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Review Paper On Extrusion Of Al-Alloy Series

Sumit Swapnil Minz[1], Dr. P Sudhakar Rao[2]

[1]*ME scholar, Department of Mechanical Engineering, NITTTR Chandigarh, India,*
[2]*Assistant Professor, Department of Mechanical Engineering, NITTTR Chandigarh, India,*

Abstract-Extrusion of Al-alloy contain Mg-Si, Lithium with its material behavior that change their mechanical properties(yield strength, ultimate tensile strength, elongation percentage), heat treatment grain structure (size). To produce nanocrystalline powder is done by low-energy mechanical to wearing down at cryonic temperature (cryomilling). The nanostructure of Al-7.5Mg powder were produce by cryomilled and then blended to form bimodal with unmilled. The average strength, percent elongation, at fracture, hardness, and electrical conductivity of the aluminum alloys. Higher exposure temperature and longer exposure times resulted in lower ultimate and yield strength values for all alloys. Transmission electron microscopy (TEM) was performed determine the strengthening phase. The energy absorption in axially loaded square thin-walled aluminum extrusion in alloy has been studied. In Al-alloy the differences in the intergranular corrosion behavior between the surface of the extrusion and the center. The productivity in an extrusion plant may be limited from numerous reason. This paper has put emphasis on the important role of the extrusion process and in particular extrusion of alloys series in the aluminum industry. Therefore, its uses in present day's application in transportation, building structure, aero-craft etc. are growing rapidly.

Keyword- Al-alloy (Mg, Si, Li, Cu), extrusion, material, mechanical properties (yield strength, ultimate tensile strength, % elongation), nano-crystalline, TEM, SEM.

I. INTRODUCTION

My concept to write this review paper- that for aluminum and its alloy with its material in extrusion process for product. The demand is increasing day-by-day globally because of its excellent corrosion resistance, mechanical properties, with good strength and low density compared with steel. Extrusion product of these aluminum alloy offer comparatively very cheap method to produce complex shape in long length with high geometric tolerance.

Aluminum consumption in Westerns Europe in year 2001(approximately 8 million tonnes). Aluminum extrusion are used in area such as the building industry(window and door frame, building structure, roofing, curtain walling etc), shipping and offshore furniture, in transportation sector for commercial aero plane application, military aircraft, rail, vehicle and automotive application.(Ref 1) But main question arise while using aluminum and its alloys in the body structure of vehicle can able to absorb energy during crash situation or not? So there are two types of body structure- sheet unit body and another is space frame construction. The sheet unit body are made in same sheet concept based where as the space frame version has extrusion for main structure member. This space frame energy absorbed during crash by means of extensive folding and bending collapse of the extruded members. In comparison with commonly used steel, al alloy have less yield strength which means that aluminum component must be thicker to absorb as much as energy of steel. While increasing the thickness will lower ductility of aluminum compared to steel which may result in high risk of material failure during deformation (Ref. 2).

By the way, the application of Al-Mg-Si alloy as automobile body sheet is increasing and there are some update news about improvement in inter granular corrosion resistance of Al-Mg-Si-Cu alloy by controlling through artificial aging conduction or lowering the corrosion potential by adding zinc. On the other hand, most of the Al-Mg-Si alloy extrusion and solution heat treatment for body sheet followed by cold rolling .It is important for knowing the behavior of Al-Mg-Si alloy extrusion with respect to inter granular corrosion because their micro structure are different to body sheet material. The behavior of 6061-T6 extrusion with respect to inter granular corrosion was examined and effect of micro structure and grain boundary characteristic on the intergranular corrosion was discussed. (Ref. 3)

Regarding Al-Mg alloy nanocrystaline material purpose generally prove to increased strength in comparison to coarser grained counterparts but reduce ductility. Ductility can be improved in achievement of nanostructure metals through the immixing of larger grain in a finer grained matrix. Legros et al.[Ref 4] and Tellkamp et al.[Ref 5] seemed this is tensile test of copper and Al 5083 alloy, respectively. In both case, considerable strengthening was occurred relative to conventional counterparts with yield strength of 535 Mpa for Cu and 3344 Mpa for Al 5083. The tensile fracture strain were 2.1% and 8.4% respectively, both of which are higher than regular nano-crystalline metals.(Ref 6)

Al- lithium alloy are either replacing or being considered for replacement of conventional al-alloy in aerospace application. The main concept for change this its interest in using these alloy at lower density and higher stiffness they can be provide. (Increased by 5-6% per weight percent of Li [Ref 7-8]

