IKTINOS a New Freight and Construction Standard to Evolve Concrete Beton Preparation from a Chaotic Contractor Site to a Container Box Mover International Industry

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Abstract

A local West Macedonia company sells a transportable beton concrete unit with a capacity of 60 tn every hour. The next step of this machine is to be fed with cement, aggregates, water and chemicals from standard containers. Our research focus on how to connect the various containers, topology layout, type of bus and cleaning. The results did not encourage us to continue our research temporary due to inability to attract research and development funds. We currently will be satisfied to sell a hand-full of "assembly line" contracts instead of a beton unit.

Keywords: Concrete plant, Container topology, Transportable beton

JEL KODES: L74-Construction, L78-Industry Studies: Primary Products and Construction: Government Policy, L79-Industry Studies: Primary Products and Construction: Other, L90-Industry Studies: Transportation and Utilities: General, L91-Transportation: General, N60-Economic History: Manufacturing and Construction: General, International, or Comparative, R42-Transportation Economics: Government and Private Investment Analysis; Road Maintenance, Transportation Planning

1. IKTINOS

IKTINOS was the ancient Hellenic architect that was in head of the construction of the Parthenon monument. He delivered to our times the contractor and plant approach for building. We borrow his glorious name to redefine worksite from building area to a nice and clean factory.
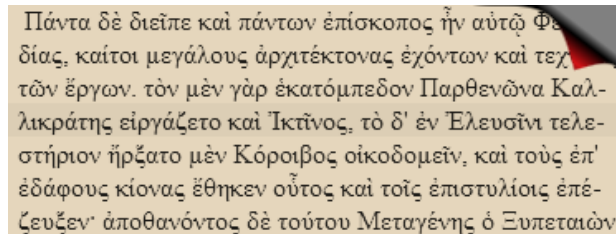

Figure 1. Plutarchus Biography

Two stories will clarify the concept

- Today

A typical concrete beton preparation plant occupies significant land resources, special vehicles running around the site, pollution is terrible, a total confusing situation with very problematic beton hydration and other problems [2, 3, 4, 6, 7, 8].

- After IKTINOS adoption

A few square meter beton site, without air pollution, where the director simply place a telephone order for for 60 containers water, 23 container cement, 13 aggregates.

We apologize for the non-scientific extensive use of demonstration graphics but we only are a financing and investment research team. Pure engineers will evolve our ideas into legal patents and construction blueprints. However this paper scope lies at:

- technology selection and evaluation.

- third party patent violation recognition.

- an extra effort to formulate a standard container - ingredients vehicle.

- pre alpha test.

- economic funds attendance.

2. Concrete Beton and Logistics Industry

2.1 Traditional Concrete Beton Plant

A traditional concrete beton plant has a variety of

- facilities

- storage areas

- intermediate areas and machinery

- heavy and normal tracks
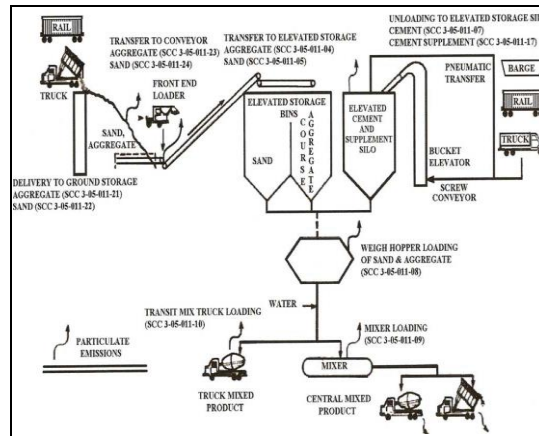
- noise, dust, chaos

Figure 2. Traditional beton plant

This contractor model served well the industry for centuries. The installed base of delivery tracks prohibited so far every change. However in modern cities the transport time exceeds by far the hydration time limit of the beton [b3, b4]. The result is less beton quality and construction security.

2.2 MIXTEK Transportable Unit

A handful of mechanic engineers instead of transporting the ready beton to the building site they design a full feature unit that incorporates everything on site. The MIXTEK patented transportable factory has features:

- Standard cargo container size

- transportable attached to a standard tractor.

- assembly time of one hour.

- delivers 1 cubic meter of beton per minute.

- full independence with power unit, diagnostics, weighting unit, logistic support.

