CONCRETE SUPPLY BY VOLUMETRIC MIXER

Understanding the Process and Advantages

INTRODUCTION

BACKGROUND

Ready Mix – dispatch, batching, quality control, sales

Discovered volumetric technology as underutilized solution to concrete challenges

Established Niche Concrete Solutions in November 23' with new yard in north Hayden

Operation to expand with second truck in April

INTRODUCTION

PURPOSE

Promote volumetric batching as optimal method of concrete supply on suitable projects - the right tool for the right job

- Explain the processes
- Review the features, advantages and disadvantages as compared to ready mix

- Address common questions and misconceptions:
  - Only for short loads
  - Only for remote jobs or those inaccessible to ready mix trucks
  - Inferior mixing method
  - New, untested technology
  - No batch tickets - no method for mix verification
- Discuss opportunities for the technology in the field

Ultimately, to encourage collaboration with trade partners who see value of this technology in the field

INTRODUCTION

DEFINITIONS

Volumetric Mix

- Mixed on site - portable concrete plant
- Batched by volume (flow), not weight

Ready Mix

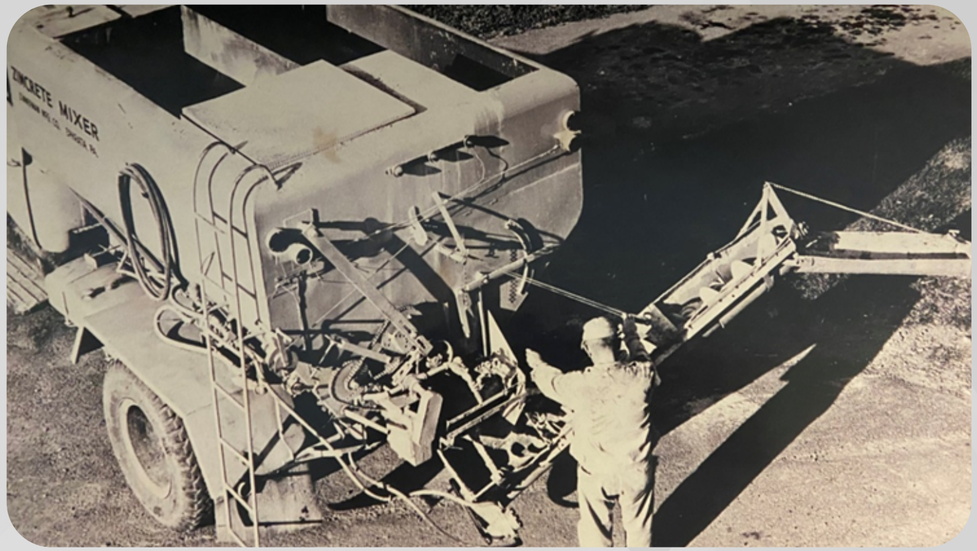
- Mixed at plant - delivered by truck
- Batched by weight

Volumetric mixers also known as **Site Mix Trucks, Continuous Mixers, Mobile Mixers and Metered Concrete Trucks**

HISTORY

OF VOLUMETRIC MIXERS

First volumetric mixer patented in 1967 by Harold Zimmerman, PA-born farmer



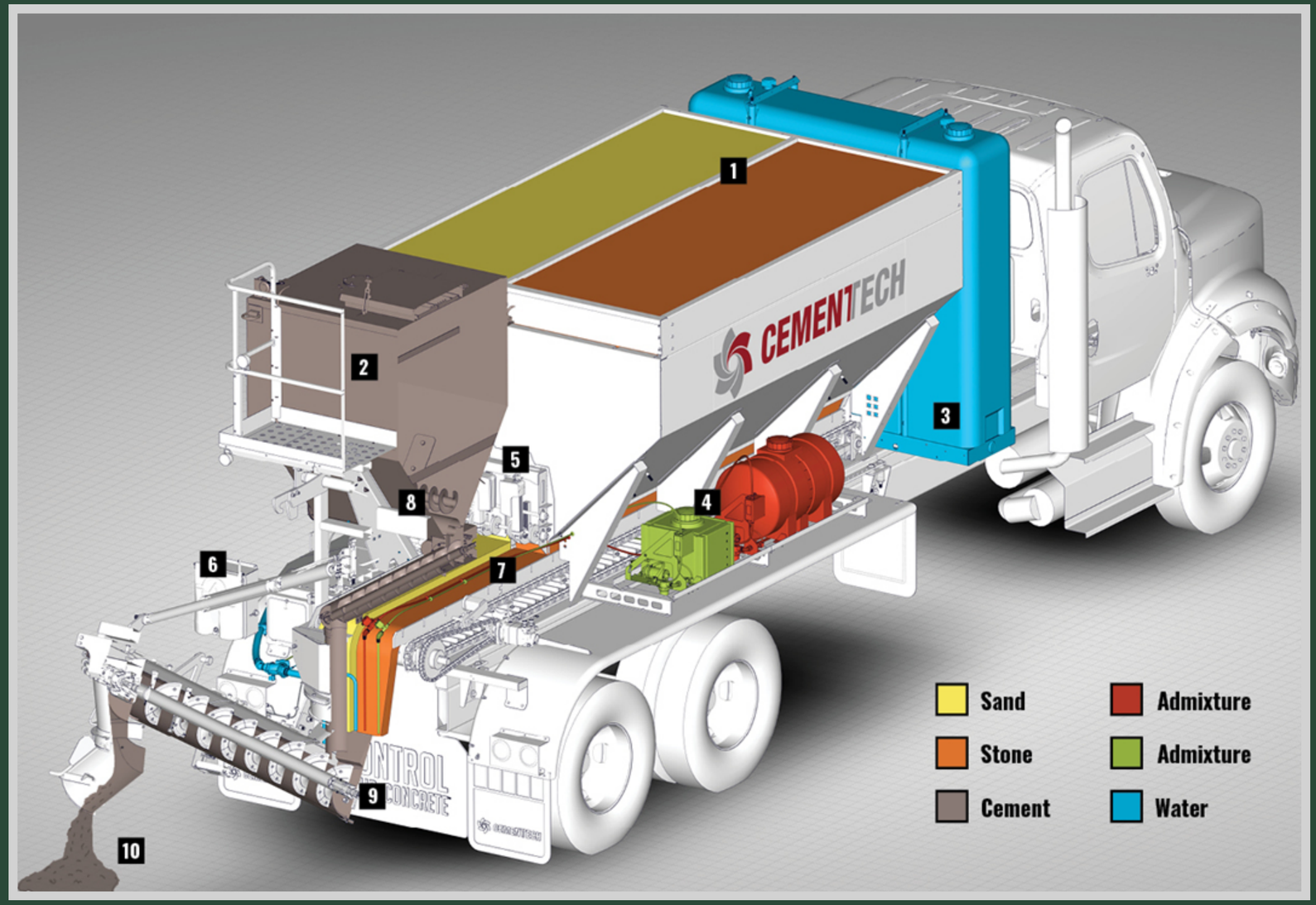
Several models in production within first decade, including Zim-Mixer by Zimmerman Industries

