

## Benefits of Helix:

Replacing rebar or mesh with Helix has many quantifiable performance benefits as well as other project benefits:

### Quantifiable Benefits:

- Increased first crack strength
- Increased crack resistance
- Increased durability
- Increased shear strength

### Project Benefits:

- Easy placing and finishing
- Improved worker safety
- Streamlined timeline/logistics
- Better concrete product
- Direct/Indirect cost savings (20% or more)

### Functional Mechanism:

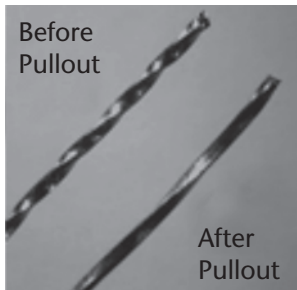
Helix, and its unique twist, is unlike any reinforcement and a substantial improvement over fibres of any type.

When concrete is stressed or bent, a straight fibre will slide out smoothly with minimal friction - so the force required for it to pull out is generally small. Adding deformation, like a hooked end or corrugation, adds friction and increases force required to pull it out, but only incrementally.

Helix's rectangular cross sectional shape and twist increases the frictional resistance - try removing a corkscrew from a cork without twisting it. Each Helix locks like a tiny screw, instead of slipping like a nail.

But the additional force required is so large that it changes the failure mechanism from simply pulling out to a torsional or untwisting mode - Helix must actually untwist before it fails. This requires considerably more energy than mere frictional pullout and results in a fundamental increase in performance to levels never before possible.

And with Helix, the farther you bend, the stronger it gets, since the required energy to untwist becomes even greater



## Product Description:

Helix is a high performance, optimized steel for use in the reinforcement of concrete. Helix is short, twisted and polygonal shaped wires that are added to concrete during mixing. The shape and the twist maximize both the frictional and mechanical bonds between Helix and a cement based matrix. The twist drives the failure mechanism from frictional pullout to a torsional, or untwisting, mode. The result is a radical increase in performance levels not possible before. Helix 5-25 is 25mm (1") in length and 0.50mm (0.02") in diameter.

### Approvals:

Uniform ES ER-0279

### Helix Physical Properties:

Specific Gravity: 7.8  
Material: High Tensile Steel Wire  
Length: 25mm (1 inch)  
Diameter: 0.50mm (0.20 inch)  
Coating: Electroplated Zinc

### Applications:

- Structural Walls
- Structural Floors
- Foundations
- Pilies/Piers
- Beams/Columns
- Shotcrete
- Tunnelling
- Paving
- Precast
- Any Rebar Replacement

### Packaging, Shipping, Storage:

Helix is packaged in boxes with a net weight of 20.5 kg (45 lb). There are 36 boxes per pallet for a net weight of 734 kg (1,620 lbs) per pallet. There are 26 pallets on a full truckload for a total Helix net weight of 19,085 kg (42,120 lbs).

For large projects, Helix Steel can provide special packaging.

Helix is shipped worldwide primarily from our Michigan manufacturing facility.

### Delivered In:



Box - 45 lbs  
Pallet 1620 lbs



Big Bag



Do No Stack  
Pallets



Protect pallets  
against rain.  
Wrapping  
Available

# HELIX™

## Micro-Rebar

*Put a little twist in your concrete*

Simply put, Helix is  
a replacement for rebar

**SHWENN**  
DISTRIBUTORS INC.

**1.844.726.4436**  
[www.shwenn.com](http://www.shwenn.com)

## Helix Mixing, Placing, Finishing:

### Helix Dosing Instructions

- Use Helix Dosing Unit or another automated method approved by Helix Engineering to dose Helix.
- Use Helix Dosing Unit, hold handle and move device in a circular motion. Instructions available at [www.shwenn.com](http://www.shwenn.com)
- Add Helix at a rate of 45-60 seconds per 45 lbs (20 kgs).
- Helix should enter the mixer clump free, ensuring no clumps larger than 2" enter the mixer.
- Watch for Helix buildup on the interior of the hopper. Push the Helix down the hopper avoiding clumps.
- A test batch is required.

