INVENTOR **SPENDS YEARS** COMPLETING SENSOR

By LIANG KAIYAN liangkaiyan@chinadaily.com.cn

When it comes to innovation, the fact that a tinv success comes after thousands of failures is a hardreflected throughout Yang Bingsong's career.

Yang started off working as an instrument main- guy," Chen said. tenance worker at Jinchuan Group more than 30 years ago. Now he is a senior instrument technician. In early 2000, Yang was in charge of maintaining instruments at the group's precious metal production factory. But there was a problem. Inaccurate measurements caused by thermolabile electrochemical sensors had resulted in low-efficiency produc-

tion. It had been a bottleneck of the group for years. "We had to replace the sensors every 10 hours due to the imported electrode's shortcomings in durability and accuracy. Each electrode is about 1,000 yuan (about \$144 today)," Yang said. "That incurs a great expense and exacerbates manpower shortages."

industrial expert to help to develop a new sensor to address this problem, but it was futile.

"The expert told me it was impossible to have high-temperature conditions," Yang recalled. However, he didn't quit. "In my philosophy, where there level is within the specified range; the fire extinis a spear, there is a shield. I believe we can find ways to counter that."

After that, Yang began to develop a sensor in the basement of his home during holidays and in his spare time. Yang chose to reconstruct a pressure cooker, which he used to simulate a high-temperature environment to test a sensor's reaction. The machinery and equipment just like soldiers on the move was just one step in his journey to develop battlefield do so with their weapons." Chen said. an ideal sensor.

greatest difficulty for me was the lack of expertise,"

During experiments, failure is common. Even a small snag forced Yang to take time off and go awareness of the rules. through literature and consult with experts. For years, Yang tried many materials, including chicken place. So when I got a stable job in this place, I was bones, and repeated his testing and inquiring of reconciled to the difficulty of work. The life has not experts until his efforts paid off in 2009.

It was at this time when a chlorine leak had occurred at a precious metal production plant of Jinchuan. The group's executives turned to Yang, asking him to use his sensor to see if it could help to fix the problem.

"At that time, my sensor ahieved a stable performance on a pressure cooker trial. Then I handed it in for the test," Yang said. Unexpectedly, his sensor served nearly eight months for the plant. That means the newly developed electrochemical sensor's life span is more than 10 times that of its peers.

The sensor, capable of resisting temperatures up to 140 C, officially made its debut in 2010. It has filled the gap of products used for measuring oxidation-reduction potential in a high-temperature environment.

"Innovations originating from front-line work are valuable because they come from practices and help to contribute profit for businesses," said Yang.

To encourage more innovations, Jinchuan has helped Yang set up a studio, where the 54-year-old and his team have developed a slew of instrumentrelated technologies, generating more than 2.4 million yuan in annual profit for Jinchuan.

"Jinchuan has constantly increased its investment in technological innovation and gives more incentives to outstanding creators," Yang said. "That not only gives us a sense of gain, but motivates us to do such things."

TECHNICIAN MASTERS HOW TO DRIVE SCRAPER

By LI YOU liyou@chinadaily.com.cn

Chen Ping, a 34-year-old senior technician, has been working as a scraper driver in the Mining Area III of Jinchuan Group since 2011. After a dozen ning the gigantic machines.

An underground mining scraper is a machine used exclusively for short-distance transporting ore. "When I first saw the machine, I was frightened to get too close to it. It took me a whole year to learn how to operate it independently," Chen said.

Driving a scraper well needs experience and brains. They are the two things needed to improve tutor once told him.

"My tutor told me to learn about the vehicle, and year, the residential district he lived in was named a for six months, Bai and his team finally solved all the learned lesson known to all inventors. And this is observe it under various working conditions. We provincial green civilized community, and Li became problems. gradually learn how it runs. I began to love the big

> As a scraper driver working in the underground hampers the physical and mental health of the growth of trees." worker. It was in this environment that Chen unremittingly exceeded his limits.

His experience in driving a scraper was blank at the start but he now has piled up a good chunk of knowledge after years of hard work. He said he has obtained a strong will as a driver.

Chen works regularly and has a strong sense a kid," Li joked. of time control. Every time he walks around the They planted 116 varieties of trees, such as peach, Bai said: "China is now accelerating the construcsee if there is any scratch, welding or unclean piece which could affect its operation.