10,000+ produced by 2000. Mixers in every U.S. state and over half of all countries, globally

Manufacturers form VMMB in 1999 with assistance from NRMCA

PROCESS


I-SERIES
CEMENTECH
EXCEPTIONAL DESIGN FOR EXCEPTIONAL CONCRETE
The I90 is one of the top modular volumetric concrete mixers on the market. Unlike other volumetric mixers which are hard welded, all of the I90's main components can be easily unbolted for replacement. Our units have been designed to the highest quality standards, yet are simple to use and maintain.
With over 75 combined years of volumetric design and operational experience, you can be confident in the I90's quality and service. This VMMB approved mixer meets AASHTO M-241 and ASTM C685 standards when operated in accordance with ACI 304.6R.
CUSTOMER REQUIREMENTS
Carrying Capacity
Production Rate
Aggregate Bin
Cement Bin
Mix Auger
Air System
Aggregate Belt
Available Water Tank
8-12 / 6.7-9.2
60-90 / 45-68
2/2-4/3 / 1.5-11.2/3
115 / 3.26
12" / 304 diameter
4 Pneumatic vibrators for accurate flow
24" / 610 for multiple agg size capabilities
525 / 1987
www.cementech.com
MOBILE CONCRETE DISPENSER
I60/I90
KEY FEATURES
Modular bin design
525 gallon water tank
60° agg. bin ensures consistent material flow with less maintenance
Open design = Easy inspection & maintenance
Variable speed cement metering
STANDARD PACKAGE
Exclusive "IRON MAN" tower bearing for extended life
View windows to easily see cement levels
Open conveyor allows you to easily see your aggregate at or to mixing
User friendly control panel
Improved design provides higher quality concrete


1
2
3
4
5
6
7
8
9
10
CEMENTECH
Sand
Stone
Cement
Admixture
Admixture
Water

PROCESS

LOADING

AGGREGATES

- 10 CY capacity
- 2 Bins - 55% rock / 45% sand
- Stored in heated shop

CEMENT

- 100 CF Capacity (~8,000 lbs aerated)
- Sufficient for ~14 CY of 6 sack

PROCESS

LOADING

WATER

- 525 Gal storage tank
- Boiler used in winter
- Temps monitored

ADMIXTURES

- Storage tanks of various sizes
- Products diluted for optimal use of tanks, flowmeters (high and low-flow)

PROCESS

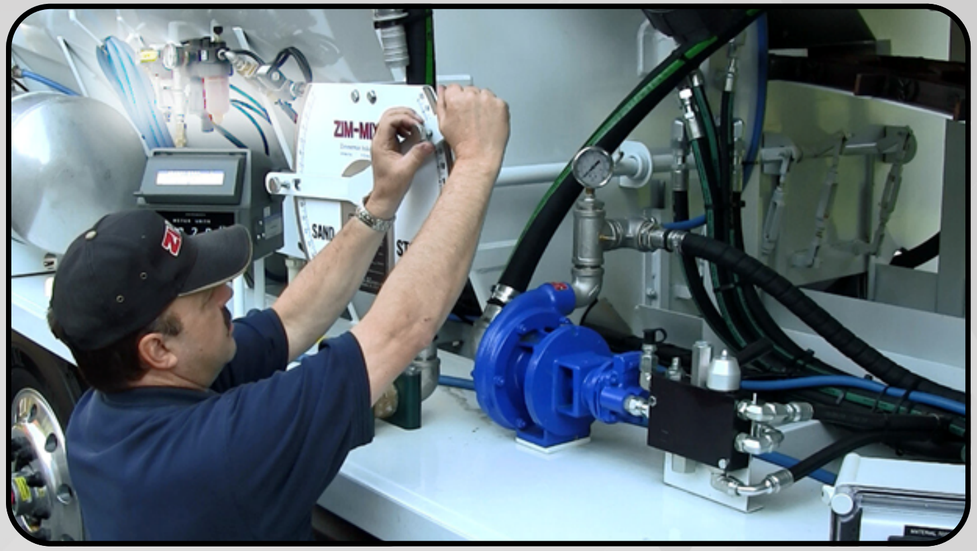
LOADING

FIBER MESH

- Spool form
- Specially designed dispenser - **FORTA**

PROCESS

BATCHING



CEMENT

- Carried by cement auger from bin to mixing auger hopper at constant rate
  - adjustable speed for low cement contents

AGGREGATES

- Conveyed by feed belt to auger hopper at constant rate
- Quantity regulated by calibrated gate settings (picture above)

WATER

- Pumped from storage tank to auger hopper
- Quantity adjusted with gate valve, monitored with flow meter

PROCESS

BATCHING

FIBER MESH

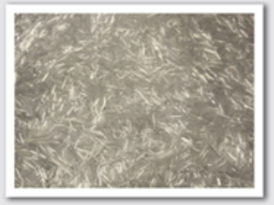
- Cut to length, discharged continuously (1-1.5 lb/CY)
- Minor adjustments to length, dosage

ADMIXTURES

- Pumped from tanks to hopper
- Valves, flowmeters to adjust and monitor dosages
- Unlike ready mix - liquid measured in graduated bottle, dispensed into load

FORTA® CONCRETE FIBER
STRONGER LASTING™

MOBILE-MESH™
FACT DATA



AR GLASS FIBER

Description

FORTA® MOBILE-MESH™ is an alkali resistant glass fiber developed for reinforcement of cement based applications to ensure increased long-term performance and durability. The density of MOBILE-MESH, which matches that of concrete, allows for exceptional dispersion by eliminating floating, sinking, clumping, and air entrapment, therefore, providing a seamless concrete application.

Reinforcement Objective

To reduce plastic, settlement and drying shrinkage cracking that occurs prior to the initial set.

