STAINLESS STEEL

INDIA & MIDDLE EAST

Insider's guide for the CRA industry in India, Azerbaijan, Bahrain, Bangladesh, Egypt, Iran, Iraq, Israel, Jordan, Kazakhstan, Kuwait, Oman, Qatar, Philippines, Saudi Arabia, Sri Lanka, Turkey, UAE

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BPCL PLANS ETHANOL PLANT IN TELANGANA

SPOTLIGHT ON:

Quality, experience and reliability are drivers for Ratnadeep's long-term success

At Ratnadeep, the company's directors have always taken a positive, forward-thinking approach to business, showing determination to make all necessary investments that will support future ambitions, develop new markets and realize sales opportunities. Hearing how Ratnadeep has recently increased production capacity for both stainless steel and carbon steel tubes and pipes, SSWIME therefore decided to contact company directors Mr. Timir Jain and Mr. Jaimik B. Sanghavi to inquire about Ratnadeep's strategy for the future.



NEWS

IIT-BHU-INVENTS NICKEL-FREE SURGICAL SS

Scientists at the Indian Institute of Technology (Banaras Hindu University) have succeeded in making nickel-free surgical grade stainless steel. This metal is cheaper and much safer than stainless steel containing titanium, cobalt-chromium, and 'nickel' metals. *Read more on page 2*.

ODISHA GOVT. APPROVES 5 INVESTMENT PROPOSALS

The High-Level Clearance Authority (HLCA) of the Odisha Government, chaired by Chief Minister Naveen Patnaik, approved five major investment proposals to the tune of Rs 1.46 lakh crore in metal and metal downstream sectors, the Chief Minister's Office said. *Read more on page 2*.

CONTRACT AWARD FOR SOUTH GHAWAR LNG PROJECT

Frames, Netherland announced that it has been awarded a contract to supply with dehydration and water treatment packages for production of natural gas by Saudi Aramco unconventional Gas Program in South Ghawar. *Read more on page* 6. Bharat Petroleum Corporation Ltd (BPCL) has evinced interest in setting up a first-generation ethanol production plant in Telangana, at an investment of Rs 1,000 crore.

A high-powered team of the public sector company called on Telangana's Principal Secretary, Industries & Commerce, Jayesh Ranjan to express interest in setting up the plant with a capacity of 5 lakh litres per day. This meeting came after the Central government announced a favorable policy to increase ethanol production in the country. The BPCL team was led by its Executive Director, Bio Fuels, Anurag Saraogi,

and included ED, Engineering and Products, L.R. Jain, and Project Leader, KHPL Project, B. Manohar.

Saraogi pointed out that Telangana is ethanol deficient as on date, considering 10% blending requirements in motor spirit. In view of 20% blending targets by 2025-26 as per the road map document released by Niti Aayog and the Petroleum and Natural Gas Ministry in June 2021, the BPCL is planning to set up a 500 KLD capacity grain-based first-generation ethanol plant. This will not only facilitate the production of first-generation ethanol and contribute revenue to the state, but will also gen-



erate huge direct and indirect employment in the state. This project will also go a long way in reducing air pollution. The delegation told the of-

The delegation told the official that for setting up the project, they need about 100 acres of land having proximity to the source of water as the plant requires about 4,000 KL a day of water for its regular operations.

TITANIUM

Titanium- the finicky superalloy

Anyone who has ever machined the superalloy titanium knows that it can be a real diva, requiring special care and attention. Chips that won't break, heat that won't dissipate, and built-up edges are some of the common ways in which titanium puts up a fight during machining. However, titanium's remarkable properties make it a favorite in aviation, motorsport, and medical technology, so it is worth learning how to machine it properly. You never know when a renowned sports car manufacturer will need to place an order for titanium screws.

By Thomas Bach, ARNO Application Technology

Whether or not the chemist Martin Heinrich Klapproth named the titanium element after the deities from Greek mythology because of its god-like properties is unclear. But the fact is that its properties make it a superalloy. Extremely tension-proof, very light, and outstandingly resistant to corrosion, titanium offers something other materials and alloys don't. Titanium is antimagnetic, biocompatible, and resistant to even the most aggressive media. This expensive material is becoming popular in more fields and applications. It's no secret to the engineers at Bugatti, who use many titanium parts in their work.

Titanium is expensive – avoid waste

Machining titanium is an investment, as it costs about three to five times more than tool steel. So logically, you want to avoid waste. The careful selection of a suitable cutting tool is only the first step. Manufacturing precision turned parts made of titanium, which are frequently needed in aviation and spaceflight, the chemical industry, vehicle construction, and medical technology, requires tools that are suited to machining this particular material, allowing for the most stubborn titanium alloys to be machined as needed.

