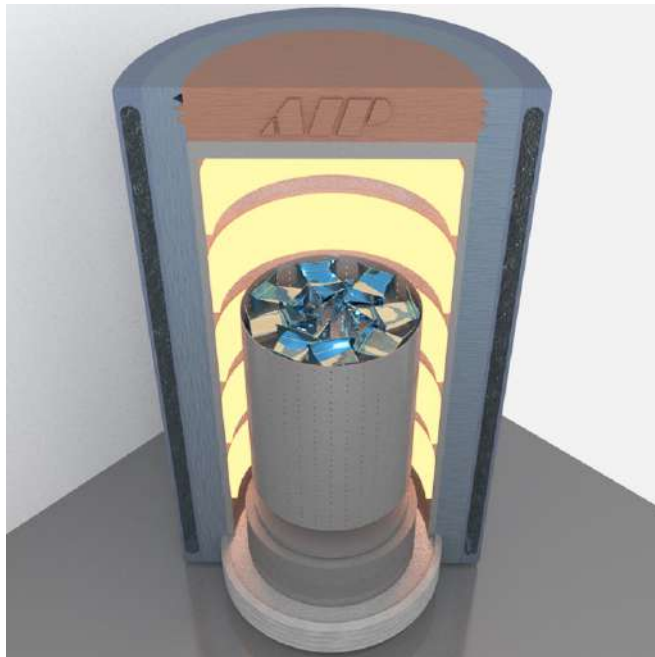




ISOSTATIC TOLL SERVICES BILBAO



This document provides the general description of the recently opened plant for toll HIP services in Bilbao, Spain

# HOT ISOSTATIC PRESSING SERVICES

Bilbao, Spain



ISOSTATIC TOLL SERVICES BILBAO

## OFFICIAL OPENING of ISOSTATIC TOLL SERVICES Bilbao SL

Bilbao, January 29th 2020

Dear Sirs,

We are pleased to submit a brief description of Isostatic Toll Services Bilbao SL.

ITS Bilbao ("Isostatic Toll Services Bilbao SL") was founded in Autumn 2018 and the first operational production cycle was performed in October 2019.

It is the most modern and capable HIP factory in Southern Europe.

ITS Bilbao will support and help boost high-tech Aviation and Medical implant manufacturing Industry in the region.

Sincerely yours.

---

Fernando del Val  
Plant Manager



ISOSTATIC TOLL SERVICES BILBAO

## INDEX

- 1) What is HIP
- 2) Applications
- 3) Investors
- 4) Technology Transfer
- 5) Plant description
- 6) Work Force
- 7) AIP Competence Center Europe
- 8) Location
- 9) Investments
- 10) Quality and Approval
- 11) Official Opening Ceremony details

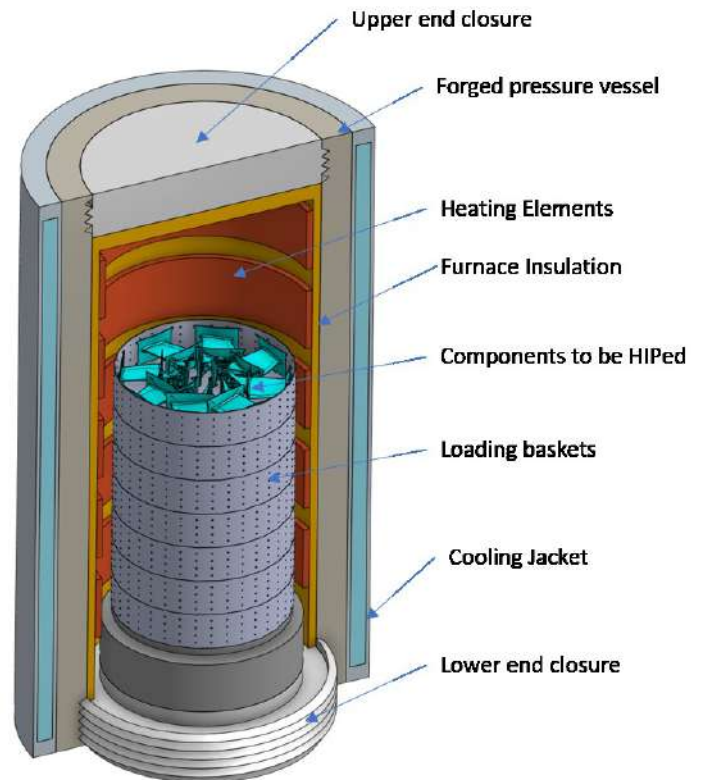
## 1) WHAT IS HIPing (Hot Isostatic Pressing)

Hot Isostatic Pressing (HIPing) is a technology that had its genesis in Columbus Ohio, USA where it was developed for the fabrication of Nuclear fuel for US Navy and still used for this purpose 60 years later.

From those early days to the present to the modern-day equipment where the process is synonymous with the manufacture of high performance and high material and components.