Physical Properties

Density	4,517 lb/cu yd (2,680 kg/cu m)
Modulus of Elasticity	10,000 ksi (72 GPa)
Tensile Strength	250 ksi (1,700 MPa)
Length	0.5 in (13 mm)
Softening Point	1580°F (860°C)
Material	Alkali Resistant Glass*
Form	1/2 in Pre-Chopped
Chemical Resistance	Very High
Electrical Conductivity	Very Low

* Our fibers are manufactured with high Zirconium content in compliance with ASTM C1666 / C1666M-07 and EN 15422, and under the recommendation of PCI and GRCA.

Compliance & Certification

- ASTM C1666 / C1666M-07 Standard Specification for Alkali Resistant (AR) Glass Fiber for GFRC and Fiber-Reinforced Concrete & Cement
- European Directive 99/45/EC, 67/548/EEC, and their latest amendment
- Manufactured under a Quality Management System approved to ISO 9001
- The actual performance of MOBILE-MESH fibers is subject of independent assessment and approval in Germany (Zulassung Nº Z-3.72.1731)

Applications

MOBILE-MESH is used in Glass Reinforced Cement (GRC) and can be easily added into a volumetric ready mix concrete truck with the help of a FORTA patented fiber dispenser. This process requires no extensive equipment changes - making it a simple and easy investment to add long-term value to your concrete.

Performance Benefits

- Reduce shrinkage cracking
- Long term durability of concrete
- Increases chemical resistance (i.e. deicing products)
- Improves freeze/thaw resistance
- Extends serviceability of concrete
- Will not rot or corrode
- Unaffected by UV radiation
- Excellent compatibility with cement matrix
- Excellent mixing and workability even at high dosages
- Fibers not visible on the surface
- Does not float or sink in concrete
- Does not entrap air

Recommended Dosage

MOBILE-MESH fibers are incorporated directly into the volumetric ready mix concrete truck with the specially designed FORTA Ranger dispensing system. Use of the Ranger system assures trouble-free and equal dispersion of the fiber in the mix. The recommended dosage in premix GRC is 1.0 to 1.5 lb/cu yd of GRC, depending on application and desired performance. Contact FORTA for design assistance and dosage recommendations.

FD 1.18.01.22

FORTA CONCRETE FIBER | 100 Forta Drive, Grove City, PA 16127 | 800-245-0306 | forta-ferro.com |

PROCESS

BATCHING

BATCHING SEQUENCE

1. Mix constituents combined in auger hopper
2. Introduced to mixing chamber, mixed by auger
3. Exits chamber onto chutes, discharged

Production averages 60 CY/hr, depending on mix design

Ingredients fed continuously during discharge - **volumetric trucks are known as continuous mixers**.

PROCESS

BATCHING

CONTRAST WITH READY MIX:

Central Mix - “Wet Batch”

- Ingredients batched into stationary drum
- Wet mixture loaded into mixer truck for delivery
- Truck used only to agitate mix, mix in water and added products on-site

Truck Mix - “Dry Batch”

- Ingredients batched directly into mixer truck for mixing and delivery

Concrete batched at central location, delivered by truck

Entire batch introduced to mixing drum, measured by weight

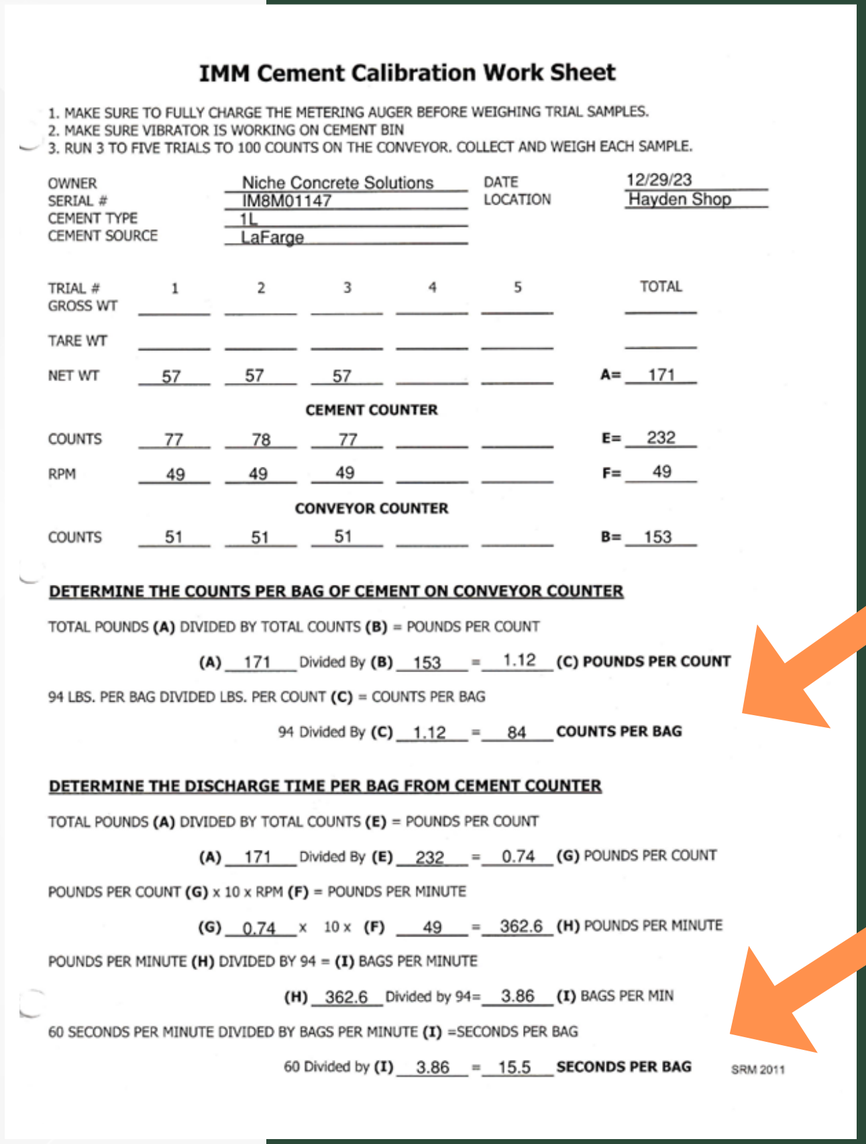
PROCESS

CALIBRATION

Portland Cement

Discharge cement into bucket.
Record:

- Weight
- Cement counts
- Conveyor counts
- Time, seconds



IMM Cement Calibration Work Sheet

1. MAKE SURE TO FULLY CHARGE THE METERING AUGER BEFORE WEIGHING TRIAL SAMPLES.
2. MAKE SURE VIBRATOR IS WORKING ON CEMENT BIN
3. RUN 3 TO FIVE TRIALS TO 100 COUNTS ON THE CONVEYOR. COLLECT AND WEIGH EACH SAMPLE.