Then he checks the dowel sleeve of the vehicle to parts. Finally, he finishes steps to make sure the oil guisher and triangle wood are complete: the light, hillside of the park, on which Li and his team worked, horn and safety belt are normal; the brake, gear and was named after him. operating valve are flexible and the pressure gauges are within the required range.

"I take good care of the body of the machine with love to make it well protected. We treat the

Over the past few years. Chen repeated such work "I only received a technical school education. The every day and never let his guard down. From an ordinary front-line worker to a key technician in the work area, his career path has been much quicker than the average, thanks to his cultivation of good behavior and

"I come from the countryside, a less-developed crushed me, but fostered my dignity." Chen said.

"After I got the job at the Mining Area III. I met professional tutors and a group of concerned colleagues, which is fortunate. I believe learning is a lifelong thing and people should never stop in the path of pursuing higher goals.

RETIREE PLANTS TREES TO TRANSFORM COMMUNITY

By YIN RUOWEI yinruowei@chinadaily.com.cn

Li Hongqi, 87, is not called the "grandfather of the trees" for nothing. He has been planting trees for Jinchang since he retired from Jinchuan Group in positions he took up in Jinchuan. 1996. Some of the area he toiled in has been named after him.

Li, who was originally from Shandong province, is a straightforward person with a booming voice. "I came margin, our company had invested 4.7 million yuan here in 1960 and was in charge of the canteen," Li said. "Despite harsh conditions in the early 1960s, I stayed charge of," Bai said. positive. I believed that one day Jinchuan will get bet-

ter and the country will get better." In 1996, when Li retired and moved to the No 6 rising labor costs. It was a successful transformation." residential district belonging to Jinchuan, he found the area strewn with garbage and quickly made a write computer codes and obtain related certificates. decision. "I wanted to plant trees on the 117 square meters of land," Li said. "I bought pickaxes and shovels, borrowed trucks and encouraged my family to help safety engineer, you will get 20,000 yuan in rewards years of study and practice, he is proficient in run-me. We dug out seven ponds and 84 dumper trucks of and a subsidy of 300-500 yuan per month as long as waste rocks were cleared out. In the following year, I you work as a safety engineer," Bai said. planted seven willow trees."

> neighbors joined him in the efforts. "The environment inside the district was improved, but the waste innovation is a good and reachable thing." treatment plant nearby became a headache," Li said. "On rainy or windy days, garbage would fly through the sky."

than 6,000 trees and 20,000 sq m of flowers. That idea with his team. After working around the clock known as the "grandfather of the trees".

mine area at the back of the district. "It was possible to mining area, Chen has adequate skills and energy transform this land into a park. Luckily, the mayor of used to be the guardian of the machines, but now we to run the machinery. The suffocating heat wave, Jinchang city took my advice," Li said. "After 40 years know how to program and fix them," Bai said. accompanied by the roar of the engine, constantly of weathering, the mine lands were suitable for the

> land, which made it hard to dig a ditch. I found a employee". In 2018, his project on improving the funchelper and paid him all my monthly wages of 1,100 yuan (about \$160 today)."

with Li to build the park. "It was harder than raising a special prize of technical innovation project of

In 2002, Jinchuan invited a Japanese chemical scraper, he checks the situation of the vehicle to elm and mulberry, on the slag and rocks. In total, tion of new infrastructure projects, which are cor-740,000 trees were planted and covered an area of 1 square kilometer.

> Standing at the foot of Longshou Mountain, the Jinchuan National Mine Park.

According to Jinchuan Group, the forest on the sense of accomplishment Jinchuan gives to me."

"I used to live in a burrow with no electricity, but now everything has changed. I am now living well and

times are good," Li said. "My advice to the young generations is listening to

words of wise men and working hard."

FRONT-LINE WORKER SEIZES NEW **OPPORTUNITIES**

By YIN RUOWEI

When Bai Xiang got a job as a worker at the Nickel Smelter of Jinchuan Group, he never thought he could lead an automation workshop in such a big nonferrous metal producer.

