#### FACTORY MANUFACTURE OF UHPC BEAMS

- ☐ 180' LONG X 96" TOP/36" BASE 4" STEM X 84" HIGH
- ☐ 2-6 BEAMS PER SHIFT
- MI-JACK FRIENDLY BUILDING
- ☐ FORM DESIGN/FABRICATION BY PRODUCER/SUB-SUPPLIER
- □ \$3.0 3.5 MM TURNKEY CAPEX BUDGET
- EQUIPMENT TO PRODUCE & DELIVER UHPC INTO FORMS
- 8 MONTHS FROM ORDER TO FIRST PRODUCTION





#### FACTORY MANUFACTURE OF UHPC BEAMS

#### **DICTUMS OF FACTORY DESIGN & OPERATION**

- SECONDS COUNT
- ☐ AUTOMATIC PROCESS CONTROL: FINE MATERIALS/ACCURACY/SPEED
- NO COLD JOINTS
- MAKE IT EASY & SAFE TO CLEAN & MAINTAIN..THEN IT WILL BE DONE!

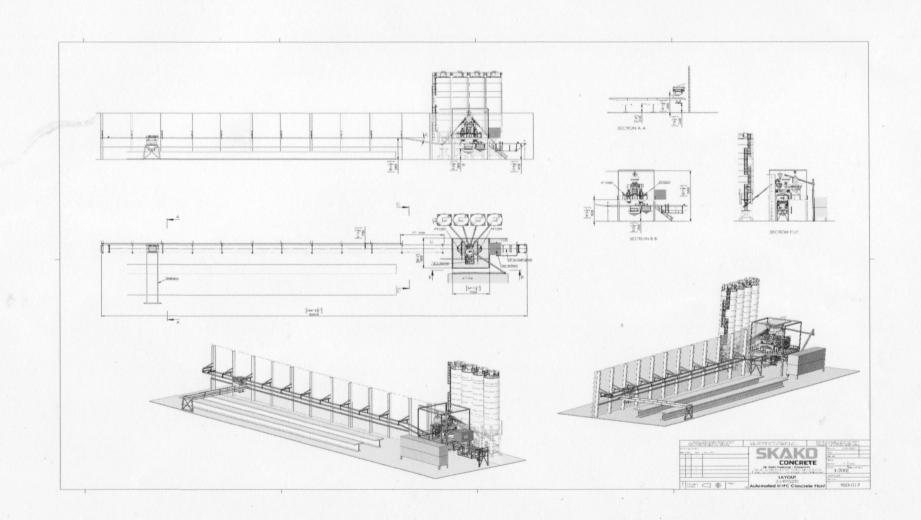


# KEY EQUIPMENT COMPONENTS UHPC FACTORY OPERATION

- ☐ CONTINUOUS WEIGHT-PROPORTIONING OF MATERIALS: "LOCK & LOAD"
- ☐ MULTI-DIMENSIONAL, HIGH-INTENSITY MIXING
- ☐ RAPID AND RELIABLE UHPC DELIVERY INTO FORMS
- ☐ FULLY AUTOMATIC OPERATION: "HANDS OFF"