OWNER: Niche Concrete Solutions — DATE: 12/29/23
SERIAL #: IM8M01147 — LOCATION: Hayden Shop
CEMENT TYPE: 1L
CEMENT SOURCE: LaFarge

TRIAL #	1	2	3	4	5	TOTAL
GROSS WT						
TARE WT						
NET WT	57	57	57			A= 171

CEMENT COUNTER

COUNTS	77	78	77			E= 232
RPM	49	49	49			F= 49

CONVEYOR COUNTER

COUNTS	51	51	51			B= 153

DETERMINE THE COUNTS PER BAG OF CEMENT ON CONVEYOR COUNTER

TOTAL POUNDS **(A)** DIVIDED BY TOTAL COUNTS **(B)** = POUNDS PER COUNT

(A) 171 Divided By **(B)** 153 = 1.12 **(C) POUNDS PER COUNT**

94 LBS. PER BAG DIVIDED LBS. PER COUNT **(C)** = COUNTS PER BAG

94 Divided By **(C)** 1.12 = 84 **COUNTS PER BAG**

DETERMINE THE DISCHARGE TIME PER BAG FROM CEMENT COUNTER

TOTAL POUNDS **(A)** DIVIDED BY TOTAL COUNTS **(E)** = POUNDS PER COUNT

(A) 171 Divided By **(E)** 232 = 0.74 **(G)** POUNDS PER COUNT

POUNDS PER COUNT **(G)** x 10 x RPM **(F)** = POUNDS PER MINUTE

(G) 0.74 x 10 x **(F)** 49 = 362.6 **(H)** POUNDS PER MINUTE

POUNDS PER MINUTE **(H)** DIVIDED BY 94 = **(I)** BAGS PER MINUTE

(H) 362.6 Divided by 94= 3.86 **(I)** BAGS PER MIN

60 SECONDS PER MINUTE DIVIDED BY BAGS PER MINUTE **(I)** =SECONDS PER BAG

60 Divided by **(I)** 3.86 = 15.5 **SECONDS PER BAG**

SRM 2011

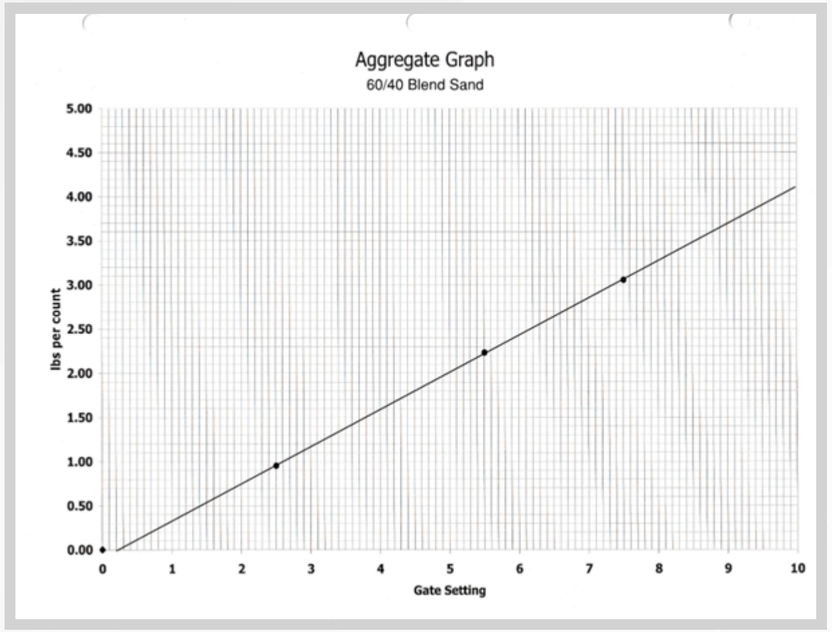
Calculate:

- Conveyor counts per 94-lb bag of cement
  - Determines conveyor counts needed per cubic yard (shown later)
- Time, in seconds, required to discharge a 94-lb bag of cement
  - Determines admixture flow rates (GPH) - admixture dosages based on cement content

PROCESS

CALIBRATION

Aggregates



Discharge cement into bucket.
Record:

- Weight
- Aggregate moisture
- Conveyor counts
- Gate settings

Calculate:

- Aggregate weight, lbs per conveyor count at respective gate settings
- Plot on aggregate graph

Volumetric Concrete Dispenser
Aggregate Calibration Work Sheet

Owner Niche Concrete Solutions
Unit Serial # IM8M01147
Date 12/29/23

Type of Aggregate 60/40 Blend Sand

1. Turn the flow control completely off for the cement metering auger.
2. Check to see that the material guides are adjusted properly.
3. If you have a two aggregate system, fill only one bin half full.
4. The gate dials should be indexed at 12 when the gate is closed and touching the conveyor belt.
5. A calibration will be required for each material you will use. If you change materials, either by source or graduation, a new calibration will be required.
6. Set the gate at a low setting and run the belt until material is flowing consistently off the end.
7. Reset the counter, place the container under the end of the conveyor, and run the conveyor to 100 counts.
8. Record weight and counts of the sample. If you stop short of 100 counts DO NOT feather conveyor to 100.
9. Repeat until you have consistent counts and weights. Move gate to a higher setting and repeat steps 7 and 8.

Trial	1	2	3	4	5	6	7	8
Gate Setting	2.5	2.5	2.5	2.5	5.5	5.5	5.5	5.5
Counts	99	99	99	99	25	25	26	25
Gross Weight								
Tare Weight								
Net Weight	100.5	99	97	97	59.5	58	59.5	58.5
Moisture %	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
Adjusted Wt.	97.1	95.7	93.7	93.7	57.5	56	57.5	56.5

Low Gate Setting (2.5)

Total Pounds 380.2 Divided by Total Count 396 = Pounds per Count 0.96

Middle Gate Setting (5.5)

Total Pounds 227.5 Divided by Total Count 101 = Pounds per Count 2.25

These values c[illegible]ted on the material graph which is used to set your mix designs.