Bai, 39, said he majored in network engineering in college, which had no connection with the first two

"But in 2014. I noticed there were changes happening inside our company. At that time, despite the nonferrous metal industry's slowdown and low profit (\$679,211) into the automation project I am now in

"Jinchuan has shown great foresight in doing so, especially now that the COVID-19 pandemic led to

In 2015, employees like Bai were encouraged to "Our company offers those with certificates material rewards. For example, if you get the certification of

"Innovation was an unreachable and high-end When these willow trees sprouted in 2000, Li's thing to me, However, after I wrote some codes for the robots used in our workshop and got rewards, I found

The most memorable day for Bai was on Aug 26, 2016, when his automation workshop officially started operating. To fix defects, Bai read many books and one's working efficiency in the machine, Chen's To solve that problem, Li led his team to plant more data he found online, and he discussed each new

"The operation of our automation workshop means In 2004, Li turned his attention to an abandoned that we have transformed ourselves from blue-collar workers into technicians working on the front line. We

Bai has won a number of titles, such as advanced producer of Jinchuan Group; outstanding innova-"There were so many rocks throughout the mine tion expert; and "the most beautiful Jinchuan young tions of an automated robot arm for nickel electrolysis starter sheets won a first prize of the 12th provincial A total of 10,000 retirees of Jinchuan joined forces technological innovation achievement awards and Jinchuan Group.

related with our projects. I am glad to be a part of it."

"Jinchang is a small city and people here are living a very simple life. I have been to Chengdu, Sichuan an electrochemical sensor that can withstand such see whether there is any oil leakage or unfastened park became a local landmark and was later named province, and Beijing to find purpose in life. But I ended up working here as an engineer because of the

PURSUIT OF PERFECTION DEFINES EXPERT'S CAREER

By LIANG KAIYAN

"Skills are

fundamental to

every front-line

factory worker.

Our country is

promoting

high-quality

development. Thus,

factory workers like

us should work to

contribute to the

country's

manufacturing

No matter how

advanced a

technology is, it

requires front-line

workers to carry

forward a

craftsman's spirit."

Pan Congming,

squad leader of the metal

refining group at Jinchuan

Group Copper Co

Congming's. It has taken him nearly 30 years to "Our resources cannot be taken away," Pan said. By compiling books and documents with more than

waste residue. His expert technique has helped to everywhere and at every moment." Pan said. He more than 1.2 billion vuan (\$172 million). produce a final metal product with a purity of 99.99 credited his achievements to the group's support.

of my work and practice. It was not achieved over- new employees in Jinchuan," he said. night," Pan said.

"Skills are fundamental to every front-line fac- students. tory worker. Our country is promoting high-quality development. Thus, factory workers like us should work to contribute to the country's manufacturing No matter how advanced a technology is, it require front-line workers to carry forward a craftsman's

account for 0.39 percent of the world's total, with of intern or practical reports every month," he said. Practice makes perfect is a strong belief of Pan 90 percent of them extracted from slag. In recent years, Pan has devoted himself to

Jinchuan Group Copper Co, has been delving into nickel smelting. He also developed a technology to talent cultivation. the smelting and purification of precious metals extract platinum, palladium, rhodium and iridium "Practice without a theoretical basis is unsustainthrough front-line work and books. metals from the anode material of nickel. able," Pan said.

For years, he developed a series of skills such as Pan was honored as a national skilled master and To date, he has engaged in nine scientific and By observing the change in colors, Pan is able to Technological Progress Award.

"Now I not only want to improve myself, I want

"This result is partially based on the calculations to pass on my skills and knowledge to students and Over the past three years, Pan has tutored more

Finding problems in practice and fixing them are than 100 students, who range from college graduessential to every skilled worker, he added. ates, postgraduates and PhDs to vocational school

China's precious metal resource reserves only "I ask every student to hand in at least 20 pages

chase his dream to shine in the precious metals persevering in honing his skills and expertise, he has 300,000 words. He has also summarized more developed a technique for extracting more than eight than 600 technological results, as part of efforts Pan, squad leader of the metal refining group at rare and precious metals from the slag of copper and to develop the precious metals industry and boost

telling the purity of a metallic solution through its is the first factory worker representative in North-research projects at national and provincial levels. change in color during refinement. west China to win a prize at the State Scientific and On top of this, he has completed 218 innovation projects and secured 30 authorized patents. Pan has figure out the contents of different materials and "It is Jinchuan's sound innovation atmosphere, also published 19 scientific research papers. All of then adopt appropriate technology to recycle the which encourages everyone to blaze new trails these contribute to the group's economic profits of

