# Extrusion Process Parameters Involved in the Experimental and Numerical Investigation: Review

SANGAMESH SIRSGI [1], DHANURANJAN CHOUDHARY [2]
[1,2]*Dept. of Mechanical Engineering, Guru Nanak Dev Engineering College, Bidar*

***Abstract – With the traditional extrusion method it's terribly troublesome to supply a hollow section tubes, for varied sorts of Al Alloys, corresponding to Al6061, Al6063 & Al7075. As a result of sophisticated structure of die Assembly it's became obligatory to analyze through an experiment. For 6061 Al alloy Taguchi technique is applied to optimize the parameters concerned in it. For alternative materials Numerical Analysis is administrated for investigation of varied parameters. During this review paper the discussion is administrated for Al6061, Al6063 & Al7075 materials within the extrusion method for investigation the various method parameters by Taguchi & Numerical Analysis technique.***

## I. INTRODUCTION

Extrusion seems to be a way of breaking down as forged structure of billet being subjected to solely compressive forces in the extrusion method. Within the cold extrusion, punches and dies square measure created of wear resistant tool steels love high alloy atomic number 24 steels that square measure subjected to severe operating conditions so as to report dimensional stability and smart surface end. Cold extrusion models to verify parameters that influence the method are investigated. Qamar [3], through a Finite part methodology (FEM) studied extrusion complexities and dead metal zone exploitation numerical simulations extrusion to validate experimental observations. Dies of 3 totally different profiles fabricated from H13 steel were used on lead and Al- 6063 alloy. Fluctuations in metal distortion throughout plastic flow and dead metal zone size were discovered. This shows the variation in die profile symmetry and extrusion magnitude relation. Tiernan used 2 totally different materials particularly atomic number 30 stearate and oil primarily based lubricant containing lead and copper additives. The experiment was organized to research effects on the reduction magnitude relation die angle and die length on the extrusion force. information obtained from experimental result and by computations exploitation FEM prophetical simulatio ns were compared. the very best extrusion force obtained by experiment. The force was measured once extruding the metal billet employing a die with exit diameter, die angle, and land height. compared of results, affordable correlations were discovered to exist between FEM and experimental values of extrusion forces[1]. Aluminum extrusion may be a single pass method to provide an extended give up high accuracy and sophisticated cross sectional geometry. The sole thanks to vary the cross section are by the employment of extrusion die. A solid cylindrical billet is heated and placed within a instrumentality that is pushed by hydraulic punch is forced to flow through die set. Therefore, merchandise with varied cross sections love rods, wires, sheets, tubes, hollow or non-hollow elements is invented [1]. In recent years, there square measure several researches analyzing plastic deformations likewise as die wear by finite part analysis[2].The basic method of extrusion is well delineated as a thermo-mechanical event in a very quite recent text that indicates that the mathematical description of the method continues to be for the most part semi-empirical. The extrusion method is advanced and involving interaction between the method variables and also the material's high temporary worker properties. Theoretically the variables which will be controlled square measure the extrusion magnitude relation, the ram speed, and also the initial extrusion temperature. However, events on the micromechanical scale square measure still not sufficiently delineated. The foremost vital of of these is probably the mechanics at the interface

between tooling and material. This influences the analyses of the temperature changes occurring throughout the method, the temperature and also the temperature history determinant the structure of the extruded and therefore, to an outsized extent, its properties [3].

## II. LITERATRE REVIEW

- S. O. Adeosun et al [1]

Have made an investigation of die entry angles 15°, 30°, 45°,60°,75°& 90° were simulated. Improvement is observed with 45°, 90°& 75° die entry angles. It is been observed that at 45° die entry angle the index of 2.1 for plain carbon steel die & 1.8 for steel die.

- Quang-Cherng Hsu et al [2]

Have investigated for Al7075 square tube with both simulation & experiment. In this there are several factors which are taken for simulation & experiment are billet temperature, billet dimensions, flow stresses, die cavity & product geometry. The material Al7075 behaves high forming resistant when compared to Al6063 & Al6061.