SRM 2007

PROCESS

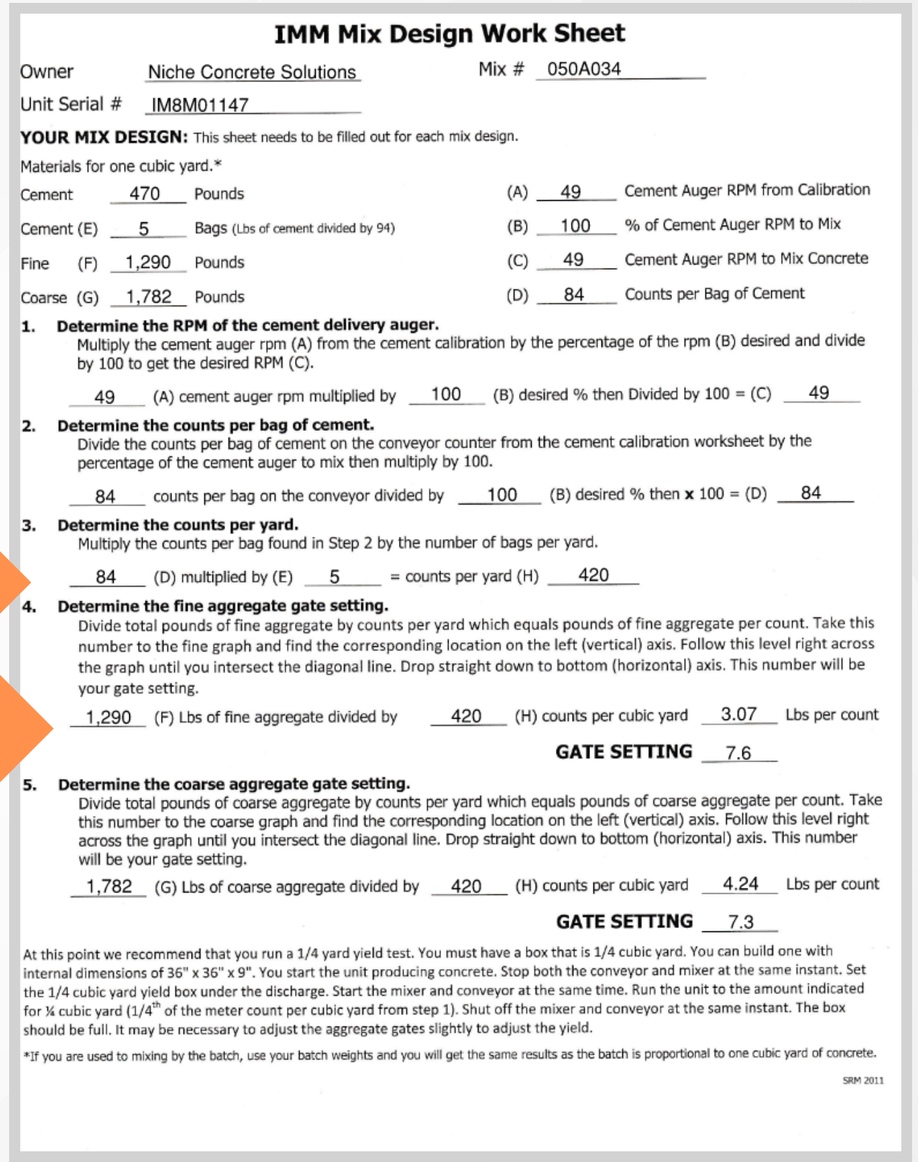
CALIBRATION

Mix Design

Using cement and aggregate calibration data, determine:

- Conveyor counts per CY
- Gate settings
  - Based on aggregate proportions in mix design
  - Reference aggregate graph for gate settings

The total conveyor counts after discharge determines the quantity of concrete batched.



IMM Mix Design Work Sheet

Owner Niche Concrete Solutions Mix # 050A034

Unit Serial # IM8M01147

YOUR MIX DESIGN: This sheet needs to be filled out for each mix design.

Materials for one cubic yard.*

Cement 470 Pounds (A) 49 Cement Auger RPM from Calibration

Cement (E) 5 Bags (Lbs of cement divided by 94) (B) 100 % of Cement Auger RPM to Mix

Fine (F) 1,290 Pounds (C) 49 Cement Auger RPM to Mix Concrete

Coarse (G) 1,782 Pounds (D) 84 Counts per Bag of Cement

1. **Determine the RPM of the cement delivery auger.**
   Multiply the cement auger rpm (A) from the cement calibration by the percentage of the rpm (B) desired and divide by 100 to get the desired RPM (C).

   49 (A) cement auger rpm multiplied by 100 (B) desired % then Divided by 100 = (C) 49

2. **Determine the counts per bag of cement.**
   Divide the counts per bag of cement on the conveyor counter from the cement calibration worksheet by the percentage of the cement auger to mix then multiply by 100.

   84 counts per bag on the conveyor divided by 100 (B) desired % then **x** 100 = (D) 84

3. **Determine the counts per yard.**
   Multiply the counts per bag found in Step 2 by the number of bags per yard.

   84 (D) multiplied by (E) 5 = counts per yard (H) 420

4. **Determine the fine aggregate gate setting.**
   Divide total pounds of fine aggregate by counts per yard which equals pounds of fine aggregate per count. Take this number to the fine graph and find the corresponding location on the left (vertical) axis. Follow this level right across the graph until you intersect the diagonal line. Drop straight down to bottom (horizontal) axis. This number will be your gate setting.

   1,290 (F) Lbs of fine aggregate divided by 420 (H) counts per cubic yard 3.07 Lbs per count

   GATE SETTING 7.6

5. **Determine the coarse aggregate gate setting.**
   Divide total pounds of coarse aggregate by counts per yard which equals pounds of coarse aggregate per count. Take this number to the coarse graph and find the corresponding location on the left (vertical) axis. Follow this level right across the graph until you intersect the diagonal line. Drop straight down to bottom (horizontal) axis. This number will be your gate setting.

   1,782 (G) Lbs of coarse aggregate divided by 420 (H) counts per cubic yard 4.24 Lbs per count

   GATE SETTING 7.3

At this point we recommend that you run a 1/4 yard yield test. You must have a box that is 1/4 cubic yard. You can build one with internal dimensions of 36" x 36" x 9". You start the unit producing concrete. Stop both the conveyor and mixer at the same instant. Set the 1/4 cubic yard yield box under the discharge. Start the mixer and conveyor at the same time. Run the unit to the amount indicated for ¼ cubic yard (1/4th of the meter count per cubic yard from step 1). Shut off the mixer and conveyor at the same instant. The box should be full. It may be necessary to adjust the aggregate gates slightly to adjust the yield.