> 李洪启 Li Hongo

SHINING ROLE MODELS

杨秉松

Yang Bingsong

From front-line factory workers to scientific researchers, managers to chief executives, the people of Jinchuan Group, a nonferrous metal producer in Jinchang, Gansu province, have taken decades to climb up the mountain of nonferrous metal manufacturing to reach their "golden peak". Everyone in the group is devoted to their work, ranging from seeking to improve metal production methods, and conquering technological difficulties to embarking on reform of the business. Over the past 10 years, Jinchuan has made notable

王永前

Wang Yongqian

Pan Congming

"It is the firm belief" and aspiration tha brings all Jinchuar people together. This is Jinchuan culture. the most cherished treasure and strongest spiritual power of us." Wang Yongqian,

chairman of Jinchuan Group

SPIRIT OF INNOVATION AND RESOLVE CONTRIBUTE TO SUCCESS OF JINCHUAN

By LIANG KAIYAN

commitment by generations of people to support ment. the country's development in the nonferrous indus-In 2000, Wang was promoted to the head of key sectors centering on management innovation," try, said Wang Yongqian, chairman of Jinchuan Jinchuan's Mining Area II, which covers an area of Wang said.

In the 1950s and 1960s, China faced a severe short- in the group. age of nickel and cobalt resources. Founding mem- "When I first came to the Mining Area II, the area Since 2017, Jinchuan has maintained robust bers of Jinchuan then endeavored to explore these maintained a competitive production capability. growth in its operations. During the 13th Five-Year metals' manufacturing techniques and equipment. But the production took place while infrastructure Plan period (2016-20), the average annual growth After decades of painstaking efforts, they helped was under construction, and this brought a chal- rate of Jinchuan's operating revenue was 6.3 perto change the country's reliance on imports of nickel, lenge to management," Wang said. cent. Meanwhile, the rate of industrial output value

cobalt industry," Wang said. "It is the firm belief and aspiration that brings all trains in the mine pit. Jinchuan people together. This is Jinchuan culture, Playing a major role in Jinchuan, the area has cessful business. Without deepened reform and the most cherished treasure and strongest spiritual taken advantage of technology to upgrade its being driven by innovation, there would be no power of us."

Having joined Jinchuan in 1991, the executive, sic motivation, compelled decision-makers to rack a master's graduate in mining engineering, served their brains for the business' further development. Jinchuan's success comes from an unswerving as technical support for the group's mining depart-

5.56 million square meters and is the largest one The chairman and his team proved their mettle

"Jinchuan created a miracle in China's nickel and over the past 20 years," he said, recalling that belts 61.41 percent. adopted to transport ores had been replaced by "Looking back over the past 10 years, I feel deeply

> underground mining facilities and ease physical Jinchuan today," he said. labor in recent years. Now, the mining area has Everyone takes a role in the group, the chairman achieved progress in intelligent manufacturing noted, explaining that corporate executives should deployed, according to Wang.

tinued his position in the group as the general "Jinchuan advocates motivating employees with manager in 2011.

experienced a fluctuation caused by the global Wang added. tional losses in those years.

"Our business operation was in its severest dilemma "Jinchuan is obliged to support the city's con-Numerous difficulties, such as unimproved insti- said. tutions for market operation and the lack of intrin- Joining hands with the local government, the

ince's working guidelines, embarking on reforms of

in weathering the storm.

cobalt and precious metals by the late 1970s. "The mining area has witnessed great changes was 14.23 percent and the rate of profit stood at

that only reform and innovation can lead to a suc-

with a slew of unmanned equipment for mining offer development strategies, middle managers are supposed to use their expertise to lead teams and After engaging in front-line work, Wang con- grassroots workers are expected to be practitioners culture and then working together to create value Between 2013-16, the nonferrous metal market This is key for the group to get the upper hand,"

financial crisis. Prices of main products dropped As a native to Jinchang, a city that was built dramatically and the group was subjected to opera- because of Jinchuan Group, the executive keeps giving back with his hometown in mind.

ever since the establishment of Jinchuan," Wang said. struction and socioeconomic development," Wang

group has made efforts in sectors including industrial chain development, industrial coordination promotion, volunteer services, common wealth and pandemic prevention and control.

