

Use of Bake Paper and Selection of Oil Grade Avoiding Surface Irregularities

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Abstract— The early detection of surface defects on raw sheet metal parts is a critical problem in the automotive industry. Typical defects like dents, bumps and waviness are invisible at the early production stages because of the parts' rough surfaces. The defects become visible and disturbing only after the later production steps, in which the parts get painted and varnished, meaning that they become specular reflecting. The later the defect gets detected, the more the correction will cost. Currently, the raw sheet metal parts are only randomly tested by special, trained experts, which means subjective and qualitative results. To overcome this problem, we propose a method that can be used on-line on each part directly at the production line.

The system employs a one-shot deflectometry method in the infrared range. At sufficiently long wavelengths, the sheet metal's surface becomes specular reflecting, thus enabling the use of the deflectometry method. For this method, a device capable of displaying a reference pattern at the infrared wavelengths was developed. This single infrared reference pattern is reflected from the surface of the raw sheet metal object and the reflected image is captured by a thermo-camera. The distortion of the reflected pattern due to the surface's geometry and defects is analyzed by the Fourier-transform method. Due to the single exposure method, vibrations during the measurement are not disturbing and the alignment problem, that is characteristic for multi-exposure methods, is nonexistent in this case.

INTRODUCTION

Atharva Industries was established in 2008 in Ranjangaon MIDC in Pune, India to manufacture and supply plastic, Metal Stamp components and also corrugation boxes. Today the company Operates 4 plants from Pune region and Turnover above 250Cr. Atharva Industries has a diversified product range to serve multiple industries. we have over 25 years of experience of plastic & Metal components serving the Medical Caps & Closures, White Goods industries,

Electrical, Automotive and Furniture Industries Atharva Industries is an end-to-end supplier that offers product validation, tool design, tool manufacturing, moulding, Stamping, welding, Post operation Printing, assembly etc. We have a customer base across India as well as USA, while maintaining our high standards in service and quality.

Atharva Industries is equipped with a state-of-the-art Mould Shop, Metal Stamping unit and a fully automatic corrugation box line with 22mt length size equipped with all testing facility. All Plants is with ISO 9001:2015 and Plastic Plant is IATF16949, ISO 14001 and OHSAS18001.

Atharva metals & engineering private limited company is an entity incorporated on 06 april 2018 under ministry of corporate affairs (mca). Atharva metals & engineering private limited company is also an entity listed under class as a private organization having registration number for the company or limited liability partnership as 175870.

Atharva metals & engineering private limited company is a non-govt company and further atharva metals & engineering private limited company is classified as a company limited by shares. The concerned entity is incorporated and registered under its relevant statute by the registrar of companies (i.e. R.o.c.), rocpune. The official address for the registered office of the organization in question i.e. Atharva metals & engineering private limited company is 207/1a, b5010, 5th floor, lohagaon marvel edge oppneco garden, viman nagar pune mh 411014 in.

Key Highlights

- Operational area of 64,560 sq.ft.
- Production capacity - 70,000 strokes / day
- Stamping Process
- Welding Process
- Special Purpose Machines

Company Capabilities

Stamping Process

We are able to produce various sheet metal parts through different stamping operations

- Stage stamping
- Progressive stamping

Welding Process

we are able to produce various assemblies by different welding procedures such as

- Spot welding
- Projection welding

- Draw oil SYN –HD

Also we have special purpose machines to carry out operations like clinching, flaring, flaring, riveting, For that we have SPM's like

- Clinching machine
- Spin riveting machine

- Flaring machine Draw-Oil SYN-HD is a 100% synthetic drawing fluid. The product has been formulated for the more severe drawing applications found in industry. However, it can be used very successfully for less severe or light drawing and stamping applications.
- Draw-Oil SYN-HD contains a unique blend of extreme pressure additives and special purpose additives. In combination with each other, these new chemical technologies combine to produce a product that will improve productivity, extend emulsion and die life and improve worker environment.
- The extreme pressure additives create a unique boundary between the work piece and the die to allow for difficult drawing to take place and reduce the wear on the dies.
- The special purpose additives function to give superior corrosion protection, eliminate any foaming and control any bacteria growth. This control of bacteria in the fluid is critical and gives a much healthier work environment for the personnel in the plant.
- Depending on the type of draw and the material used in the operation, the concentration would vary from 5% to 15% by volume.

Typical Analysis:

- Appearance: ReLiquid
- Odour: Mild
- Specific Gravity @ 15 °C: 1.1
- pH 5%: 8.8
- 5% Emulsion: Light pink, opaque, good foam break.
- Rust Test
- (ASTM 4627/86): 5% No Rust, No Stain
- Refractometer Reading: 5% = RF 4.5 (Factor 1.1)

Application:

- Draw-Oil SYN-HD is recommended for moderate to heavy duty blanking, piercing, bending and deep drawing applications for single die, multi stage transfer dies and progressive die applications for mainly ferrous metals. Depending on application, severity and metal, concentrations between 5% and 15% are recommended.