*If you are used to mixing by the batch, use your batch weights and you will get the same results as the batch is proportional to one cubic yard of concrete.

SRM 2011

PROCESS

QUALITY CONTROL

Mix Designs

- Developed per ACI 211
- Customized per job specs

Routine QC Monitoring

- Air, slump, temp., strength - ASTM standards, same as RM
- Yield - <u>2 methods</u>
  - Fill 0.25 CY box - compare actual conveyor count with theoretical (calibration)
  - Divide sample weight (lbs) by unit weight (lbs/cf) to determine actual volume, compare

Niche Concrete Solutions
Hayden, Idaho
Robert Moore
Cell: 208-819-7091

QUALITY CONTROL REPORT - 2024

Mix: 5 SK Exterior 050A034						Compressive Strength Data (psi.)			
Date	Slump (in.)	AEA%	Unit Weight	Mix Temp.	Air Temp.	2-Day	7-Day	14-Day	28-Day (Avg.)
1/2/2024	4.0	6.2	143.0	75	38	1,630	2,640	3,000	3,430
Mix: 6 SK Exterior 060A034						Compressive Strength Data (psi.)			
Date	Slump (in.)	AEA%	Unit Weight	Mix Temp.	Air Temp.	2-Day	7-Day	14-Day	28-Day (Avg.)
1/2/2024	4.0	5.5	140.3	76	38	2,020	3,430	4,080	4,500
Mix: 6 SK Interior 060N034						Compressive Strength Data (psi.)			
Date	Slump (in.)	AEA%	Unit Weight	Mix Temp.	Air Temp.	2-Day	7-Day	14-Day	28-Day (Avg.)
1/2/2024	6.0	2.0	144.5	75	38	1,940	3,390	3,180	4,270
Mix: 7 SK Exterior 070A034						Compressive Strength Data (psi.)			
Date	Slump (in.)	AEA%	Unit Weight	Mix Temp.	Air Temp.	2-Day	7-Day	14-Day	28-Day (Avg.)
1/2/2024	4.5	5.0	141.1	75	38	2,500	4,180	4,380	5,090

HMH Engineering
3882 N. Schreiber Way, Suite 104 | Coeur d'Alene | Idaho 83815
Office: 208.635.5825 | www.hmh-llc.com

STANDARDS

FOR VOLUMETRIC PRODUCTION

- ASTM C685 - Original version issued in 1971
- ACI 304 / AASHTO M 241
- ACI 548.4-93 - Latex Modified Concrete Overlays - Volumetric - preferred production method
- VMMB 100-01
- ITD - Sec 409 (PCCP) and 502 (Conc. Structures)

ASTM C685/C685M-17 ⓘ

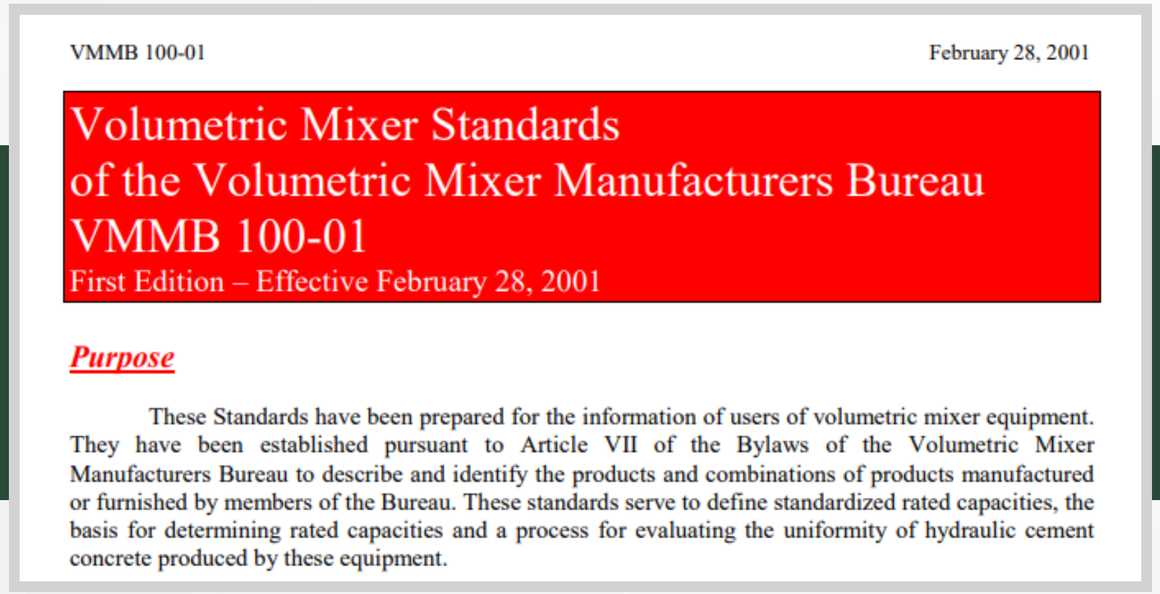
Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing

Significance and Use

A1.2 Significance and Use

A1.2.1 These tests and requirements are used to evaluate loading and operating procedures; verify the accuracy of proportioning and indicating systems; and determine if mixing uniformity has been degraded by excessive wear or by accumulations of hardened concrete, or both (Note A1.1).

NOTE A1.1: The method of loading the batching-mixing unit, proper maintenance, and other factors may have an effect on the ability of the unit to produce uniformly mixed concrete. For this reason, the use of this test method not only measures the efficiency of the mixer, but also the combined effect of the method of loading and operating the unit.



VMMB 100-01 February 28, 2001

Volumetric Mixer Standards of the Volumetric Mixer Manufacturers Bureau VMMB 100-01

First Edition – Effective February 28, 2001

Purpose

These Standards have been prepared for the information of users of volumetric mixer equipment. They have been established pursuant to Article VII of the Bylaws of the Volumetric Mixer Manufacturers Bureau to describe and identify the products and combinations of products manufactured or furnished by members of the Bureau. These standards serve to define standardized rated capacities, the basis for determining rated capacities and a process for evaluating the uniformity of hydraulic cement concrete produced by these equipment.