"This is the mission and responsibility tha Jinchuan, as a State-owned business, should undertake," Wang added.

progress thanks to its people's hard work. We have profiled some of the most distinctive individuals occupying various positions across Jinchuan. By documenting their daily work, we reveal their contributions to the group and even the country's nonferrous metal industry. They come from different backgrounds but have worked together to strive for greater achievements in the nonferrous metal sector for Jinchuan and the country, regardless of race, gender, nationality or age, showing us the strong spirit that role models have.

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"In Kinsenda we work in a multicultural environment. I is enjoyable to work with Chinese people. They are full of enthusiasm for work and life. They are happy to share their work experience. We can get along well and make improvements together." Grace Musas, an employee of Kinsenda Copper Company



By LI YOU

Grace Musas, an employee of Kinsenda Copper Company, has found there is a real paradigm of cooperation in an enterprise run by a Chinese firm in the Democratic Republic of the Congo.

Since 2017, the 32-year-old has been working as the deputy head of its finance department. She has not only received a competitive salary but has also greatly improved her abilities under the guidance of the company's leaders and her colleagues.

Owned by the Jinchuan Group, Kinsenda fully respects the professional opinions of its staff members, providing a stage for them to display their abilities and pursue their careers. The company is also committed to providing each of its local employees with an annual wage increase.

"I gave birth to a child last year. In order to take good care of the child, the company provided me with a free apartment on the work site," she said.

Due to differences in language, culture and the institutional environment, Chinese companies operating in the DR Congo encounter problems in taxation, loans and labor given their unfamiliarity with local policies. In dealing with such problems, the staff members will carefully study the relevant policies and regulations from the perspective of enterprises and give solutions to the management group.

Free medical benefits, maize flour, tuition fees and holiday welfare are provided for Kinsenda's employees. The company also gives an extra month's bonus every year and quarterly awards.

The free training provided by the company is an important reason for the growth of workers' business capabilities in Kinsenda. The training provided by the company includes online and offline courses at home and abroad, business conferences and lectures by wellknown experts in the industry.

"In Kinsenda, we work in a multicultural environment. It is enjoyable to work with Chinese people. They are full of enthusiasm for work and life. They are happy to share their work experience. We can get along well and make improvements together.

"I have learned a large number of working methods in my daily work and understand the views of Chinese people on work. Therefore, I am happy to attend some training in China to learn more about my working partners," she said.

Kinsenda is a subsidiary of the Jinchuan Group, a well-known mining company headquartered in China. The management team of Kinsenda is a capable, efficient and pragmatic work team composed of people rom China, South Africa and the DR Congo. It is a edium-sized mining company that has provided 1,533 jobs for people in the area, which plays a positive role in community development in the DR Congo.

杨艳

ILLUSTRATIONS BY LI XIAOTIAN / CHINA DAILY

ENGINEER BACK IN OFFICE TO FULFILL HER LIFE'S 'MISSION

By LIANG KAIYAN

Rather than sit back and enjoy her retired life, Yang Yan chose to return to her office to fulfill her "mission". Yang, a senior engineer at Jinchuan Nickel Cobalt Research and Design Institute, should have hung up her spikes in March, but the 55-year-old accepted

being rehired after her earlier retirement. "Alloys that we produce are applied in specific industries such as aviation, nuclear and solar fields. We are entrusted with the duty and mission of serving the needs of these special fields. I want to continue our scientific projects by coming back," Yang said.

Joining Jinchuan in 1989 after graduating from the University of Science and Technology Beijing with a major in metallurgy, Yang has participated in work involving the development of metal materials, metallurgy process research and project design and planning over the past three decades.

Dedicated to scientific work, Yang has taken a leading role in Jinchuan's new nonferrous metal product development and resource utilization.

In 2016, Jinchuan decided to invest in the WP & RKA laterite nickel mine project in Indonesia. However, the group was confronted with its inexperience in conducting feasibility research and a preliminary design for such a project. Yang was then asked to help to solve the pressing needs of the project.

