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Digest of an article titled “Major Adventures by Niche Chemical Companies”

One of the largest coal-fired boilers in the Tohoku Region (Northeastern part of Japan’s main island), standing 40 meters high in Kureha’s Iwaki Factory, was swaying from side to side. Pieces of metal were falling down to the ground, steam was blowing out from broken pipes and the large stack seemed to collapse at anytime. Everyone in the factory wondered if this quake would last forever.

The Iwaki Factory counts for 70% of Kureha’s domestic production. Immediately after the Great East Japan Earthquake on 3.11, Kureha fell into state of suspended animation as a manufacturing company. What’s more, there was a severer second phase waiting.

One month later, on April 11 and on 12, strong local aftershocks hit Iwaki region twice. The maximum vibrational acceleration recorded 509 gal, which was 1.6 times larger than that of the main shock on 3.11. Any chemical plant in Japan has never experienced quake of this scale.

In Iwaki Factory, pipes were cut off and welded parts were torn apart. Land sinking and ground liquefaction took place. “All the repair works done by this time on the damages caused by the main shock were nullified by the aftershocks” said Mr. Shiojiri, GM of Manufacturing Planning Department. It was a heartbreaking event to the people who had been making efforts for plant recovery works.

Dr. Iwasaki, the president and CEO, said “I could not foresee when we could complete the restoration work. I do not think anyone who was working for it on site could imagine how long it would take either.

Surprisingly, all the restoration works were completed three months after the aftershocks and all the plants started running at the full capacity in August. It is incredibly quick comparing with the slow progress paces of the governmental reconstruction programs. What made this fast track recovery possible? One among the most important factors is employee’s reliance on the company’s strategy in product

development that can be characterized as “Agriculture People Type.”

Kureha’s turn over is about 130billion JPY (1.7billion USD). That is only about one twentieth to one thirtieth of the sales of major Japanese chemical companies like Mitsubishi Chemical (3,500billion JPY) and Sumitomo Chemical (2,100billion Yen). However, Krewrap splits the market of household wrap film with Asahi Kasei’s Saranwrap. Kureha holds 70% of global market share of PVDF binder (adhesive) for Lithium ion battery. Kureha also has a unique medicine “Kremezine” used for chronicle kidney diseases.

“Being ready to spend long period of time for developing niche materials which have unique and excellent properties. That is essential for a middle-scale chemical company to run the business. I have confidence with this thought.” This served to give Kureha people a sense of confidence in standing on a solid ground.

The core of Japanese industry is shifting from assembling to manufacturing of parts and materials. In such a new trend in industry, presence of chemical companies has been growing and major chemical companies’ large scale projects are drawing increasing attentions. However, advanced materials business is the area where niche chemical company’s technologies can be appreciated the most.

The city of Iwaki was making announcements to the public urging to evacuate if they can move by themselves. The situation shortly after the Great East Japan Earthquake was tense to that degree.

Dr. Iwasaki, the CEO of Kureha, contacted Mr. Shiga, the COO of Nissan Motor Co. who has a manufacturing plant in Iwaki as well, over the phone many times. Dr. Iwasaki said “In such a difficult time, companies in the region must act strong. In manufacturing factories, there are many dangerous and hazardous materials. We should not abandon our responsibilities by running away leaving these behind. Let’s jointly declare that we will stay and do our best.

“Let’s recover our factory as fast as possible. That will ultimately contribute to the restoration of Iwaki City and Fukushima Prefecture.” This became a slogan at Iwaki Factory and all Kureha group companies supported that. Sales force of Krewap in

Western Japan collected water and food through their sales network and the trucks of Kureha Unyu Co. (a logistics company) carried them to Iwaki Factory spending 30 to 40 hours. Many of Kureha factory staff stayed in the factory and made themselves available for 24 hours for recovery works.

Cooperation also came from the region. The nuclear power plant accident caused more troubles. Many companies situated outside of Fukushima refused to come to Fukushima for work saying "Our head quarter dose not allow us to enter Fukushima prefecture" Many companies overreacted to the accident as there were insufficient information on radioactive contamination at that time. Ultimately, it was local contractors and construction companies who supplied necessary services to Kureha.

Recovery task force meetings, gathering all business divisions in Kureha, were held seven days a week at the Iwaki Factory until the end of May. Know-how and lessons on the recovery work has been shared by all divisions. News of recovery of any facility in the factory greatly encouraged all people in the factory. "Sharing the same experience and suffering gave us extra power."

At the polyvinylidene fluoride (PVDF) plant, the piping was torn near the ground. Its repair work required reconstruction of plant's frameworks while reactors were suspended in the air. At the same time, work for capacity expansion from 2,700tpa to 4,000tpa was done. "I would say good job to myself" said Mr. Shiojiri.