- Flitta et al [3]

This investigation is mainly focuses on simulation of the extrusion process & in particular the effect of the initial billet temperature on friction & its consequences on material. The simulation is validated with experimental results. The effect of billet temperature both in simulation & experimentally are presented.

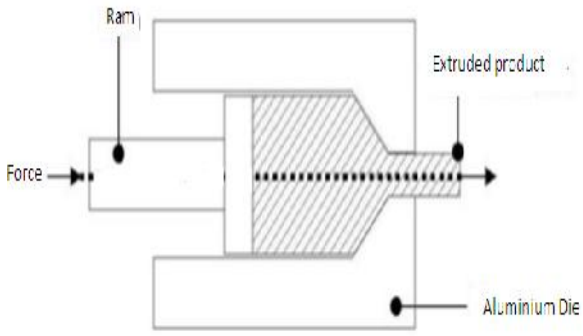
- Rajamamundi Prabhu et al [4]

Have gone through the forming of hollow section tubes that are very difficult to produce by conventional extrusion with a mandrel on the stem. During the hot extrusion for Al6061 Alloy the change of process parameters will effect to the mechanical properties. In this extrusion are tested for tensile test, flattening test, expanding test using a conical punch, surface finish & micro-structure.

## III. EXTRUSION PROCESS FOR ALUMINUM ALLOY

- Extrusion Process

This study uses direct extrusion or forward extrusion. the method is that once the billet is pushed within the instrumentation, the ram keeps pushing forward, so the fabric is extruded and flows out of the die outlet. because the material flows enter identical direction because the ram moves, once the billet is concerning 20mm thick, the extrusion stops, whereas the ram moves backward, another billetis place into the instrumentation, and then the ram presses within the new billet. The method is then continual, as shown in Figure. [2]




## IV. FRICTION

The constant of friction at the metal billet interface contributes considerably to the issue of extruding, and it may be a purpose wherever the friction resistance approaches the shear resistance of the new material throughout the deformation. Furthermore it's some extent wherever a fraction or all of the displacement of billet at the interface occur by shear in its surface layers feat a fraction of the billet deposited on the wall of the instrumentality. In observe Al alloys are extruded with none material or with solely at low quantity of carbon applied to the die face. Finding an acceptable material would be difficult task and in any case of un-lubricated aluminum extrusion is fascinating so as to stop impurity devour from the tools and to make sure that everyone the fabric creating up the extruded surfaces originates from material among the billet. Therefore

the surface conditions at the billet instrumentality interface throughout extrusion f eatures a direct impact on metal the stresses acting upon each the tools and among the fabric and thence load and energy needs and extruded temperature.

## V. SELECTION OF CONTROL FACTORS

The objective of this work is to spot the result of protrusive die angle which might optimize the load and durability of hot extruded tubes Method the methodology parameters usually thought-about for decent extrusion process of Al 6061 alloy tubes victimization port hole die method embrace extrusion speed, die shape, billet temperature, rotating shaft length, protrusive angle, tooling temperature, extrusion quantitative relation, port hole range and rotating shaft form etc. In Taguchi methodology, the choice of cogent parameters for analysis may be a crucial issue. For this case, the foremost cogent method parameters for the analysis square measure elect supported studies reported in literature with main concentrate on durability and cargo characteristics and that they square measure listed. These four input parameters square measure taken as management issues and every factor has been thought-about with 3 levels. Since the amount of degrees of freedom is eight, AN orthogonal array (inner array) L9 has been found appropriate for this style[4].

## VI. CONCLUSION

1) In this extrusion process the thickness of the product is varied and other parameters are kept remain same.

2) If we consider billet dimension for fixed condition, we get smaller extrusion ratio for thicker product & also smaller stress in the die.

3) With the numerical analysis the maximum stress is on corners of the square tube which is same for the experimental method.

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