"That was Jinchuan's first overseas collaboration adopted the rotary kiln-electric furnace for smelting ferronickel, so we had to look up relevant studies, consult others and even conduct tour inspections with our counterparts," Yang said.

Concentrations of water, nickel and iron in ores are vital in designing the project, as these are essential with samples for further assessment and field tests." in material balance calculations. If one condition changes, the calculation and analysis work had to start all over again, according to Yang.

Under these pressures, Yang and her colleagues, a team of three, worked day and night on the project

"I was assigned to have 15-day training in the United States during my work on the project," Yang said. Despite the time difference, Yang was busy with daily classes being held in the US while working with the domestic team to ensure the smooth progress of the project.

"It was extremely exhausting during that period," she said. After almost six months of effort, they completed

the challenge to hand in the project's design scheme, contributing to Jinchuan's first step in the laterite nickel business.

Doing something new without enough experience ments to technological innovation. in Jinchuan happer tion. She is in charge of the research and development of high-temperature alloys.

"It is Jinchuan's convention to get over technological difficulties through cooperation with universities and colleges," she said.

Before 2014, there were no high-temperature alloys in Jinchuan. Now the group has developed its product portfolio of cast, powder metallurgy and wrought superalloys, which are essential materials in the aviation, military and other sectors.

"We have grown out of nothing, and now our high-temperature alloy business is taking shape," Yang said.

WOMAN AIDS **BUSINESS IN** BECOMING SELF-RELIANT

By ZHANG LINWAN zhanglinwan@chinadaily.com.cn

More than 15 years ago, when Zhang Jing was a researcher at a metal chemistry lab of Jinchuan Group, she realized self-developed core technologies are what underpins a business' sustainable development.

"We will be involved in endless price wars if manufacturing just conventional products. Only unique technologies and distinctive products can make us stand out in the industry," said Zhang, who is the current deputy general manager of the Lanzhou Jinchuan Technology Park, a subsidiary of Jinchuar Group.

Zhang then resolved to focus on products that can substitute imported ones.

In 2008, the Switzerland-headquartered Metalor had almost monopolized the domestic market of palladium plating solution, which is generally used in electroplating connectors of electronic products. With the price of imports escalating, connector

manufacturers expressed an urgent need for homegrown counterparts. Zhang therefore pitched into extensive research and

experiments to achieve technological breakthroughs. "We made progress in improving purification tech niques after repeated attempts and managed to make palladium content as high as that of imported goods Zhang said.

One year later, their self-developed solutions started mass production and entered the market.

Zhang added that except for the research and deve opment, the hardest part was to earn recognition and project in terms of ferronickel. Our group has never trust from customers who became accustomed to the imported products.

> "Our strategy was to show an evaluation report which was published by a third-party agency and suggested that our products were comparable t imports," she said. "Based on that, we provided them

As a result, Jinchuan broke the monopoly of foreign suppliers in palladium plating solutions. It became one of China's largest manufacturers in the early 2010s, capturing roughly 30 percent of the domestic market

In addition to the solution, Zhang and her team have developed a batch of products that are on a par with imported counterparts applied in industries such as electronics, autos and medicine.

Last year, Jinchuan Precious Metal Material, an enterprise whose predecessor is the metal chemistry lab, registered an annual revenue of 1.3 billion yuan (\$188 million). This marked a sharp jump from about 14.8 million yuan in 2013 when the company was founded, according to data from Jinchuan.

Meanwhile, the company has established a close partnership with industry giants from home and abroad including Huawei, Apple and Samsung. Zhang attributed most of the remarkable achieve

Not just for the company innovation is the major driver behind the rapid growth of the group and even

the whole industry, she said. So far, the technology park has cultivated four

major industries of battery materials, precious metals, semiconductors and silver-related materials. Zhang and her team have also received many

honors for their contributions to the industry Committed to innovation, her team is now work

ing on a special silver powder that is used in solar cells. Currently, the industry is heavily reliant or imports, Zhang said. "We have made great advances in research and

development and aim to become one of China's leading suppliers in the near future," she said.

"Alloys that we produce are applied in specific industries such as aviation, nuclear and solar fields. We are entrusted with the duty and mission of serving the needs of these special fields. want to continue our scientific projects by coming back."

Yang Yan, a senior engineer at Jinchuan Nickel Cobalt Research and Design Institute