## THE FACTORY



### State   St	## TYPE   REMARKS   Time   20   40   60   80   100   120   140   160   180   200   220   2		.2019	NO: X-903017 DATE: 09.18.2019					93 lbs 716 Ounces 191 Ounces	93 71 19	Flake Ice: Premia150: Optima100:
Match    Siz19   16Kg/sec (35lb/sec)   80   80   130	Mich         TYPE         REMARKS         Time         20         40         60         80         100         120         140         160         180         200         20 <th>a a</th> <th>oc - DRW 903-017 ter-Vortex RTX750</th> <th>CYCLEDIAGRAM UHP 2xROTOCONIX Count</th> <th>42 Cubic Yard/Hr</th> <th>5 batches/hour/mixer</th> <th>380 sec = 3600/380=10.</th> <th>Remarks: Cycle time/Mixer = Capacity: Pa</th> <th>te 78 lbs 2 lbs 35 lbs 0 lbs 6 lbs</th> <th>ard Concre 11 15 16 57 21</th> <th>Mixdesign: 1 Cubic Ya Cement: Silica Fume: Sand: Slag: Water:</th>	a a	oc - DRW 903-017 ter-Vortex RTX750	CYCLEDIAGRAM UHP 2xROTOCONIX Count	42 Cubic Yard/Hr	5 batches/hour/mixer	380 sec = 3600/380=10.	Remarks: Cycle time/Mixer = Capacity: Pa	te 78 lbs 2 lbs 35 lbs 0 lbs 6 lbs	ard Concre 11 15 16 57 21	Mixdesign: 1 Cubic Ya Cement: Silica Fume: Sand: Slag: Water:
Match    Match	Nach  IYPE  REMARKS  Itms  20 40 60 80 100 120 140 150 180 200 220 240 260 280  S551219  S17219  S17219  S17219  S17219  S17219  S17219  S17219  S17219  S17220  S1722										
Match    Siz119	Ntch  TYPE  REMARKS  Time  20 40 60 80 100 120 140 160 180 200 220 240 260 280  ST219  2x517219  2x1 19 (kg/sec(2x5lb/sec) 70  51723  28 kg/sec(2x1b/sec) 70  70  11b/sec  170  22 SKg/sec(5xb/sec) 70  20 30  ST240  22 SKg/sec(5xb/sec) 70  27 70  28 kg/sec(5xb/sec) 70  29 30  30 30 40 40  27 70  27 70  27 70  27 70  27 70  30 30 40 40  30 30 40 40  27 70  28 79 78 78 78 78 78 78 78 78 78 78 78 78 78	700	530						nin	2 yd/3 r	JHPC Delivery To Form
Match  Ma	Ntch  TYPE  REMARKS  Time  20 40 60 80 100 120 140 160 180 200 220 240 260 280  S1719  S1719  10 16 (g/sec (35)b/sec)  T0  T0  T0  T0  T0  T0  T0  T0  T0  T		0.29		240						
Mich ST219 16Kg/sec (35lb/sec) 80 80 80 80 80 80 80 80 80 80 817219 2x41 91 kg/sec (24lb/sec) 70 70 70 150 817219 81 kg/sec (24lb/sec) 70 70 70 81720 817219 81 kg/sec (24lb/sec) 70 90 90 90 90 90 90 90 90 90 90 90 90 90	Nath         TYPE         REMARKS         Time         20         40         60         80         100         120         140         160         200         220         240         260         280<										
Match  Ma	NET         REMARKS         Time         20         40         60         80         100         120         140         160         80         200         220         240         260         280 <td></td>										
Atch    Si7219   16Kg/sec (35lb/sec)   80   80   80	TYPE   REMARKS   Time   20   40   60   80   100   120   140   160   180   200   220   240   260   28	2000					10				Jischarge MIXER M2
Match     Batch       56lbs     \$17219     16kg/sec (35lb/sec)     80     80     130       2x517219     2x4 1.9 kg/sec(22/2 6lb/sec)     70     70     130     150       \$1723     28 kg/sec(22lb/sec)     70     70     150     150       WW300     11lb/sec     20     30     30     150       FVE2240     225kg/sec(5lb/sec)     70     70     150       ZPV36     36l/min(1220 ft 0z/min)     40     40     40     70       Mn     18l/min(608 ft 0z/min)     30     30     20     230       D     20     20     20     230       20     20     20     230       20     20     20     230       20     20     230       20     20     230       20     20     230       20     230     230       20     230     240       20     230     240       20     230     240       20     230     240       20     240     260       20     20     260       20     20     260       20     20     20       20     20     <	NECH         TYPE         REMARKS         Time         20         40         60         80         100         120         140         160         180         200         220         240         260         280         240         260         280<	700		100			080	2			fixing Time 5 min M2
## Atch    Si7219   16kg/sec (35lb/sec)   80   80   80	Arch         TYPE         REMARKS         Time         20         40         60         80         100         120         140         160         80         280 </td <td></td> <td></td> <td>420</td> <td></td> <td></td> <td>60</td> <td></td> <td></td> <td></td> <td>PREMIX Time</td>			420			60				PREMIX Time
## Aich   ## Aic	ACTION TYPE REMARKS Time 20 40 60 80 100 120 140 160 180 200 220 240 260 280 280 280 280 280 280 280 280 280 28	650			270		40				Optima 100
### AICH	INPE         REMARKS         Time         20         40         60         80         100         120         140         160         180 </td <td></td> <td></td> <td>10</td> <td></td> <td></td> <td>70</td> <td></td> <td></td> <td></td> <td>oremia 