



Fine Fiber / Eco Fine

We have been thinking about
“sustainable society, environment and the earth “





Aiming to accomplish the Recycling Society and World,
we are doing the research and development of fine products
in harmony with
the environment and the future.

The Conversion from " Mass consumption society of natural resources" to "Harmonized society with the earth environment" is now the inevitable global issue. The reuse and recycling of wastes are will be much more important issue in the future. As the environmental problem becomes aggravated, the concern with the environment protection rises year by year, and the recycling business will grow up and establish in the future. Recycling products will have to and be able to bear our future due to the limit of natural resources and the acceptable environment.

We have ever executed the development of not only efficient and high functional materials but also ones harmonized with the environment, that is, of which the recycling rate were designed to its maximum and the load to the environment were designed to its minimum. These are activities to achieve the society in which the children of the next generation can keep their safe lives.

"**Fine Fiber and Eco Fine**" have been developed through such activities and are the most suitable binders for the recycling aggregate.

"**Fine Fiber and Eco Fine**" are products with high safety by which air pollution, the river contamination and soil pollution are not caused. We have been researching and developing the various utilization of "**Fine Fiber and Eco Fine**", ex. paving materials.

We, Mikro Kosmos Inc., will perform the **Fine Business** with "**Fine Fiber and Eco Fine**" and will proceed together with environment protection and economic activities. Aiming at the achievement of the **Fine World** which is the circulation type society without wastes, we will contribute to the society and the world.



Fine Fiber / Eco Fine

*Fine Fiber and Eco Fine have been developed to realize
our comfortable environment and world.*

High permeability and durability in harmony with the environment

< Features of Fine Fiber and Eco Fine >

1. Fine Rock which is the combination of Fine Fiber and one/some aggregates are permeable and more than 3 times of permeable concrete in strength.
2. Excellent in durability, salinity tolerance, wear-proof, staining proof and little stiffening shrinkage.
3. Harmonious item with the environment, which is capable of making those of melted slag, glass sands, rubber chips, wood chips, etc. useful as recycling ones.
4. Adjustable curing time and flexible construction/molding .
5. Keeping natural colors of various aggregates and excellent in landscape.
6. Capable of coloring some aggregates.



Applicable to the construction of various aggregates.

< A product line of Fine Fiber/ Eco Fine >

FF-1000 (epoxy resin)

Composition --- synthetic resin : hardener = 3 : 1

synthetic resin = 18kg/can

hardener (Japan) = 6kg/can

hardener (overseas) = 18kg/can

Application --- pavement, concrete molds and adhesive for concrete products

Aggregates --- sands, crushed stones, melted slag and glass sands

EF-2000 (urethane resin)

Composition --- synthetic resin : glass fiber powder = 15 : 2

synthetic resin = 18kg/can

glass fiber powder = 2kg/pack

Application --- pavement of rubber chips, wood chips, etc

Aggregates --- rubber chips, wood chips, etc.

EF-3000 (acrylic resin)

Composition --- synthetic resin = 18kg/can

Application --- transparent top coat of sands, crushed stones, rubber chips
wood chips, board, etc.

Others : - adhesive,

- topcoat (for surface finisher)

- primer (for groundwork processing)