The Hot Isostatic Press (HIP) consists of a water-cooled pressure vessel with an internal electrically heated furnace. Argon gas is compressed into the pressure vessel whilst the furnace is heated. Components inside the HIP are subjected to combined temperature (300-2200 °C) and pressure (50-200 MPa). Under these conditions and the gas behaves as a supercritical fluid and the component/materials can be effectively squeezed under isostatic compression whilst still maintaining their original geometry. This results in HIPing being able to significantly improve the mechanical properties of the parts, it does so by healing internal voids in thus eliminating defects. It can also be used to consolidate encapsulated metal and ceramic powders.

Moreover, through HIPing, as per the original invention, dissimilar materials can be bonded together to manufacture unique, value added components. For example, having a hard-wearing material



***Cross sectional view of Loaded HIP system***

bonded onto a base material having greater ductility or higher thermal conductivity or lower cost.

In summary the main applications of HIPing are:

- Pore/defect elimination of solids
- Consolidation of powder
- Diffusion bonding of dissimilar materials.

The mechanisms by which this is achieved is through plastic deformation, creep and diffusion.

## 2) APPLICATIONS

It is with the need for higher performance and defect free for critical applications that there is a growing usage of HIPing on large production scale, as a consequence of extensive and still growing usage of Titanium, Nickel and CoCr alloys in key applications such as aerospace, orthopedic implants, and defense applications.

The **Aerospace industry** pushes towards the production of aircraft with reduced operating costs through an extended service life, better fuel efficiency, and increased payload and flight range. In this regard there is an increasing demand of new materials and/or materials with improved characteristics to reduce the weight of mechanical components and improve their high temperature performance in an effort to decrease fuel consumption.

Independent of the production method used for these components, they are safety critical and need to be defect free as lives depend on their integrity. The HIPing process helps to minimize or eliminate internal defects that could otherwise grow under high cyclic loads that lead to catastrophic failure.



The **Orthopedic Industry**, implant market has witnessed a meteoric rise over the past few years, mainly due to the rising number of replacement surgeries like hip, knee, shoulder, and other joints or bones. The increased incidences of orthopedic diseases and injuries and the rapid growth in the aging population are some of the growth stimulants of the orthopedic implants market. The world population of over 60 years is anticipated to at least double from 12% to 24% from 2015 to 2050. And ironically with a more; sports active younger generation and professional athletes. The number of people requiring some form of implant will be in the order of 1 in 4. In the USA alone, 1.2 million football players are anticipated to be requiring orthopedic implants. Additional to this 53 million people in the USA will suffer from osteoporosis. Similar trends can be seen in Europe and the rest of the world.

Implants demand apparently contradictory qualities such as stiffness yet have impact resistant, high fatigue life and ideally lightness. Apart from these mechanical properties, the



ISOSTATIC TOLL SERVICES BILBAO

material must also be biologically compatible. The most commonly implanted metals used in orthopedic implants are cobalt/chrome, stainless steel, and titanium alloys, more specialized implants use Zirconium or ceramics. Alloys, by definition, contain small amounts of other elements. Some of these minor elements such as nickel show hypersensitivity in some patients. In those cases, Titanium alloys are the preferred choice for its bio-compatibility.



The presence of a dependable and accessible HIPing capability is crucial for any Industrial District wanting to be successful in the manufacturing of these high-tech components and assemblies.



Again, whether the parts are made via Precision Casting, Metal Injection Molding, Additive Manufacturing such as 3D printing, they still need to go through a HIPing process to eliminate defects to enable the component to realize its full potential of the mechanical properties without early failure which would cause further trauma to the patient.





ISOSTATIC TOLL SERVICES BILBAO

### 3) INVESTORS

Isostatic Toll Services Bilbao SL (ITS Bilbao) is an entrepreneurial initiative of 5 individuals of 4 different nationalities = USA, Italy, Belgium and Australia, each with a strong current operational activity in related businesses: forging, toll HIP facility, HIP unit design and assembly, advanced materials production.

The European Holding, ITS Europe SA, is located in Luxembourg and will solely control the Bilbao operations.

### 4) KNOW HOW

ITS Bilbao is the sister company of 3 similar HIP Toll Center in USA, already approved by NADCAP and from relevant jet engines manufactures.

The operation competence is a direct fertilization from the American Toll Services Centers, while the technology is provided by AIP Inc, supplier of the HIP units, also shareholder in ITS Bilbao.

As such, AIP is currently the only player in the Western World with relevant direct operation activities both in Fabrication and Operations of HIP units.





ISOSTATIC TOLL SERVICES BILBAO

## 5) TECHNOLOGY TRANSFER

Isostatic Toll Services Bilbao SL will benefit from the competence transferred by 3 relevant shareholders;

ITS Inc, AIP Inc. and AMEPT LLC.



ITS Inc, founded by the owner of AIP Inc, has 3 Toll HIPing facilities in US, representing the only case in the Western world of combined competence in design and operations of Hot Isostatic Presses.



is approved vendor for MTU and Rolls Royce engines, and has all the relevant approvals such as ISO 9000, 14000, 18000, AS9100, Nadcap.

ITS Bilbao has inherited from its shareholders all the best business practices, such as operational and safety procedures, quality manual and instructions, maintenance structures.