150</td>			10			70				oremia 150
### AICH	IVPE         REMARKS         Time         20         40         60         80         100         120         140         160         180         280 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td>10</td> <td></td> <td></td> <td></td> <td>ibers M2</td>						10				ibers M2
### Atch    ST219   16k/g/sec (35lb/sec)   80   80   80	IVPE         REMARKS         Time         20         40         60         80         100         120         140         160         180         200         220         240         260         280           56lbs         517219         16Kg/sec (35lb/sec)         70         70         70         130         150         1513         150         1513         150	710		340			30				CE M2
### According to the control of the	Atch         TYPE         REMARKS         Time         20         40         60         80         100         120         140         160         180         200         220         240         260         280<		640	440	260		30				VATER M2
### According to the control of the	Atch         TYPE         REMARKS         Time         20         40         60         80         100         120         140         160         80         200 </td <td>710</td> <td></td> <td>330</td> <td></td> <td></td> <td>70</td> <td></td> <td></td> <td></td> <td>SAND M2</td>	710		330			70				SAND M2
### Action   Billion   Bil	Inth         Inth         20         40         60         80         100         120         140         160         180         200         220         240         260         280         100         120         140         160         180         200         220         240         260         280	700		20			60				SLAG M2
### Action	Atch         TYPE         REMARKS         Time         20         40         60         80         100         120         140         160         80         180         280 </td <td>660</td> <td></td> <td></td> <td>310</td> <td></td> <td>70</td> <td></td> <td></td> <td></td> <td>PROP. SF M2</td>	660			310		70				PROP. SF M2
### Action	Atch         TYPE         REMARKS         Time         20         40         60         80         100         120         140         160         180         200         220         240         260         280           556lbs         ST219         16Kg/sec (35lb/sec)         80 <td< td=""><td></td><td>640</td><td></td><td>260</td><td></td><td>80</td><td></td><td></td><td></td><td>PROP. CEMENT M2</td></td<>		640		260		80				PROP. CEMENT M2
### Action	TYPE         REMARKS         Time         20         40         60         80         100         120         140         160         180         200         220         240         260         280           56lbs         ST219         16kg/sec (35lb/sec)         80         80         80         100         120         140         160         180         220         220         220         140         160         180         220         220         220         150         220         220         220         150         220										AIXER 2
### According to the control of the	TYPE         REMARKS         Time         20         40         60         80         100         120         140         160         180         200         220         240         260         280           56lbs         ST219         16Kg/sec (35lb/sec)         80         80         80         100         120         120         220		000				-				rischar de Misses
### 16Kg/sec (35lb/sec)	Atch         TYPE         REMARKS         Time         20         40         60         80         100         120         140         160         180         200         220         240         260         280           56lbs         S1219         16Kg/sec (35lb/sec)         70         80         80         80         130         180						80	2			fixing time 5 min M1
#tch   #   #   #   #   #   #   #   #   #	TYPE REMARKS Time 20 40 60 80 100 120 140 160 180 200 220 240 260 280 280 280 280 280 280 280 280 280 28		620	420	240		60				ry-Mix Time
#tch   #   #   #   #   #   #   #   #   #	Atch         TYPE         REMARKS         Time         20         40         60         80         100         120         140         160         180         200         220         240         260         280           55lbs         ST219         16Kg/sec (35lb/sec)         60         80         80         90		610	410	230		20				Discharge Optima 100
#tch  #tch    According to be a continue of the continue of th	TYPE REMARKS Time 20 40 60 80 100 120 140 160 180 200 220 240 260 280 16tch Time 20 40 60 80 100 120 140 160 180 200 220 240 260 280 280 280 280 280 280 280 280 280 28		620	420	240		30				ischarge Premia 150