PROCESS

BATCH TICKETS

- Requirements in ASTM C685
  - Same as C94 – plus calibrated settings for flow controls of mix constituents (aggs, cement, admix, etc.)
  - Conformance ensured by monitoring calibrated settings

- Submittals available in same format as ready mix with addition of calibration records (mentioned above)

D. Mixing and Delivery.

1. Mix and deliver concrete by any of the following means:
   a. Central mixed concrete. Mixed completely in a stationary mixer and the mixed concrete transported to the point of delivery in agitating equipment or in approved nonagitating equipment.
   b. Transit mixed concrete. Mixed completely in a truck mixer at the batching plant or while in transit.
   c. Truck mixed concrete. Mixed completely in a truck mixer at the point of delivery following the addition of mixing water.
   d. Shrink mixed concrete. Mixed partially in a stationary mixer, and the mixing completed in a truck mixer.
   e. Mixed in an approved mixer that volumetrically measures the concrete ingredients and continuously produces concrete that meets ASTM C685.
2. Operate truck mixers and truck agitators within the rated capacity and at a speed of rotation for mixing or agitating as designated by the equipment manufacturer.
3. The minimum mixing time for mixers of 10 cubic yards or less is 50 seconds for central mixed concrete. Mixing time for mixers of more than 10 cubic yards capacity requires approval. Measure mixing time from when the cement and aggregates are in the drum. Charge the batch into the mixer so some water will enter before cement and aggregates and all water is in the drum by the end of the first ¼ of the specified mixing time.
4. For shrink-mixed concrete, the Contractor may reduce mixing time in the stationary mixer to at least 30 seconds. Complete mixing in a truck mixer with 50 to 100 revolutions of the drum or blades at mixing speed. Do not exceed a batch volume of 70 percent of the drum gross volume.
5. When a truck mixer is used for complete mixing, mix each batch of concrete with 50 to 100 revolutions of the drum or blades at mixing speed. Use agitating speed for additional mixing.
6. When a truck mixer or agitator is used for transporting concrete that has been completely mixed in a stationary mixer, use agitating speed for mixing during transport.
7. When a truck mixer or agitator is used for transporting concrete, apply the following:

FEATURES

QUALITY

FRESH PRODUCT

- Prolonged shelf life
  - Improved workability
  - Less mix water needed on-site - no slump loss from haul
- Increased bleed water
  - Mitigate exposure to rapid evaporation, plastic shrinkage cracking
  - Counteracts problems related to new blended cements (Type 1L)

- Reduced water content means decreased W/C ratio:
  - Increased early and ultimate strength
  - Expedited form removal, service of concrete member
- Alternatively, W/C ratio can be maintained while reducing cement:
  - Mitigation of shrinkage, surface failure

FEATURES

QUALITY

GREATER PRODUCT CONTROL & FLEXIBILITY

- Test & change mix properties in real time - **NO REJECTED LOADS**
- Modify slump or swap entire mix design mid-truck
- Maintain workability indefinitely
  - Curb, shotcrete, high-early, CDF, etc.
- Increased mix uniformity with small batches - no “doughballs”

FEATURES

EFFICIENCY

BATCH ONLY WHAT YOU NEED

- Eliminate waste (**over-ordering**)
  - Waste averages 15-20% of total concrete ordered
  - Eliminates waste management cost, permit compliance

$ $

- Avoid running short (**under-ordering**)
  - Produce additional concrete as needed
  - Eliminate additional short load fees, 2-3 CY minimums, waste from “clean-ups”
  - Save labor cost from delays
  - Avoid cold joints

FEATURES

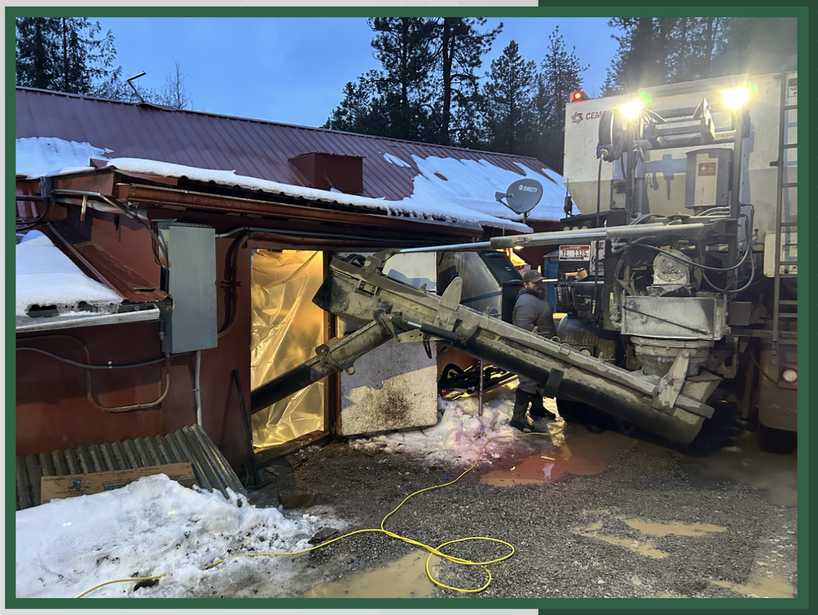
EFFICIENCY

PLANT OPENING FEES

- Minimal “fire-up” cost compared to ready mix (weekends, after-hours)

CHEMICAL ADMIXTURES

- Reduce dose for set retarders and superplasticizers - no slump loss from travel to job
- Greater efficacy, less waste - liquid admixtures are more potent in fresh concrete
    - Water added by RM drivers counteracts accelerators



FEATURES

EFFICIENCY

SUPERIOR MANEUVERABILITY

- Operator controls auger, chutes by remote - no “chute man”
  - Labor cost savings
  - Improved safety
- Articulation of discharge assembly covers larger area than chutes on RM truck

FRITZ-PAK CONCRETE ADMIXTURES

Follow us on Social

Water Conditioner | **False-Set Admixture**

Water Conditioner is a dry powdered admixture packaged in a ready-to-use, water-soluble bag. It is intended for use in volumetric concrete mixers to prevent false-set problems. False-set is a term used to describe the stiffening of the concrete within one minute after water is added. It is not a "hard set". It happens more frequently in volumetric mixers because mixing times are not long enough and don't go past the false-set condition.

No 98420

MEETS STANDARDS

There are not applicable standards for this product.