This transportable unit passed beta test successfully being in heavy duty operation around Europe with advantages like:

- bypassing all bureaucratic barriers for concrete beton worksites.

- Fulfilling all environmental regulations for air polution in modern cities.

However the transportable approach in order to totally replace tarditional unit has one major drawback: feeding in with:

- Cement

- Water

- Various diameters of Aggregates

- Various Additives

Our IKTINOS patent is exact a solution to this feeding in problem and running the MIXTEK on site unit for ever.

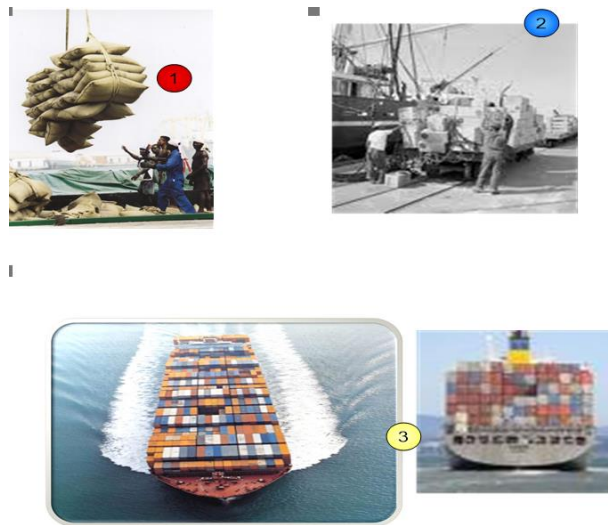*2.3 An Analogy: Container Industry*

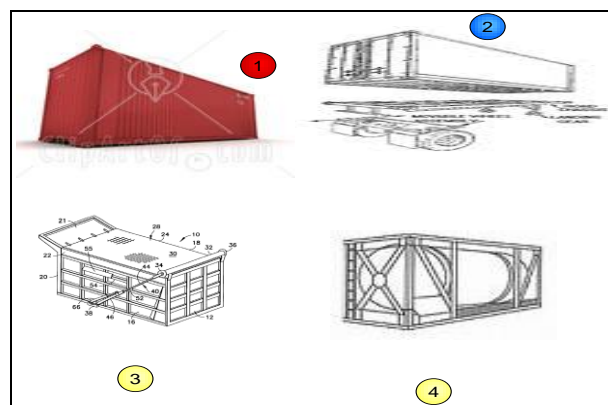Figure 3. From hand loading to Cosco

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Figure 4. IKTINOS containers

Every container in appropriate facilities far away from the building site follows a straight forward procedure

- Is filled with the ingredient material.

- Sealed accordingly.

- Attached with all logistics information.

- Placed overtop on a standard tractor.

- Loaded into a ship if needed.

- Delivered in the building site

- Finally placed in the desired place in contact with the basic IKTINOS loading bus.

It is now ready to interconnect to all other containers and finally feed MIXTEK. With all these containers connected the machinery could provide thousands of cubic meters of concrete beton, theoretically in an endless operation.

3.2 Container Interconnection

A typical moderate building project for a 24/7 operation needs a number of container of every type. According to our calculations with real life construction buildings an IKTINOS site could enumerates:

content	containers
water	6
cement	4
various chemicals	1
sand	2
gravel	2
crushed stones	1
slag	1
flying ash(recycled)	2
inert agregrates(recycled)	2
waste glass(recycled)	2
total	23
capacity	63
Total m3 beton	1449

All these 23 containers are needed for 24 hour ongoing typical beton preparation. As a general rule is that a container arrives every hour while MIXTEK portable machinery produces more than 60 cubic meters per hour.

The placement of every single container in space and time is a typical mathematical problem to be solved at a later stage. Three types of stacking up are demonstrated below:

- 1=high tower.

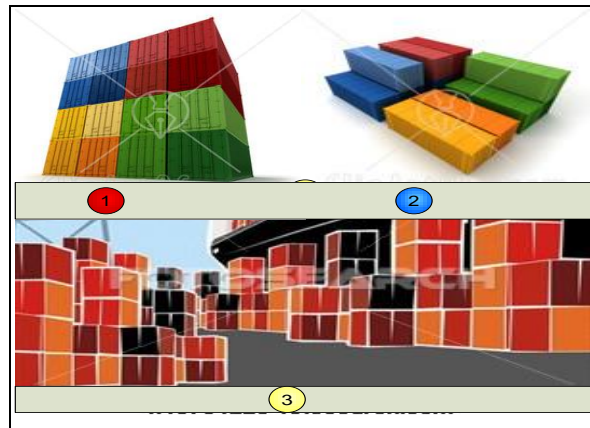- 2=horizontally spread.

