

Internship Report

Done by:
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ABOUT THE ENTERPRISE



VPG is an internationally recognized designer, manufacturer and marketer of components based on its resistive foil technology, sensors, and sensor-based systems; specializing in the growing markets of stress, force, weight, pressure, and current measurements. We provide vertically integrated products and solutions that are primarily based upon our proprietary foil technology. These products are marketed under a variety of brand names that we believe are characterized as having a very high level of precision and quality. Our global operations enable us to produce a wide variety of products in strategically effective geographic locations that also optimize our resources for specific technologies, sensors, assemblies and systems.


About The Founder

Felix Zandman was born in Grodno in the Second Polish Republic (now Belarus) and lived in Kresy until the Nazi-Soviet invasion of Poland.[2] Following German Operation Barbarossa, in October 1941, at the age of 14 he arrived at the Grodno Ghetto (liquidated by the Nazis at the end of 1942) with parents, sisters, grandparents and many other relatives. He survived the Holocaust thanks to a family of Polish Righteous Jan and Anna Puchalski who hid him and his uncle for 17 months. Their main hiding place was a dugout 170 cm long, 150 cm wide and 120 cm tall.


Felix Zandman shared this hideaway with three other Jewish refugees. One of them, his uncle Sender Freydowicz, taught him trigonometry, and advanced mathematics in the long hours of darkness. The advancing Soviet Army liberated them in July 1944..



SECTORS

- RAW MATERIAL
 - MACHINING & PROCESSING
 - ASSEMBLY
 - LOGISTICS
- 

RAW MATERIALS

- STAINLESS STEEL
 - CAST IRON
 - ALUMINIUM
 - EN 24
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WHILE ENTERING THE RAW MATERIAL SECTOR THE JOBS ARE MANUALLY ENUMERATED ACCORDING TO THE REQUIREMENT GIVEN TO THE DEALER. THE JOBS WHICH COME FROM THE DEALER ARE SEMI-PROCESSED, HENCE THE JOB IS VISUALLY INSPECTED BY THE TECHNICAL TEAM . THE QUALITY CONTROL TEAM INSPECTS THE JOB USING VARIOUS INSTRUMENTS SUCH AS

- ROCKWELL HARDNESS TEST FOR TESTING THE HARDNESS OF THE MATERIAL
- THICKNESS GAUGE & PAINTING GAUGE FOR VERIFYING THE NUMERICAL PROTRUSION OF THE PAINT JOB

Types Of Coating:

- ELECTROPOLISHING
 - ELECTROLESS NICKEL PLATING
 - ANODIZING
 - KTL PAINT
 - ELECTROLYTE USING ZINC
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TYPES OF CNC MACHINES USED:

VERTICAL MILLING MACHINE(VMC):

❖ DMG

❖ BFW

HORIZONTAL MILLING MACHINE(HMC):

❖ MAKINO

❖ MORI

❖ MAZAK

TURNING MACHINE:

❖ MORI NLX

❖ TAKISAWA

❖ MAZAK DT20

❖ MAZAK QTN 350

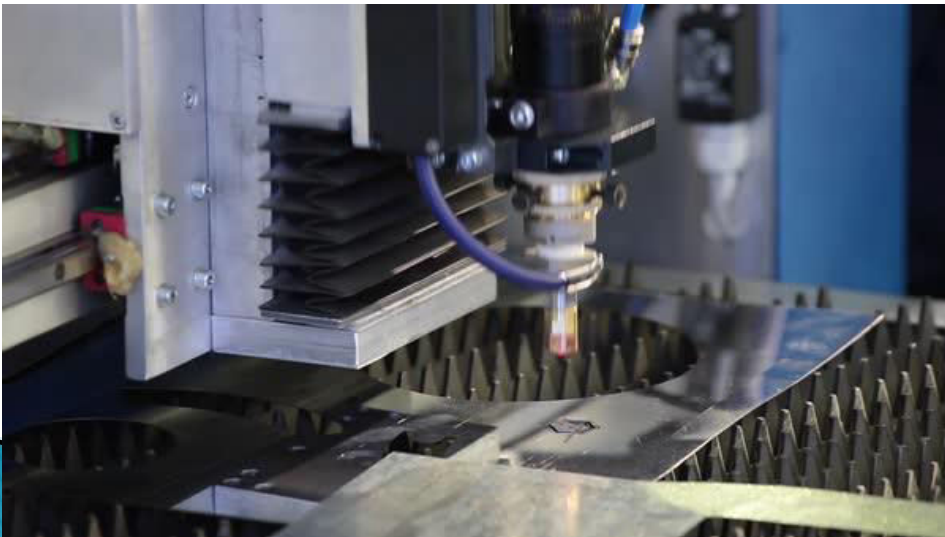
❖ MAZAK QTN ISO

TYPES OF MACHINING PROCESSES

- ▶ Cutting
 - ▶ Pocket milling
 - ▶ Drilling
 - ▶ Sand blasting
 - ▶ Micro blasting
 - ▶ Deburring
 - ▶ Grinding
 - ▶ Stamping
 - ▶ Tapping
 - ▶ Blanking
 - ▶ Buffing and Polishing
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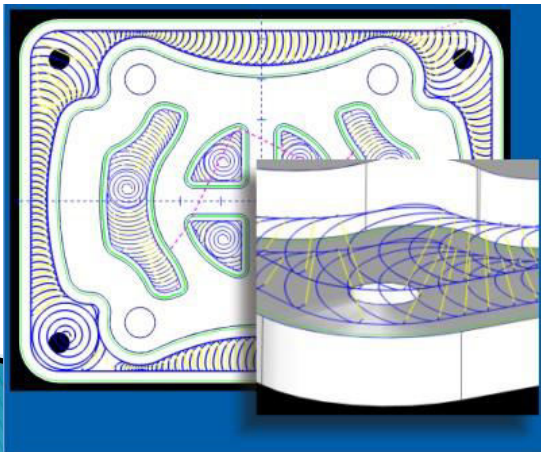
CUTTING

Cutting is a process in which a cutting tool is used to remove small chips of material from the workpiece (the workpiece is often called the "work"). ... The shape of the tool and its penetration into the work surface, combined with these motions, produce the desired shape of the resulting work surface.



POCKET MILLING

Pocket milling allows the machinist to use an end mill type cutting tool and machine away large amounts of material in a “Roughing” cycle prior to finishing the part. This saves time and efficiently maximizes the amount of material removal. There are different styles of pocket toolpath that include traditional lace or zig-zag (back and forth), concentric or offset In/Out and high speed cutting paths.



DRILLING

- ▶ **Drilling** is a cutting process that uses a drill bit to cut a hole of circular cross-section in solid materials. The drill bit is usually a rotary cutting tool, often multi-point. The bit is pressed against the work-piece and rotated at rates from hundreds to thousands of revolutions per minute. This forces the cutting edge against the work-piece, cutting off chips (swarf) from the hole as it is drilled.



SAND BLASTING

Sandblasting is process of smoothing and cleaning a hard surface by forcing solid particles across that surface at high speeds using compressed air.



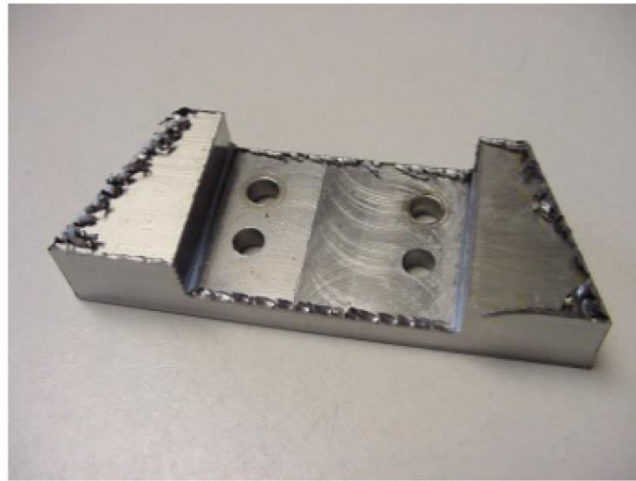
MICRO BLASTING

Microblasting technology has made existing technologies such as ultrasonic processing, laser processing, etching and microdrilling obsolete.

Microblasting Machining, or Precision Blasting, is a process in which high pressure air and very fine powder are blended together in a chamber to form an abrasive mixture. ... The result is a highly accurate abrasive stream that can be used for cleaning, cutting, drilling, deburring and finishing all types of surfaces.

DEBURRING

It is usually an unwanted piece of material and is removed with a deburring tool in a process called 'deburring'. Burrs are most commonly created by machining operations, such as grinding, drilling, milling, engraving or turning.



(a) Before deburring



(b) After deburring

Grinding

- ▶ Grinding is an abrasive machining process that uses a grinding wheel as the cutting tool. Grinding practice is a large and diverse area of manufacturing and toolmaking. It can produce very fine finishes and very accurate dimensions; yet in mass production contexts it can also rough out large volumes of metal quite rapidly.