Kureha's interim ordinary profit in the 1st half of FY2011 was 4 billion JPY (55% increase from last year). "I think this is rather good when considering that Iwaki Factory stopped operation for three months." Dr. Iwasaki said. Even considering that the loss caused by the Earthquake was counted as special loss in the PL, making this result possible requires nearly 100% of operation ratio in August and September.

As a matter of fact, customers had been waiting for Kureha's products. Taking binder for lithium ion battery as an example. There are only three suppliers of this product in the world including Kureha. Kureha is the only company who has necessary approvals for all applications. There are many uses to which Kureha's binder is irreplaceable.

When Iwaki plant was stopping its production, directors in charge of procurement of

companies like Apple and Samsung visited Kureha head office to request to supply them even one kilogram at higher price.

“We felt sorry to have caused troubles for companies in the related supply chain. At the same time, we reaffirmed our recognition on how important our products are to our society.”

The development of PVDF was done in a typical way for Kureha. The polymer was commercialized 40 years ago. Its superior properties, like high chemical resistance, were known, but there were not many applications found for this material at the beginning. Production of PVDF was maintained in relatively small scale for applications like fishing lines and molding materials. It was only recently that PVDF was found to be the most suitable material for LiB binder which must withstand the high voltage and strong corrosivity of electrolyte of LiB.

CEO Iwasaki calls this style of product development “agricultural people type”. “Success in development of novel material happens only once in 20 to 40 years. We must polish rough diamond. We will cherish and grow our products which have excellent properties for extended period of time not minding short term profits. It will bear a lot of fruit in a long run.

Krewrap and Krehalon, which are generating stable profits for the company, were commercialized more than 40 years ago. At that time, Kureha developed direct crude oil cracking technology. That was expected as a highly economical process to produce ethylene and acetylene compared with ethylene center using naphtha because it was designed to utilize inexpensive crude oil. This ambitious project lost its economical merit over ethylene center when crude oil price skyrocketed due to the oil crisis in 1970s while naphtha was subject to tax break.

What remained are technologies of utilizing tar and pitch that are the by-products of the thermal cracking process of crude oil. Since then, Kureha has been improving technologies on how to make efficient use of tar and pitch for 40 years.

Kureha’s carbon fibers, which are produced by carbonizing or graphitizing of pitch, do not have strength of PAN carbon fiber. However, it is less expensive and has good thermal insulation property. It now holds 50% of global market share of carbon

insulation materials for furnaces used for PV production.

Kremezine is a bead-shaped activated carbon made from the same pitch. This is a unique medicine for chronicle kidney diseases designed to adsorb uremic toxins.

Hard carbon which is also made from the pitch is used for anode material of Lithium ion batteries. It was adopted by Sony for the first generation LiB used for personal computers about 20 years ago, but it lost out in competition with graphite based anode materials because of difference in cost.

However, hard carbon is now drawing increasing attention for automotive application (batteries for EV and HEV) because of its superior properties, especially its durability and high output characteristics. In order to ride the wind, Kureha tied up with Kuraray who developed bio carbon made from natural plant materials. The Kureha-Kuraray alliance is aiming to produce and sell 8000 ton/year of carbon anode materials to hold 40% of global market share in automotive application.

The center of Kureha's agricultural people style development is the Iwaki Factory which has proved its underlying strength by dealing with the Earthquake crisis.

Will Kureha depend on Iwaki factory more in future? The answer is no. Dr. Iwasaki says "I know Iwaki Factory is not cost competitive. Labor cost, electricity and corporate tax. There is no place in Japan where we can make investment in production capacity expansion at the moment"

While the current production capacity of PVDF at Iwaki is 4000 ton/y, Kureha will build a new 5000ton plant in Jiangsu province in China straight away. Next 5000ton plant will be "in China or somewhere other than in Japan" Dr. Iwasaki said.

It does not mean that he intends to contract the Iwaki Factory. "We will concentrate our technologies at Iwaki Factory that should serve as our mother factory. Assembling work should be done at a place near to the users. Development of new materials takes 20 to 40 years. It requires concentration and integration of resources both in research and production." Iwaki is the place that can provide the best environment for technology development in this sense.

Kureha's latest major challenge is a novel biodegradable plastic PGA. Initially, it was promoted for carbonated soft drink bottle application emphasizing its superior gas barrier property. Kureha invested 17 billion JPY, but PGA demand for bottle application could not be materialized. Dr. Iwasaki does not lose confidence on the "true value" of PGA which even DuPont could not industrialize. "In 20 to 30 years, it will become an indispensable material for our lives like Krewrap. Since we will sell PGA globally, its business scale will grow more than ten times bigger."

It is expected that sales of Kremezine will start in the US and Europe in 2013. The profit from Kremazine business will support the incubation period of PGA that will bear rich fruits in future. Therefore, "We did not see necessity of changing our strategy in the new mid term business plan. Future is in our hand."

Feeling of being needed by customers and confidence in the principal of the corporate business strategy are the factors that made the admirable recovery possible.