### Mixing Instructions

**SITE BATCHING** (Loaded Ready Mix Truck at Construction Site)

- Set the drum to charging speed.
- Add Helix per Dosing Instructions above.
- Helix will be the final component added to the mix.
- Mix at charging speed for 5 minutes (60 revolutions) after Helix is added.

### BATCH PLANT - DRY PLANT (TRUCK MIX)

- Set the drum to charging speed.
- Add Helix per Dosing Instructions above.
- Helix may be added at the following times:
- After 10-15 gallons of water, before all other materials (drum at charging speed)
- With aggregates via conveyor belt. (drum at charging speed)
- After all other materials have been added. (drum at charging speed)
- Mix at charging speed for 5 minutes (60 revolutions) after Helix is added.

### BATCH PLANT - WET PLANT (CENTRAL MIX)

- Set the drum to charging speed.
- Add Helix per Dosing Instructions above.
- Helix may be added at the following times:
- After 10-15 gallons of water, before all other materials (drum at charging speed)
- With concrete mix via conveyor belt. (drum at charging speed)
- After concrete mix has been added. (drum at charging speed)
- Mix at charging speed for 5 minutes (60 revolutions) after Helix is added.

### USING CONVEYORS

- Add Helix per Dosing Instructions above at appropriate times per Mixing Instructions.

### PAN MIXER/DRUM MIXER

- Set the mixer to the proper speed.
- Add Helix per Dosing Instructions above.
- Helix should be added with the aggregates.
- Mix at max speed for 5 minutes after Helix is added.

### Placing

Placing Helix reinforced concrete requires no special methods. Concrete can be placed directly from the mix truck, via a pump truck, or shotcrete, using all standard proper placing procedures.

### Finishing

Finishing of Helix reinforced concrete does not require any special equipment. Helix reinforced concrete can be finished according to standard, proper finishing procedures. Helix reinforced concrete can be stained and stamped.

Some standard practices to remember:

- Do not overwork the surface.
- Always pull finishing tools in a constant direction.
- A wet-cut saw may be used to cut joints.
- Wait 15-60 minutes after concrete is placed to apply a broom finish. Broom in one direction only.

### Mixing/Placing Tips

#### MIXING INTO TRUCK HOPPERS

When adding Helix, it may collect on any residual concrete on the interior surfaces of the hopper. Push the Helix into the drum avoiding clumps. Adding a slippery lining, such as PVC sheeting, to the hopper may help avoid these buildups.

#### MONITOR FOR CLUMPS DURING POUR

There is always the potential for small clumps of Helix/concrete to form in the drum. Different drum materials, fin designs, fin damage and left over concrete are some reasons this may happen. It is not unusual to see up to 5 small (approximately 2 inch or smaller) clumps per truckload. If a consistent flow of larger clumps are observed or the quantities of smaller clumps increases, adjustments to the batching procedure and/or mix design must be made. Stop pouring and contact the Helix representative immediately.

## Helix Mix Design Recommendations

### All Mixes

- A test batch is required.
- Design concrete mixes using standard practices (like ACI 211.1).
- Dosage must be in accordance with Uniform ES Evaluation Report 0279 ([www.iapmoes.org](http://www.iapmoes.org)).

### Note on Slump and Workability

Field and laboratory testing as well as literature (AC 544) indicate Helix workability (flow with vibration) is not directly related to slump. Water should never be added to adjust slump or workability. A test batch is required to properly adjust the workability and determine the correct admixture dosages.

### Low Dosage Mixes (up to 36 lbs/yd<sup>3</sup>)

- No effect on slump with Helix dosages less than 10 lb/yd<sup>3</sup>.
- Aggregate gradation should be well graded (see recommendations in ASTM C33)
- Slump loss will occur at dosages above 10 lb/yd<sup>3</sup>. Average loss is 1.5 inches at 10 lb/yd<sup>3</sup>. Water reducers may be added as desired, dose only as needed for workability as measured in the field with vibration, not with slump. (See Slump and Workability note above.)