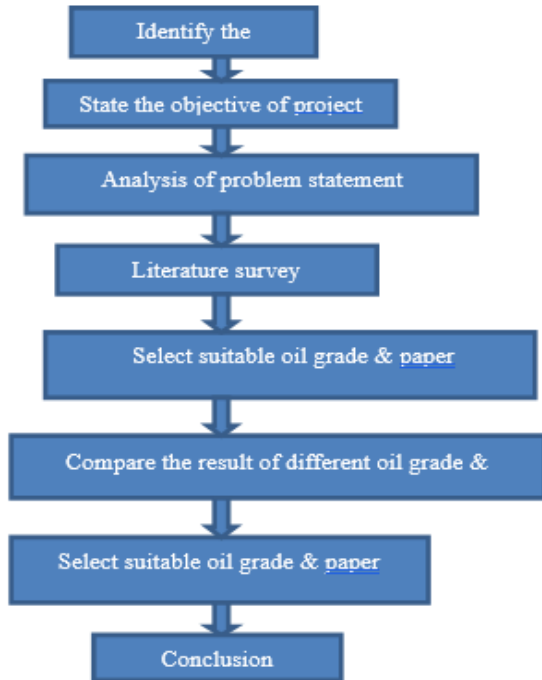
Problem statement - The most common sheet metal stamping defects are also the easiest to predict using advanced simulation software, such as Auto Form. Choosing the wrong size blank, underestimating the number of forming tool required, or encountering an unexpected wrinkle (or split) can be very costly if only discovered during first physical tool. The following issues can be identified and solved using incremental stamping simulation software before any tooling is manufactured using virtual try outs:

- Wrinkles (either minor or severe)
- Splits (and risk of splits)
- Springback (or final part deviation from nominal)
- Incorrect process or number of forming tools
- Incorrect blank shape and/or size
- Excessive thinning/thickening of the sheet during forming

Objective to avoid some visual inspection problem

1. To improve the quality of product
2. To avoid the rejection of product during final inspection
3. To reducing cycle time.
4. To improving product quality

METHODOLOGY



LITERATURE REVIEW

1. Influence of oil films in the deformation zone on the surface finish of cold rolled aluminum sheets.
February 1988
Authors song jisheng
Abstract
During cold rolling the sheet surface finish depends mainly on the roll surface finish. Although the oil film of the lubricant in the deformation zone has a great effect on the sheet surface finish, in itself it improve the sheet surface finish. It only protects the roll surfaces so that the usage period of the rolls will be lengthened. During rolling with full-fluid lubrication, the oil film causes the metals to lose luster. In limited lubrication, it is possible to obtain a good surface finish.
- Oil-Grade Alloy 718 in Oil Field Drilling Applications
January 2010
Authors - Hendrik jhon
Abstract
Due to continuous advancements in drilling technology, the materials in use have to fulfill higher demands in regard to mechanical properties and corrosion resistance. The complex working loads and high vibration, the hostile downhole environments, together with the high working temperature and

pressure encountered when operating in an ultra-deep drilling environment, provide major challenges for the drilling tool materials. This paper focuses on the performance of oil-grade alloy 718 for applications in bottom hole assemblies (bhas) under drilling conditions. Potentiodynamic polarization was applied to investigate the general characteristics of corrosion and pitting attack. Key influence factors including working temperature, cation species in corrosive medium, and post-mortem heat treatment were discussed. These results will help to direct the optimization strategy of Ni-base superalloys in oil field drilling.

2. Surface finish and lubrication at low cutting speeds

February 1999

Authors – j. wallbank

Abstract

Surface finish is one of the most important parameters to be controlled during machining as it affects many functional properties of components. It can be effected by workpiece and cutting tool material, geometry, cutting fluid, and cutting conditions. When machining at low cutting speeds a cutting fluid with good lubricant properties is often recommended to improve surface finish. This improvement is often thought to affect built up edge (BUE) formation, which is a major cause of poor surface finish. This work studies the effect of sulphur, an extreme pressure (EP) additive, in an oil lubricant on the surface finish of an AISI 1040 steel machined with a cemented carbide cutting tool. The application of a lubricant, with and without sulphur, does not prevent the formation of BUE but does affect the surface finish. This work suggests that the BUE is squeezed against the workpiece material close to the tool nose affecting surface finish. This region is where lubricant acts to improve surface quality and therefore very low volume of lubricant should be sufficient.