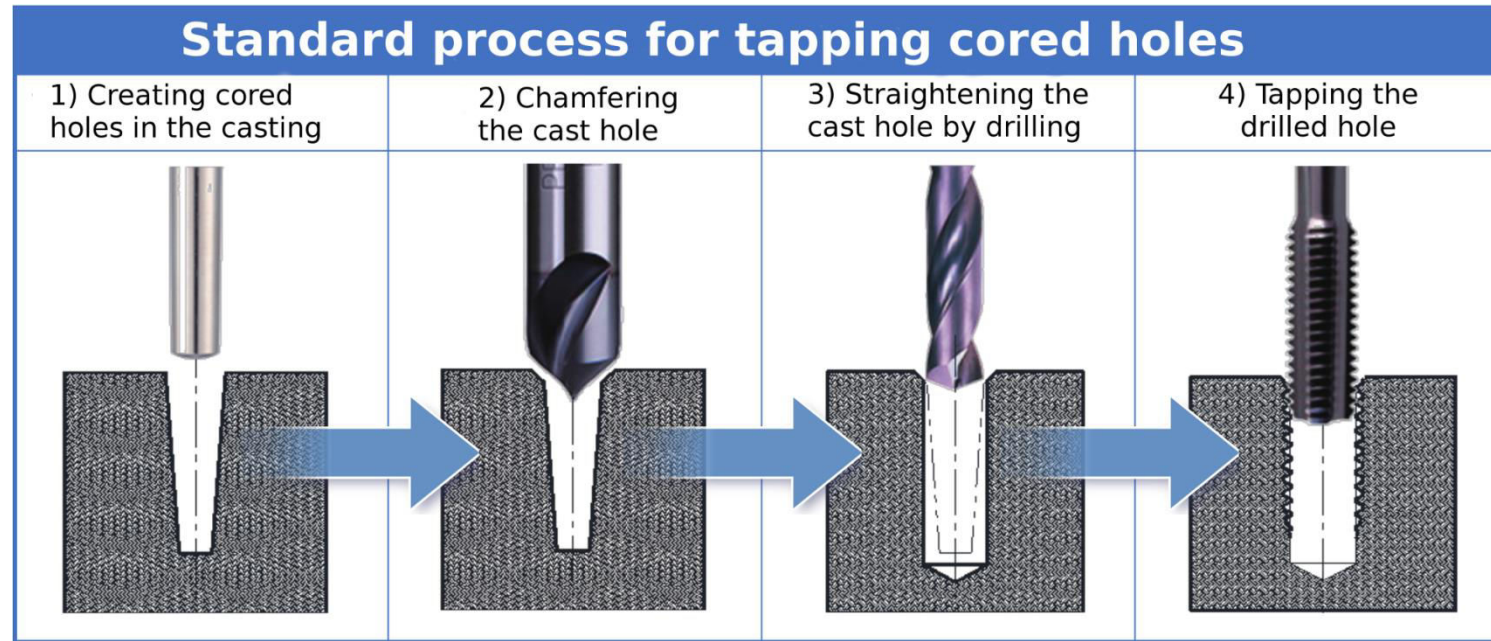


Stamping

- ▶ Stamping is widely known as engraving in which it is the practice of incising a design onto a hard, usually flat surface by cutting grooves into it with a burin. The result may be a decorated object in itself, as when silver, gold, steel, or glass are engraved, or may provide an intaglio printing plate, of copper or another metal, for printing images on paper as prints or illustrations; these images are also called "engravings"
- ▶ Four important information are printed
 - >Serial Number
 - >Capacity
 - >Configuration
 - >Raw Material

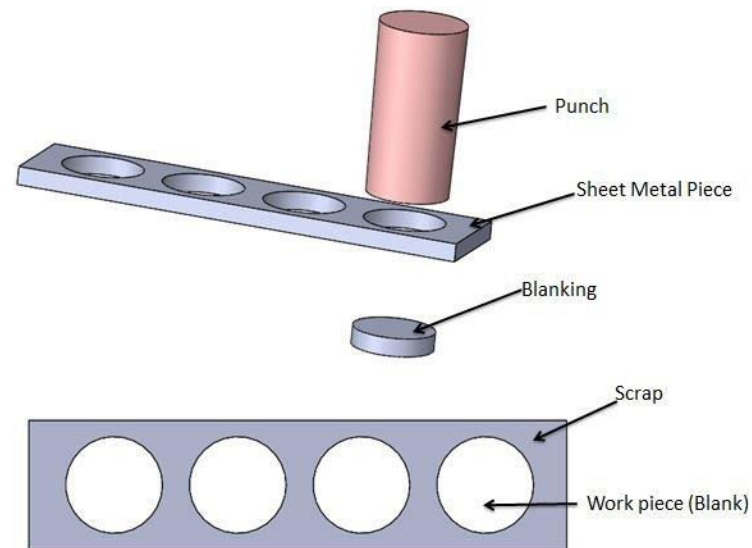
Tapping

- ▶ Tapping is the process of cutting a thread inside a hole so that a cap screw or bolt can be threaded into the hole. Also, it is used to make thread on nuts



BLANKING AND PIERCING

- ▶ **Blanking** and piercing are shearing processes in which a punch and die are used to modify webs. The tooling and processes are the same between the two, only the terminology is different: in **blanking** the punched out piece is used and called a blank; in piercing the punched out piece is scrap.