But this diva of the materials world can do a number on your cutting tools due to:

- High heat resistance
- Chips not breaking
- Titanium's distinct tendency to stick to cutting tools
- A low elastic modulus (Ti6Al4V = 110 kN/mm², steel Ck45 = 210 kN/mm²)

Since only a privileged few manufacture titanium screws for the 1500-HP Bugatti Chiron super sports car, let's instead take a look at the manufacture of a threaded and grooved shaft made of the standard titanium alloy Ti6Al4V Grade 5/23, as is frequently used in medical technology. With a tensile strength of Rm = 990 N/mm², yield strength of Re = 880 N/mm², a hardness of between 330 and 380 on the Vickers hardness scale, and elongation at fracture A5d of approximately 18%, this titanium alloy is typically used for medical implants as well as aviation applications (3.7164) and industrial applications (3.7165). With six percent aluminum and four percent vanadium, and extra-low interstitial elements (ELIs), this

alloy is highly biocompatible, inducing virtually no known allergic reactions.

Evacuate heat from the cutting zone

This requires a high-quality surface finish, reliable process safety, and controlled chip removal, all while keeping process times short despite potentially high rates of chip removal. You might assume that most of the heat generated in the turning process is evacuated via the chips, but this isn't so. Since titanium is a poor thermal conductor, the heat cannot be alleviated from the cutting zone via the chips. And at temperatures of 1200°C and higher in the cutting zone, the cutting tool can quickly sustain heatrelated damage. The easiest things you can do to prevent too much heat from building up are to feed coolant directly to the cutting zone, reduce the cutting force by using a sharp cutting edge, and adjust the cutting speed to suit the process at hand.

Choose the right tools to increase service life

Real improvements are made by selecting the correct cutting tool. Since the heat must be evacuated via the cutting edge and the coolant, not via the chips, as is the case with steel, a small portion of the cutting edge must withstand extremely high thermal and mechanical stress. The cutting pressure is reduced by using ground, high-positive



∧ The superalloy titanium is extremely tension-proof, very light and outstandingly resistant to corrosion.

chuck and pose a hazard to the machine or your safety. It could help to change the direction of rotation and turn the cutting edge around if the machine's design allows it. If the cutting edge is pointing downward, chips will fall freely to the ground and no longer pose a danger. However, when working with

Since titanium is a poor thermal conductor, the heat cannot be evacuated from the cutting zone via the chips

indexable inserts with polished flutes, if necessary, with the appropriate coating, minimizing friction in the chip removal process. These three parameters help prevent heat from being produced in machining. If only a little bit of the heat is reduced further through optimal coolant flow, the cutting edge will have a longer service life. Or the cutting speed (Vc) can be increased again to improve productivity.

So far, so good. But since this diva's chips don't like to break, you may face other difficulties. An endless chip could wind itself around the workpiece, your tool, or the machine demanding roughing applications and lessthan-stable machinery, you will have to check whether the cutting action allows the chips to be directed towards the machine bed. Once the chips have left the work zone, they can no longer disrupt the process.

Find a tool manufacturer that offers advice and process support

If you want to make sure that you choose the right tool for titanium machining, turn

to a manufacturer. Some go above and beyond, offering advice based on specific application experience in addition to supplying the cutting tool itself. An experienced tool manufacturer will be able to recommend and provide high-positive indexable inserts that are sharp enough to keep cutting force to a minimum, whilst optional rounded edges can ensure excellent stability. Expedient high-tech coatings can ensure indexable inserts are well-equipped against the poor thermal conductivity of this tricky material. Negative indexable inserts with certain geometries can be affordable, reliable solution for more basic machining and roughing. Further, do ask your tool manufacturer about positive indexable inserts with geometries that are ideal for machining superalloys and check these inserts are highly resistant to notch wear and heat when machining tough material. Unique geometries can ensure exceptional chip control and process safety. Dedicated titanium machining experts appreciate the value of being well prepared. After all, you never know when you're going to get that call from a Bugatti engineer.





∧ An endless chip could wind itself around the workpiece, tool, or machine chuck and can pose a hazard to the machine or your safety. It can help to change the direction of rotation and the approach angle of cut.

 Since chips do not break in titanium machining, choosing the right tool for threading is essential. Founded by Emil Arnold in 1941 and rooted in tradition, innovative tool manufacturer ARNO Werkzeuge Karl-Arnold GmbH is now under the leadership of the third generation of owners. A high production depth, in-house developmental expertise, and global sales structures pave the way for the manufacture of cuttingedge, high-performance tools used for efficient machining applications worldwide - from turning and Swisstype machining to grooving, drilling, and milling. ARNO provides the largest selection of precision-ground high-positive indexable inserts for demanding manufacturing tasks.