- cleaning solution

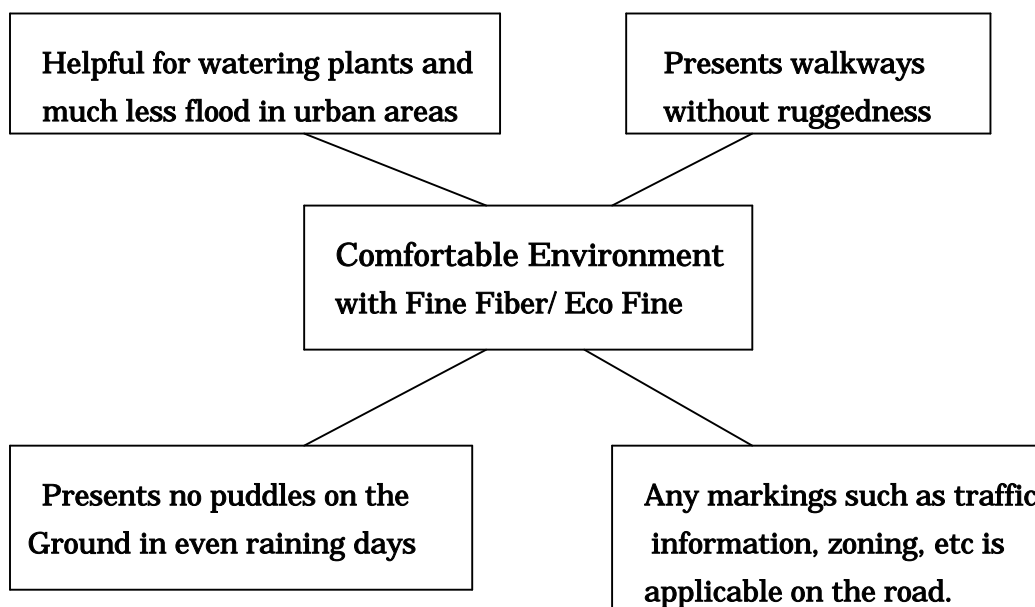


Fine Fiber and Eco Fine are

: the most suitable binders for various recycling aggregates including wastes such as melted slag, used glasses, etc.

: new material binders of high performance and high functions.

- Fine Fiber and Eco Fine are binders of the mixed synthetic resins with suitable fibers.
- The superior strength of the Products was achieved by our own special manufacturing method, keeping durability, chemical resistance and water resistance which are advantages of the synthetic resins.
- Fine Fiber and Eco Fine are the most suitable binders for the recycling aggregates of various wastes such as garbage incineration ash (melted slag), used glasses, waste plastics rubber chips of tires, etc which have never been given enough strength by other binders.
- Fine Fiber and Eco Fine are applicable in various fields due to the fiber binder.
- Fine Fiber and Eco Fine are products developed aiming at the economy with the performance and the function, and one of the new materials useful for the sustainable environment and comfortable world which are requested now and in the future.





Fine Business

*“Fine Fiber / Eco Fine”, in harmony with the environment
and superior in function and cost performance.*

• High performances of Fine Fiber

(In case of using FF-1000 and #7 macadam aggregate)

Bending strength test (JIS A1106)	8.5N/mm ²
Compressive strength (JIS A1108)	22.5N/mm ²
Wear examination (JIS K7025)	0.78m/m in 500 times
	1.14m/m in 1000 times
	1.50m/m in 1500 times
Sliding friction test (B.P.N)	Dry 85, Wet 60
Permeability test	0.25cm/second
Freezing and thawing test(JIS A 1435)	-2.3% of weight in 50 cycles
	-2.2% of weight in 150 cycles
	-2.1 % of weight in 250 cycles

JIS: Japanese Industry Standard

• Dissolving Analysis

Cadmium	No detection 0.01mg/L or less
Cyanide	No detection 0.1mg/L or less
Lead	No detection 0.01mg/L or less
#6 Chrome	No detection 0.05mg/L or less
Arsenic	No detection 0.01mg/L or less
Mercury	No detection 0.0005mg/L or less
PCB	No detection 0.0003mg/L or less

L: Little

• Chemical Resistance (weight variation rate : %)

Sulfuric acid	10% to -0.69%
Hydrochloric acid	10% to -0.48%
Mercury sodium	20% to -0.27%
Potassium hydroxide	10% to -0.46%
Ammonium water	10% to -0.67%



A lot of advantages on the construction with Fine Fiber and Eco Fine

- Fine Fiber and Eco Fine has been applied in various fields and obtained a good evaluation with high performance and durability.
- The excellent quality has been proved by various test data.
- Fine Fiber and Eco Fine are at lower cost than the previous binders, the most suitable for waste aggregate(s) and one of the high secure materials.
- Moreover, various advantages of simple construction, short caring time, etc.