### High Dosage Mixes (36 lbs/yd<sup>3</sup> & up)

- Aggregate gradation should be in accordance with ACI 544.1R Table 4.2
- Target slump should be 1.5 inches above desired slump.
- Water reducers are required to achieve a workable mix, dose only as needed for workability as measured in the field with vibration, not with slump. (See Slump and Workability note above.)

## Design Considerations:

The application determines the Helix dosage. The number of pieces and the efficiency are key drivers of composite (Helix + concrete) performance. Because the failure mechanism is different, typical fibre performance formulas (ex. aspect ratio, length and Re3) are not applicable.

Helix has undergone extensive laboratory and field-testing; more than 10,000 tests over ten years. Helix has been evaluated under and meets ALL performance based industry test methods and standards including, but not limited to, the following:

ACI 318	ASTM C913	ASTM	ICC A208
ASTM A820	ASTM	C1609	JSCE SF4
ASTM C76,	C1227	CE EN	SDI 5.5
ASTM C116	ASTM	14889-1	TR-34
ASTM C478	C1399	IBC 2009	UL263

**SEE UNIFORM ES EVALUATION REPORT 0279 FOR COMPLETE DETAILS.**

Three common application ranges are discussed below:

### 1) CRACK CONTROL AND LIGHT LOADING, 3-6 KG/M<sup>3</sup> (5-10 LB/ YD<sup>3</sup>)

Maximizing the number of pieces per unit volume is important for crack prevention. At these dosages, Helix provides added durability and secondary reinforcement over steel mesh. Example applications in this range include sidewalks, driveways, composite decking, slab on grade, residential slabs and basements, septic tanks, burial vaults, utility vaults, drainage structures and other pre-cast products. Using Helix in 10 cm (4 in) slab instead of 6x6 w2.9xw2.9 (6 gauge) mesh results in 20% increased crack resistance and 18% increased structural capacity (post cracking strength).

### 2) MEDIUM LOADING, 6-20 KG/M<sup>3</sup> (10-33 LB/YD<sup>3</sup>)

At these dosages, Helix provides added durability, secondary reinforcement and moderate load carrying capacity. Example applications in this range include, heavily loaded pre-cast products, heavy industry slabs on grade, slabs on grade built under poor soil conditions, and light structural slabs at ground level. Using Helix at 12 kg/m<sup>3</sup> (20 lb/yd<sup>3</sup>) in a 15 cm (6 in) slab instead of one layer of #4 bars spaced at 30 cm (12 in) each way results in 50% increase in crack resistance, 5% increased structural capacity (post cracking strength) AND a 10% cost savings. Furthermore, the thickness of the slab may be reduced to 13 cm (5 in) with 20 kg/m<sup>3</sup> (33 lb/yd<sup>3</sup> Helix) and yield a 15% increase in crack resistance and equal structural strength.

### 3) HEAVY LOADING, 20-40 KG/M<sup>3</sup> (33-66 LB/YD<sup>3</sup>)

At these dosages Helix provides heavy load carrying capacity in addition to all the other benefits associated with using Helix. Example applications in this range include runways, structural walls, earthquake resistant structures, blast resistant structures, and structural panels. Using Helix at 30 kg/m<sup>3</sup> (50 lb/yd<sup>3</sup>) in a 40 cm (16 in) slab instead of 2 layers of #6 bars spaced at 30 cm (9 in) each way results in 50% increased crack resistance, equal structural capacity (post cracking strength) with a 10% cost savings. Using Helix in a 30 cm (12 in) slab instead of 2 layers of #5 bars spaced at 30 cm (12 in) each way results in 50% increased crack resistance and equal structural capacity (post cracking strength).