HEAT TREATMENT

- ▶ Heat treating is a group of industrial and metalworking processes used to alter the physical, and sometimes chemical, properties of a material. The most common application is metallurgical. Heat treatments are also used in the manufacture of many other materials, such as glass, etc.,.



Polishing and Buffing

- ▶ Polishing and buffing are finishing processes for smoothing a workpiece's surface using an abrasive and a work wheel or a leather strop. Technically polishing refers to processes that use an abrasive that is glued to the work wheel, while buffing uses a loose abrasive applied to the work wheel.



ASSEMBLY OF LOADCELL

In Assembly Line , The inspected loadcells are chemically treated to remove micro particles they undergo various process such as ,

- Scribing
- Gauging
- Process
- Clamping
- Pre-balancing
- Cable assembly & Wiring
- a
- Visual inspection
- Electrical test
- Labelling

Scribing

The load cells from blasting are sent to scribing room, where they make a mark to fix the gauge.

In most of the load cells the pocketed area is known as T-joint. The surface is made rough for adhesion for fixing the strain gauge.

Process

- ▶ Nitrogen gun is used to remove moisture content from the load cell. This is done to prevent rusting then 43-B glue is applied on it and takes 5 minutes for curing. Later Teflon tape is applied on it for the protection for gauge from the upcoming process it has to undergo.

Clamping

After gauging process the loadcells are fed to clamping side. Clamping is further divided into two, That is Prebake & Post-Bake. In prebake the cells with clamp and silicon rubber make sure even pressure is applied on the load cell to prevent the external damage. Before clamping it must be cleaned thoroughly. Now the load cells are placed in oven for four hours in 191 degree celcius . Post-bake is carried out after prebake. In post-bake load cells are retrieve from the oven and remove the clamp and silicon rubber from it.


Pre-balancing

- ▶ Over head bridge resistance is balanced zero output and the zero output is obtained when no load is applied on the loadcell.


CABLE ASSEMBLY AND WIRING

- ▶ Remove the temporary cable and fix the permanent cable using gland. Make sure that the gland touches the shield wire , then locktite 242 is applied on it to lock and seal the thread fasteners . Altering the cable length affects the calibration. Over here 2 types of torques are used. Firstly , analogue torque is used to tighten the cable manually and then digital torque to tighten it to a maximum level.


Raw calibration

- ▶ First a known amount of load is applied to the cell, from this we get brutto value and on removing the load we get tare value by subtracting these two values we get raw calibrated value . 3 trials are taken. The variation of tare values can range from 2-3 counts but not exceeding more than that.
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Resistor programming

- ▶ Magnum wire is used as resistance In this process to decrease the voltage . Colour coded resistors are fixed with particular values whereas in wire we can get exact value by altering its length .
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Final calibration

- Output sensitivity is checked with full load
 - Linearity checking
 - Hysteresis checking
 - In this process error occurs only due to material issues . Final cleaning is done using TCE tank.
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Visual inspection

- ▶ Checks for :
 - Cleanliness
 - Excess lead and flux
 - Cable damage
 - Internal wire damage
 - ▶ UR wire
 - ▶ Soldering wire
 - ▶ Temp comp wire
 - ▶ Balance wire
 - ▶ Body damage
 - FBT is applied on to the gauge and mod for protection and kept in conveyor oven under 70 degree Celsius for about four hours. Cover plate is fixed on the load cell and then black RTV is applied onto it and it is allowed to dry for 12 hours.


Electrical test

- ▶ Checking the load cell of 150 V insulation resistance test and after this it is being packed neatly , sent to quality check . If it passes it is sent to stores

Testers made on load cell

7T Tester:

Using this tester all the parameters of load cells are tested

- Zero test
 - Input resistance
 - Output resistance
 - Red split
 - Black split
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Flash Test:

- ▶ Parameters to be checked in flash test system are
- ▶ Frequency-50Hz
- ▶ Current-5mA
- ▶ Voltage-0.5Kw
- ▶ Timer-60 seconds
- ▶ Flash mode ACW


Flash test is used to check accuracy excess lead, floss and PCB wires in load cell

Quality

- ▶ Every load cell undergoes quality check before and after assembly of it. All assembly individual parts undergoes quality check.
- ▶ Quality check is verified through various strategies such as,
 - ✓ Dimension
 - ✓ Hardness
 - ✓ Profile...etc,

To have advanced accuracy and precision of load cell is controlled by CMM Lab

Instruments used in CMM LAB:

- 2D height gauge
 - Profile projector
 - Video measuring machine
 - Viscosity meter
 - Contour machine
 - Vickers Cum
 - Brinell Hardness Test
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Precautions