Comparison Table

Item	Fine Rock (*)	Permeable concrete	Resin pavement
Construction	- easy construction - walking in a few hours after construction	- easy construction - walking in a long time after construction	- easy construction - walking in some time after construction
Viewing/Design	- keeping natural colors of stones - various color designs	- limited natural colors design	- keeping natural colors of aggregates - various color designs
Durability	- excellent	- partial crack of surface gravel	- good
Functionality	- high permeability - structure and surface dressing materials	-structure material -not surface dressing material	- dressing material - no strength of structure material
Price in Japan (material/labor)	- J¥9500/m ² (t=30mm)	- J¥5500/m ² to J¥11500/m ²	- J¥7000/m ² to J¥13000/m ² (t=10mm)
Bending strength	- 8.9 N/m m ²	- 3.0 N/m m ²	-----
Sliding friction	- Wet 60	- Wet 65	-----
Permeability	- 0.25cm/sec	- 0.05cm/sec	-----

(*)Mixture of FF-1000 & #7macadam aggregate



Simple construction

Road correction

Checking the surface conditions of the under layer of the road such as surface waving, hardness, dryness, etc.



Mixing of Fine Fiber & aggregate

Adding Fine Fiber which binder and hardener are blended to the aggregates and mixing them.



Installation of mixture

Spreading and installing the mixture uniformly from the edge to the edge.



Compression

Pressing the surface using the compression tool if necessary.



Finishing by metal trowel

Make the details finishing using a trowel.



Caring

Completion

Keeping the condition of the construction completion around one day, walkable after around 3 hours of the construction, in case of FF-1000.





Fine World

We contributes to the achievement of the recycling society.

The waste aggregates such as rubber chips, wood chips, etc are reused as one of the paving materials by Fine Fiber and Eco Fine.

Fine Fiber enables recycling of resource

The recycling aggregate, which is made from the wastes such as empty pots/bottles, abolition tires, thinned lumber, general garbage, and colloidal sediment, has been widely made the best use of for paving materials, etc with Fine Fiber.

By using Fine Fiber and Eco Fine, we can present various kinds of paving materials various of which features are suitable for base and excellent in permeability and elasticity.

It is, therefore, possible to make pavement roads easy and tender for walking even on the raining day.

We will contribute to the achievement of the recycling society, through developing and manufacturing suitable products for human beings, the environment and the earth.

Many kinds of the aggregates can be utilized.