#tch	TYPE REMARKS Time 20 40 60 80 100 120 140 160 180 200 220 240 260 280 16th		610	410	230		20				Discharge Flake Ice
#tch    ST219   16Kg/sec (35lb/sec)   80   80   80     2x5T219   2x1 19 Kg/sec (24lb/sec)   70   70   130     ST3219   11Kg/sec (24lb/sec)   70   70   130     ST3213   28 Kg/sec (62lb/sec)   70   30   30     WW300   11b/sec   20   110     ST 11lb/sec   20   110   150     FVE2240   2 25Kg/sec (5lb/sec)   70   10   10     Oz ZPV36   38l/min(608 fl oz/min)   40   40   40     Oz ZPV18   18l/min(608 fl oz/min)   30   30   180     ZPV18   18l/min(608 fl oz/min)   30   30   30     Mt	TYPE REMARKS Time 20 40 60 80 100 120 140 160 180 200 220 240 260 280 16th Mark S 17219 16Kg/sec (35lb/sec) 80 80 80 70 70 70 70 70 150 150 150 150 150 150 150 150 150 15		610	410	230		20				ischarge water
#tch    ST219   16Kg/sec (35lb/sec)   80   80   80	Arch         TYPE         REMARKS         Time         20         40         60         80         100         120         140         160         180         100         120         140         160         180         200         220         240         260         280         300         300         320         340         460         480         500         560         680         60         60         60         70         70         70         70         70         70         440		manual P	2000	10000		30				ischarge fiber
#tch	TYPE REMARKS Time 20 40 60 80 100 120 140 160 180 200 220 240 260 280 18tch  Time 20 40 60 80 100 120 140 160 180 200 220 240 260 280 280 280 280 280 280 280 280 280 28			390	210		30				Discharge SF/slag
#tch    STZ19   16Kg/sec (35lb/sec)   80   80   80	TYPE REMARKS Time 20 40 60 80 100 120 140 160 180 200 220 240 260 280 280 250 250 250 250 250 250 250 250 250 25	74	580	360		180	30				ischarge sand/cement
#tch    ST219   16Kg/sec (35lb/sec)   80   80	TYPE REMARKS Time 20 40 60 80 100 120 140 160 180 200 220 240 260 280 280 280 280 280 280 280 280 280 28			450					18l/min(6)	ZPV18	ptima 100 -382 fl oz
y/batch     g/batch       2,356lbs     ST219     16Kg/sec (35lb/sec)     80     80       80     2xST219     2x1.19 Kg/sec (2x2.6lb/sec)     70     70     130       80     5T219     11Kg/sec (24lb/sec)     60     130     150       80     5T323     28 Kg/sec(52lb/sec)     70     150     150       80     150     150     150       80     150     150     110	NA         TYPE         REMARKS         Time         20         40         60         80         100         120         140         160         180         200         220         240         260         280           y/batch         1         4 <td></td> <td></td> <td>49</td> <td></td> <td></td> <td></td> <td>nin)</td> <td>36l/min(1)</td> <td>ZPV36</td> <td>remia 150 - 1,432 fl oz</td>			49				nin)	36l/min(1)	ZPV36	remia 150 - 1,432 fl oz
Batch   Batc	batch         TYPE         REMARKS         Time         20         40         60         80         100         120         140         160         200         220         240         260         280           batch         The						10			FVE224	IBERS - 526 lbs
Deatch   D	batch         TYPE         REMARKS         Time         20         40         60         80         100         120         140         160         200         220         240         260         280           batch         16Kg/sec (35lb/sec)         80<		520			150	20			ST	CE - 186 lbs
356lbs   ST219   16Kg/sec (35lb/sec)   80   80   80   80   80   80   80   8	batch         TYPE         REMARKS         Time         20         40         60         80         100         120         140         160         180         200         220         240         260         280           batch         16Kg/sec (35lb/sec)         80			440						WW300	VATER - 432 lbs
ST219   16Kg/sec (35lb/sec)   80   80   80   80   80   80   80   8	batch         TYPE         REMARKS         Time         20         40         60         80         100         120         140         160         180         200         220         240         260         280           Jac         ST219         16Kg/sec (35lb/sec)         80         8		510			150	70		28 Kg/sec	ST323	AND - 3,270 lbs
1541ch   1	batich  TYPE REMARKS Time 20 40 60 80 100 120 140 160 180 200 220 240 260 280  batch		520			130				ST219	SLAG - 1,140 lbs
ST219 16Kg/sec (35lb/sec) 80 80	TYPE REMARKS Time 20 40 60 80 100 120 140 160 180 200 220 240 260 280 270 270 270 270 270 270 270 270 270 27									2xST219	PROP SF - 304lbs
	TYPE REMARKS Time 20 40 60 80 100 120 140 160 180 200 220 240 260 280			440					16Kg/sec	ST219	PROP CEMENT, 2,356lbs
	TYPE REMARKS Time 20 40 60 80 100 120 140 160 180 200 220 240 260 280										MIYED 4
	TYPE REMARKS Time 20 40 60 80 100 120 140 160 180 200 220 240 260 280										xRTX2250, 2 cuy/batch