- 3=as they arrive

Figure 5. IKTINOS container stack

The initial design was to embed in every container a universal coaxial route for all type of ingredients. However engineering and cost limitations brought us to keep the container frame intakt. On the side or upper body of the container a simple connection is drilled and where we adapt the appropriate valves. The investigation list to drive the materials from the container into the MIXTEK includes:

- archimedes screw

- gravity

- pump

- vibration assisted

- Hydraulic booster

- pusher

- washout

- conveyor

3.3 IKTINOS Topology

We examined four container stack and interconnection topology:

- 1=Daisy chain or ring,

- 2=bus
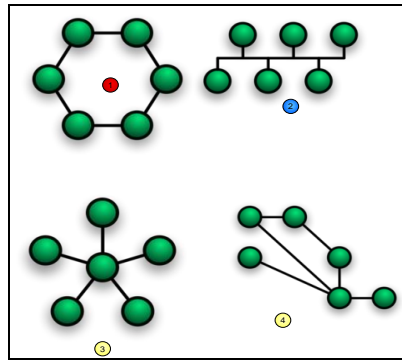
- 3=star

- 4=Partially connected

Figure 6. IKTINOS topology

The table below describes the benefits and problems for every connection.

	1 Daisy chain or ring,	2=bus	3=star	4=Partially connected
Simplicity	8	8	8	2
use of plain containers	1	9	9	2
number of connectors	6	1	1	3
easy of use	1	8	7	1
machine initial cost	8	2	2	3
operation cost	1	3	3	4
crane usage	1	9	5	1
ingredient flow	1	6	9	5
implemenation complexity	5	5	5	1
	32	51	49	22

Figure 7. Container topology evaluation

We have chosen the bus connection primarily for simplicity and in order to proceed to pre alpha in lab test.
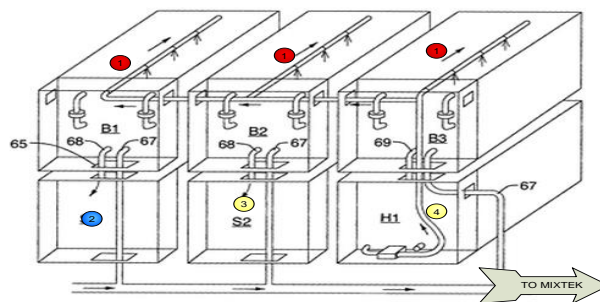

Figure 8. Wash gravity bus

An indicative six container stacked up on to the top of the other demonstrates the washout operation.

Containers have:

- 1=water.

- 2=cement.

- 3=sand.

- 4=aggregates.

From the container the material goes to the bus. The bus leads to the MIXTEK concrete beton preparation machine. The water facilitates the flow and is always weighted according to the B class requirements.

4. IKTINOS Future

4.1 Electro-Mechanic Properties

After theoretical problems clarification the major part of our research and development will follow. For the beta test we seek answers in:

- Load-unloading properties-capabilities, avoiding expensive solutions like crane.

- Static analysis for the stacked container heap and structural   homogenization

- All type of various electric connections, security and

- Sensor connections from temperature and hydration measurement to dust pollution alarms.

- Water flow inter-connection

- Cement-fly ash flow connection

- Aggregates flow inter-connection

- Simple, inexpensive, durable design, since it concerns containers moving around the globe.

4.2 Design Drawbacks

To redefine a multi billion business radically a wider acceptance is needed. This is the major drawback of our design. In order to proceed to the next step from "transformers" to profitable industry a number of action are necessary.

4.3 Sale per Country Factory

For such a useful machinery we could expect to boost sales. On the contrary years of chat talking led us to the point to reverse the universe. We try to sell a few thousands units with significant sale cost without profitable results. We are working for a non-patented contract to sell an assembling factory of the beton machinery. With minimum cost we will be satisfied to sell a hand-full of "assembly line" contracts.

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