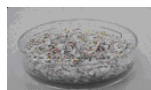
Glass sand



Rubber chips



Shells



Plastic chips

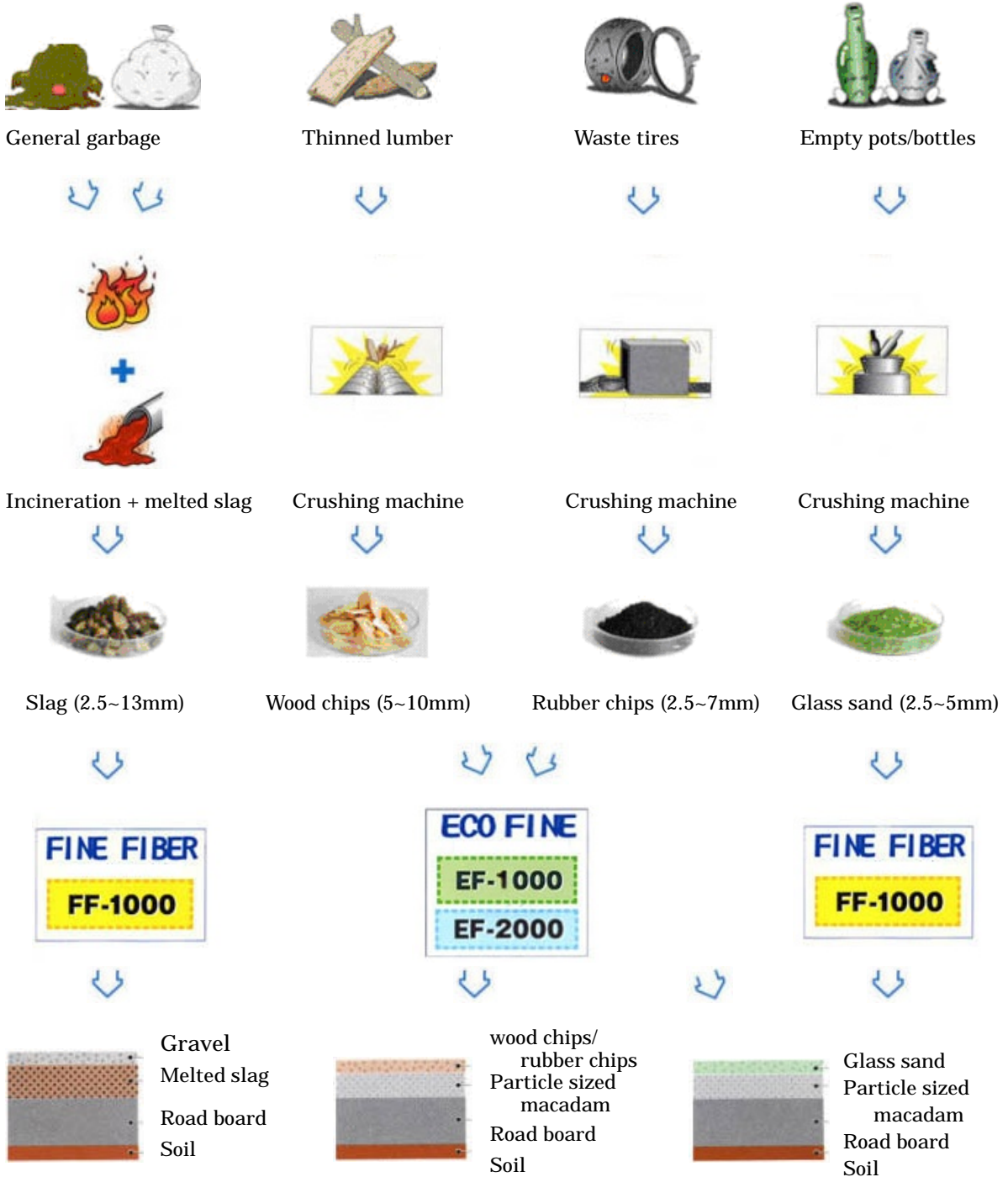


Natural stones





Fine Fiber is applicable to various aggregates.





Fine Fiber is used in various places due to its wide application and excellent design.

Fine Rock, which consists of Fine Fiber and aggregate(s), is the most suitable for the park, the plaza, the parking and the tree circle. Fine Fiber and Eco Fine have been adopted by some local governments and Fine Rock has been widely used in the public places. As Fine Rock is excellent in the sight viewing and the function, it is possible to comply with various designs and to present comfortable environment.



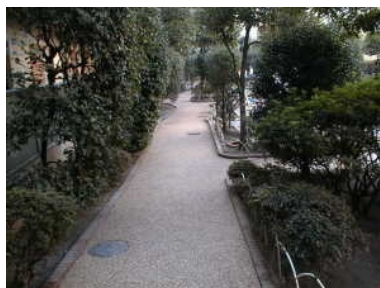
(1) Colored natural stones
Matsudo City,
Chiba Pref.



(2) Melted Slag
Koriyama City,
Fukushima Pref.



(3) Colored rubber chips
Kashiwa City,
Chiba Pref.



(4) Natural stones
Hibiya Park,
Chiyoda-ku, Tokyo



(5) Natural stones
Koriyama City,
Fukushima Pref.



(6) Glass cullet
Matsudo City,
Chiba Pref.

We have developed original permeable products such as a gutter plate, a rain water box and planter with Fine Fiber and Eco Fine.





Mikro Kosmos Inc. (MKI) supports comfortable living friendly to the environment.

Company Profile

Mikro Kosmos Incorporated (MKI)

Establishment : July 8, 1999

Activities : Products Development, Manufacturing and Sales of binders whose brand are
"Fine Fiber /Eco Fine" and deodorizers whose brand is "e-Fine".

Patent application # : 10-37267

Fine Fiber & Fine Rock : Registered Trade Mark

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