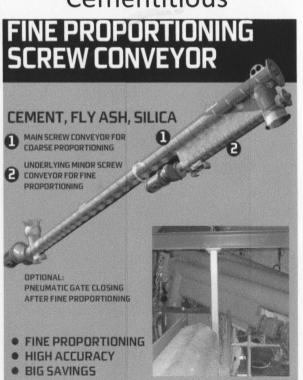


2

#### CONTINUOUS PROPORTIONING OF MATERIALS

Holding Batching Tolerances Depend On Choice of Proportioning Devices

Cementitious

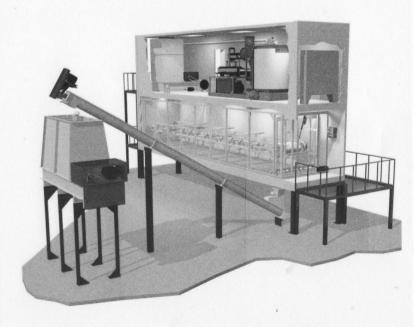


Steel Fiber





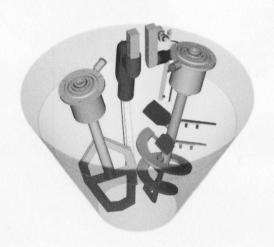
ICE

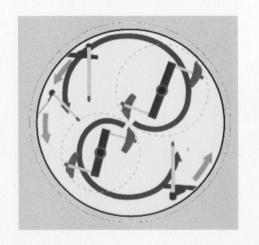




#### MULTI-DIMENSIONAL, HIGH-INTENSITY MIXING

## COUNTER-VORTEX VS COUNTER-CURRENT (PLANETARY) ROTOCONIX ATLANTIS

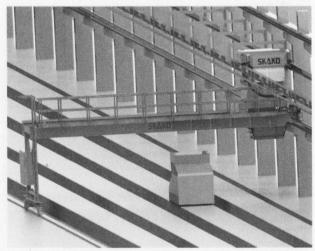






#### RAPID & RELIABLE UHPC DELIVERY INTO FORMS



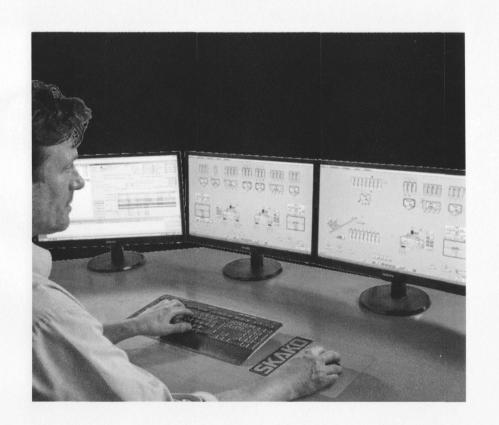








### FULLY AUTOMATIC OPERATION: "HANDS OFF"



# Milan, Italy UHPC Concrete Mixing