ITS Bilbao personnel is trained on the process parameters to execute correct HIPing cycles for any relevant material. Consultants from ITS Inc Mississippi are currently resident in Bilbao to train the Bilbao Personnel.

Specific training on the job were conducted in US for keys ITS Bilbao employees.

**AMEPT LLC** is team of Materials Engineers focused on: powder metallurgy and ceramics, high temperature materials for extreme environments, and nuclear waste treatment via the HIP process.



*Vulloy™, patented material, testing at extreme conditions 3,125°C flame temperature. Materials being developed for Hyper-Sonic applications*





ISOSTATIC TOLL SERVICES BILBAO

## 6) PLANT DESCRIPTION

Isostatic Toll Services Bilbao SL is erected in a dedicated new facility in Abanto Zierbena municipality in Biskaia. The plant will soon be equipped with 2 identical AIP-52 units. Unit No. 1 is already fully operational, and the unit No. 2 will be installed by December 2020. Each unit consists of a water cooled monolithic forging of steel, integrated with molybdenum furnaces, vacuum pumps, compressors, and other high-tech accessory equipment, with full redundancy of the critical components.

The redundancy is aiming to ensure Customers a Service Level of 95% availability of each year.



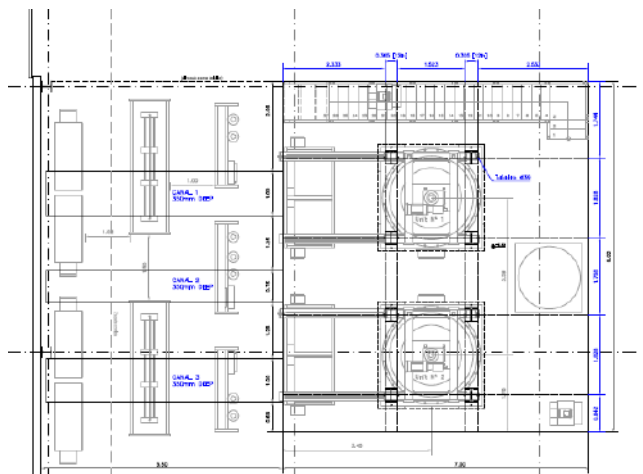
The hot zone of  $\varnothing 1117 \times 2539$  mm will be the largest available in southern Europe, capable to host large items such as engine blades, big vanes, integral rings.





ISOSTATIC TOLL SERVICES BILBAO

Software and controlling system are provided by AIP operating on proprietary software to ensure full compliance with customer requirements



The current level of investment is **9.000.000** Euro. It will reach 14.000.000 Euro when unit No. 2 will be installed.





ISOSTATIC TOLL SERVICES BILBAO

## 7) AIP COMPETENCE CENTER EUROPE

Leveraging the ITS Bilbao staff AIP Ohio will support the creation in Bilbao of an AIP Competence Center.



In synergies with AIP Inc, the AIP European Competence Center will serve the EMEA region for installation, commissioning, maintenance, inspection, tendered repairs, upgrade and surveillance of AIP presses and systems.



#### 8) WORKFORCE

The normal working hours of ITS Bilbao will be 24/24 for 7/7, 50 weeks per year.

The floor workers will be organized in 3 shifts of 8 hours.

Additionally, the staff consists of 1 Quality Manager in charge of Certification, Quality Assurance and Quality System, and a Technical Engineer to supervise production parameters and inner functioning of the unit. Total initial workforce **will be approximately** 10 people.

With a worldwide support of international experts and state of the art international facilities to train and transfer core skills it is anticipated that after the first 12 months into operation, all the personnel will be local.

#### 9) LOCATION

The size of the Abanto-Zierbena building of 1.000 m<sup>2</sup> covered, 300 m<sup>2</sup> of office and 800 m<sup>2</sup> of yard, with possibility of future expansions of the production capability.

- 1 Roof crane of 8 ton
- yard for Argon storage and heat exchanger,
- 8 parking bays
- Loading and unloading area for trucks

The building is equipped with foundations to carry 2 presses, with further expansion feasible to host an additional 2 more large presses or a number of smaller specialized high-tech HIPs

#### 10) INVESTMENTS

until now the company has invested 9 Million euro in fixed asset. The total investment when the unit Nr 2 will be installed will be 14 Million euro. ITS Bilbao was granted of the Basque Country Financial Support available for similar initiatives through the dedicate Development Agency SPRI.

#### 11) QUALITY & APPROVALS *(to be revised)*

The facility has been already granted with the EN 9100 Approvals by Bureau Veritas and has successfully been audited and approved by Rolls & Royce and Pratt & Whitney. The Safran approval is currently under way. Nadcap is planned for 2nd Semester 2020

#### 12) OFFICIAL OPENING CEREMONY

It will be hold next 29<sup>th</sup> January 2020 at 11.00 am by the ITS Bilbao Production Plant located in Lugar Barrio Campo Diego 1J – 48500 Abanto Zierbena (Biskaia)

Among the participants the most relevant personalities of the Basque Government

Ministry of Industry	Arantxa Tapia
Vice Minister of Industry	Javier Zarraonaindia
Director of Industry	Mikel Amundarain