Production of Ready Mixed Concrete

A. Transit Mixed (or "truck-mixed") Concrete

In transit-mixed concrete, also called truck mixed or dry-batched, all of the raw ingredients are charged directly in the truck mixer. Most or all water is usually batched at the plant. The mixer drum is turned at charging (fast) speed during the loading of the materials. There are three options for truck mixed concrete:

- **Concrete mixed at the job site.** While travelling to the job site the drum is turned at agitating speed (slow speed). After arriving at the job site, the concrete is completely mixed. The drum is then turned for 70 to 100 revolutions, or about five minutes, at mixing speed.
- **Concrete mixed in the yard.** The drum is turned at high speed or 12-15 rpm for 50 revolutions. This allows a quick check of the batch. The concrete is then agitated slowly while driving to the job site.
- **Concrete mixed in transit.** The drum is turned at medium speed or about 8 rpm for 70 revolutions while driving to the job site. The drum is then slowed to agitating speed. (More information on ready mixed concrete trucks can be found in the Delivery section.)

B. Shrink Mixed Concrete

Concrete that is partially mixed in a **plant mixer** and then discharged into the drum of the truck mixer for completion of the mixing is called shrink mixed concrete. Central mixing plants that include a stationary, plant-mounted mixer are often actually used to shrink mix, or partially mix the concrete. The amount of mixing that is needed in the truck mixer varies in these applications and should be determined via mixer uniformity tests. Generally, about thirty turns in the truck drum, or about two minutes at mixing speed, is sufficient to completely mix shrink-mixed concrete.

C. Central Mixed Concrete

Central-mixing concrete **batch plants** include a stationary, **plant-mounted mixer** that mixes the concrete before it is discharged into a truck mixer. Central-mix plants are sometimes referred to as wet batch or pre-mix plants. The truck mixer is used primarily as an agitating haul unit at a central mix operation. Dump trucks or other non-agitating units are sometimes be used for low slump and mass concrete pours supplied by central mix plants. About 20% of the concrete plants in the US use a central mixer. Principal advantages include:

- Faster production capability than a transit-mix plant
- Improved concrete quality control and consistency and
- Reduced wear on the truck mixer drums.

There are several types of plant mixers, including:

- Tilt drum mixer
- Horizontal shaft paddle mixer
- Dual shaft paddle mixer
- Pan mixer
- Slurry mixer

The tilting drum mixer is the most common American central mixing unit. Many central-mix drums can accommodate up to 12 yd3 and can mix in excess of 200 yd3 per hour. They are fast and efficient, but can be maintenance-intensive since they include several moving parts that are subjected to a heavy load.

Horizontal shaft mixers have a stationary shell and rotating central shaft with blades or paddles. They have either one or two mixing shafts that impart significantly higher horsepower in mixing than the typical drum mixer. The intensity of the mixing action is somewhat greater than that of the tilt drum mixer. This high energy is reported to produce higher strength concrete via to thoroughly blending the ingredients and more uniformly coating the aggregate particles with cement paste. Because of the horsepower required to mix and the short mixing cycle required to complete mixing, many of these mixers are 4 or 5 yd3 units and two batches may be needed to load a standard truck or agitator.

Pan mixers are generally lower capacity mixers at about 4 to 5 yd3 and are used at precast concrete plants.

Slurry Mixing
The slurry mixer is a relative newcomer to concrete mixing technology. It can be added onto a dry-batch plant and works by mixing cement and water that is then loaded as slurry into a truck mixer along with the aggregates. It is reported to benefit from high-energy mixing. Another advantage is that the slurry mixer reduces the amount of cement dust that escapes into the air.

"Mix Mobiles" - Mobile Volumetric Proportioning Plants
"Mix Mobile" are truck-mounted, volumetric batching and continuous mixing units. These "plants-on-wheels" often supply small-volume or specialty pours and offer the convenience of freshly mixed concrete in fairly precise quantities. The unit consists of a truck with bins of sand, coarse aggregate, cement, water, and admixtures. The aggregate bins have longitudinal belts at the bottom of the sand, and as well as coarse aggregate bins that drag the aggregate to separate adjustable gates at the rear of the bin. The speed of the belts is connected to a feeder in a cement bin, and all three materials drop down into a mixer. Flow meters control the introduction of water and admixtures.

Plant Styles, etc.
Concrete batch plants come in a variety of styles and configurations designed to accommodate a variety of markets, technical and environmental considerations.

- **Portable Plants** In general, they have a cement silo and an overhead bin for sand or one or two coarse aggregates.
- **Permanent Plants** The plant operates from same location for a relatively long period of time. Large quantities of materials of greater variety are stored at the plant. The plant will tend to have larger overhead storage and may have two lanes to permit batching two trucks at the same time. Plants may be also classified as
- **High profile** - The traditional stack up plant is a tall plant that has aggregate and cement storage bins that feed into batchers or weigh hoppers by gravity.
- **Low profile** - The aggregate weigh hoppers are near the ground with belts to elevate the aggregate to load the mixer.