PACKAGING:

SIZE	4 oz. Bags
BAGS/CASE	100
CASES/PALLET	24

ADVANTAGES

- Reduced false-setting concrete
- Easy storage & transportation
- No effect on set times
- No effect on concrete strength

Fritz-Pak Corporation: 4821 Eastover Circle, Mesquite, TX 75149; (214) 221-9494; fritzpak.com

FEATURES

UNIQUE CHALLENGES

FALSE SET

- Concrete stiffens, loses workability without heat or progress with setting - "Plaster of Paris"
- Occurs within first 1-5 minutes after mixing
- Gypsum unbonded to Portland cement - ready mix overcomes by mix during haul
- Requires adaptation of finishing technique
- Admixtures available to combat effect

FEATURES

UNIQUE CHALLENGES

OTHER FACTORS

- Increased bleed water - **Pros & Cons**
  - Excess water (water of convenience) absorbed, evaporated in RM truck during travel
  - Improved workability - counteracts rapid surface drying from blended cements (discussed earlier)
- Delayed set time - due to freshness
- Discharge in motion
  - “Tailgating” impractical at times
  - Offset by superior chute articulation

FEATURES

OPPORTUNITIES

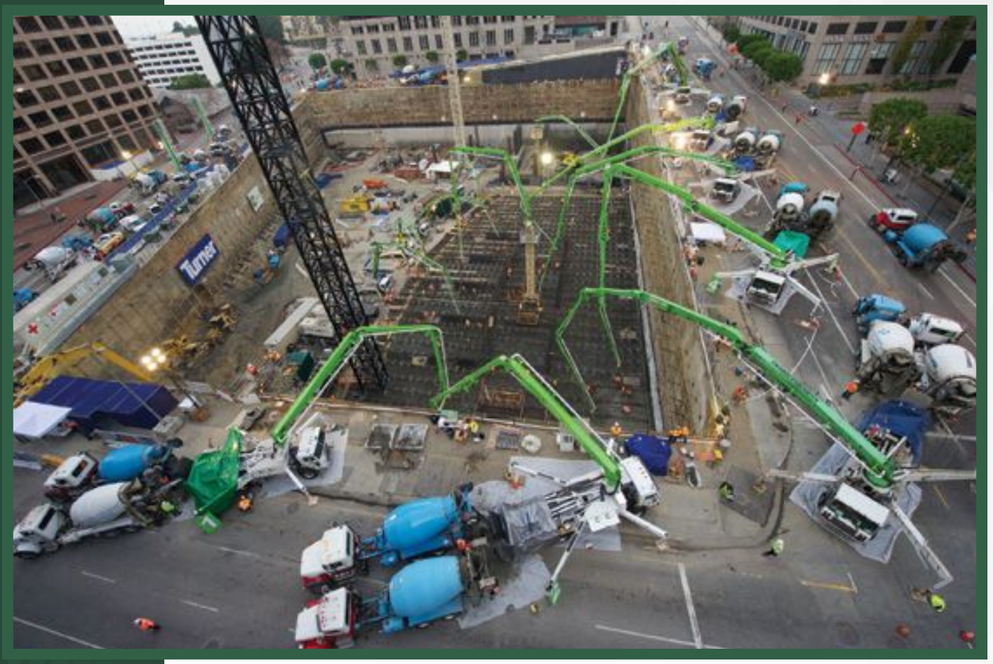
OPERATE AS PORTABLE BATCH PLANT
for **local or remote projects**

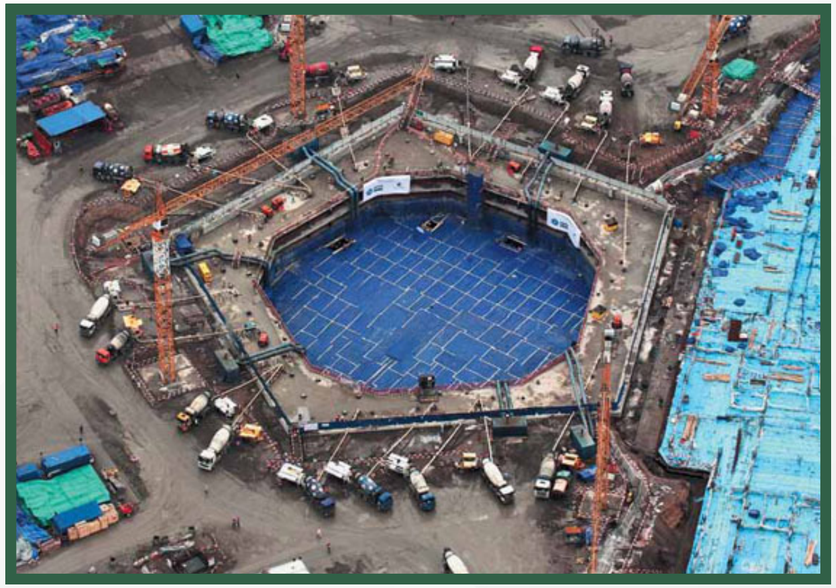
- Work around load limits
- Stage 1-2 mixers for continuous batching - eliminate truck traffic
  - Minimize impact to roads
  - Eliminate delays due to traffic
- Stockpile aggregates on-site
  - Maintain, monitor quality
- Deliver Portland Cement directly to site
  - Portable cement silo
  - Super sacks
  - Tanker truck

FEATURES

READY MIX ADVANTAGES

- Can prove more efficient for large projects with 1 mix design. Potential advantages include:
  - Faster turnaround for batching & discharging
  - Less variability on sizable pours - 1 batchman; drivers only deliver product
  - Less set up, mob cost on local projects easily accessible to trucks
- May be preferred for tailgate jobs





FEATURES

CURRENT USES

- State DOT’s, municipalities, Army Corps of Engineers
- Ready mix suppliers, concrete pumps, concrete contractors
  - Cascade Mobile Mix - Graham, WA
  - Stremler Concrete - Lynden, WA

Notable projects

- I-5 Pavement Panel Replacement - Seattle, WA
- SR-99 Tunnel Precast Wall Panels - Seattle, WA
- Various Latex Modified Overlays - WSDOT & ODOT
- Washington State Penitentiary - McNeil Island, WA
- Tumwater Dam (underwater piers, grout) - Leavenworth, WA

CONCLUSION

SUMMARY

Volumetric mixers are versatile machines that function as portable concrete plants. As such, they offer solutions for both unique and ordinary concrete projects:

- Increased product control, customization
- Batch exact quantities needed (post holes, footings, tear-out/replace)
- Unique maneuverability
- Multiple mix designs on single truck (interior, exterior)
- Flexible scheduling (weekends, after-hours)
- Specialty mixes - low slump, Rapid-Set, etc.
    - Bagged mixes (latex overlays, grouts, UHPC)
- Delivery to remote locations

Questions?