - | 16,3 |



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