3. A review of conventional and modern single-point sheet metal forming methods

February 2003

Authors - Jack jeswiet

Abstract

The use of computers in manufacturing has enabled the development of several new metal forming processes that are based upon older technologies. In

this case modifications have been made to traditional forming methods such as conventional spinning and shear forming. These two processes are similar in that the deformation mechanism is localized to a small region under the forming tool. Recent advances in computing power have enabled this localized deformation to be accurately controlled and studied. Spinning, shear forming and flow forming are limited to forming parts that are symmetrical about the revolving lathe axis. Current research has been focused on forming non-symmetrical parts using computer numerical control (CNC) technology, without the need for costly dies. A comparison of traditional and modern forming methods is presented here in an attempt to illustrate the evolution of different incremental sheet metal forming techniques. Emphasis is placed on conventional spinning, shear forming and modern computer-controlled forming methods that are currently being studied.

Machine specification

Serial no.	IMI / DD/250 / 4PH /2021/244
Manufacturing year	Sep 2021
Main tonnage capacity	250 ton
Connected load	30 HP + 3HP
Bolster size	1800 mm* 1200 mm
Main cylinder stroke	800 mm
Shut height	200 mm
Ejector/cushion capacity	80 ton
Ejector / cushion stroke	250 ton

Machine setup



WORKING PROCESS

Hydraulic press machine definition:

The hydraulic press is a machine press that works is to generate compressive force by the use of a hydraulic cylinder. The hydraulic press machine is a device which is used for lifting the heavyweight by the application of much smaller force.

This is based on pascal’s law.

Pascal’s law state that the intensity of pressure in a static fluid is transmitted equally in all hydraulic press machine parts:

A hydraulic press machine consists of following parts:

- Safety door
- Limit switch
- Manual control valve
- Electrical control box
- Relief valve
- Pressure gauge
- Hydraulic cylinder
- Motor
- Oil tank
- Pressing plate
- Bailing compartment

Safety door:

Safety door is just like the correction gate when any accessories get damage than from this door we can fix this.

Limit switch:

It is a switch that prevents the travel of an object in a mechanism past some predetermined point, mechanically operated by the motion of the object itself.

Manual control valve:

The operation is controlled manually with the help of the valve.

Relief valve:

When pressure is high exceeds the limit this valve is used to release or control the pressure

Pressure gauge:

It is fixed thereto measure the pressure.

Hydraulic cylinder:

This is a mechanical actuator which is used to give a unidirectional force through a unidirectional stroke

pressing plate:

The main works of pressing plates are to provide pressure to the object and this plate having high strength.

Bailing compartment:

Here the workpiece and placed and press according to the required shape and size. here hydraulic oil is stored and supply.

hydraulic press machine working principle:

A hydraulic press machine work in the following steps:

1. This is based on pascal's law, pascal's law state that the intensity of pressure in a static fluid is transmitted equally in all the direction.
2. The hydraulic press consists of two cylinders of different diameters. One of the cylinders is of large diameter and contains a ram, while the other cylinder is the small diameter and contains the plunger as shown in the below figure.
3. The two cylinders are connected by a pipe.
4. The cylinders and pipe contain a liquid through which pressure is transmitted.
5. When a small force f is applied on the plunger in the downward direction, a pressure is produced on the liquid in contact with the plunger.
6. This pressure is transmitted equally in all directions and acts on the ram in the upward direction as shown in the figure.
7. The heavier weight placed on the ram is then lifted up

Types of hydraulic press machine:

The hydraulic press machine is categorized into 5-types and those are:

1. Four-column hydraulic press
2. Single column hydraulic press (also known as c-type)
3. Vertical hydraulic press
4. Horizontal hydraulic press
5. Universal hydraulic press

Hydraulic press machine advantages:

The advantages of hydraulic press machine are:

- High tonnage capacity

- The hydraulic press is quieter because it's having less number of moving parts.
- It generates a high amount of pressure.
- Greater versatility (ability to adapt). Here are a few examples of the machine

Hydraulic press machine disadvantages:

The disadvantages of hydraulic press machine are:

- The pressure is set for some limit can not exceed more than that.
- Maintenance requires is more.
- There is a carbon footprint.

Applications of hydraulic press machine:

These are the following applications of hydraulic press machine:

- The hydraulic pressing machine is used to convert any metal block to a sheet.

Although hydraulic press machine is used for:

- Forging
- Blanking
- Clinching
- Molding
- Deep drawing
- Metal forming operations
- Punching

Some more application of hydraulic press machine are:

- Thermoplastics
- Composites
- Rtm (resin transfer molding)
- Smc (sheet molded composites)
- Carbon fiber molding, and
- Gmt (glass mat transfer)

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