Anisotropy of the mechanical properties has been a concern in the past and consequently, new allots must be characterized thoroughly to be able to determine the specific effect of crystallographic texture and microstructure on static mechanical properties.[9-11]. With this concerned in mind Al-Li extrusion made from Alcoa's 2099-T83 alloy were characteristic to provide a better idea of the impact of deformation texture on static mechanical properties. The chemistry of the alloy is presented in table 1. The two extrusion that have been studied are a cylindrical extrusion with a diameter 6.73cm presented and the integrally stiffened panel (ISP). The location indicated on both extrusions represent the location where sample have been taken for characteristic. (Ref 12)
Additionally, the effect of thermal exposure on 2099-T83 extrusions studied. The alloy belong to the group of Al-alloy containing 1.0%to 3.0% lithium that have increased interest in recent year. The interest stemmed from the fact that each 1.0% lithium added to the alloy reduced its density by 3.0% and increased the elastic modulus by approximately 5.0% (Ref 13). The aluminum –lithium alloy were developed as direct substitution for existing Al-alloy to reduce the weight of aircraft and other aerospace structure (Ref.14). Regular components for which Al-Li alloy have been visualized are air craft structure, spacecraft skin, and liquid oxygen and liquid hydrogen fuel tanks for spacecraft. (Ref.14-17**).**

II. LITERATURE REVIEW

David Witkin et al. 2003 (Ref. 6)To produce nanocrystalline powder is done by low-energy mechanical to wearing down at cryonic temperature (cryomilling).Spray atomized Al-7.5Mg alloy powder were cryomilled in modified Union process 01-HD attritor with a stain steel vessel and6.4mm milling ball. The ball-to-charge ratio was 36:1 stearic acid 0.25% was add in powder weight to the moderate the cold welding process. The attritor machine was rotating with speed 180 rpm and maintained temperature -190° C for flowing liquid nitrogen submerging the powder and ball where milling time will be 8 hour.
Now this cryomlled powder is fuse and extruded for tensile testing and microstructure analysis. Before fuse three powder blends comprised of cryomilled powder with 0.15%and 30% weight unmilled powder is prepare. These blended powder are loaded in aluminum can for vacuum to get free from gas at 400° C. The can were sealed and fused in HIP at 325deg C and 25 ksi. The fused billet is extruded by UES Corp. Dayton Ohio using an extrusion ratio of 6.5:1and proprietary rate and temperature parameter.
The cylindrical tensile specimen were machined from extrusion with a gauge length and diameter if 13.5X3.5mm2 Tensile test taken under minimum strain rate of 10-3s-1. Now this extruded microstructure are investigated by transmission electron microscopy (TEM) and optical microscopy.
A TEM image of extrusion containing only cryomilled powder. Some larger grain (600-1000nm) and grain size of sample is 100-300 nm and noticeable. The grain are having equal dimension I all direction approx. with little evidence of grain elongation from extrusion. The extrusion with unmilled powder addition viewed a nano-structured matrix similar to the all-cryomilled sample as well as occasional coarse-grained band with grain size of approx. 1μm.Tensile stress-strain plots, along with data for a conventional fine-grained (1-5μm) sample of Al 5083,an Al-4.4Mg alloy. The yield strength, ultimate tensile strength and elongation of single specimens in the plastic regime of these four sample. The all-cryomilled sample have four time high yield strength than that of conventional Al-alloy. When blend with unmilled powder with proportion is increased with 15% and 30% the yield strength decrease by 1.7% and 13.6% respectively. But the elongation percentage increases by 71% and 286%respectivily.Suppose sample is 30%the fraction of unmilled powder, the yield stress is nearly four times higher than the conventional material. The result shows that there are similarities between elongation and proportion of unmilled powder. All three curve show proof of work hardening of the yielding.The nanostructure of Al-7.5Mg powder were produce by cryomilled and then blended to form bimodal with unmilled. This novel approach to engineering material to enhanced the strength and ductility. By increasing yield and high initial work hardening these can compare with aluminum metal-matrix composite (Al-MMCs) [Ref.19] this matrix have ductility with rigid and strong in properties.Finally, these step are used to improve the material properties. The extrusions of Al-7.5Mg were produce by standard powder material metallurgy procedure. To develop this type of material only requires some significant step and same process in extrusion method.

J. Jabra et al 2005 [Ref. 18] The material we get for this experiment is from Alcoa (Alcoa, Aerospace Application Engineering, Bettendorf, IA). The average strength, percent elongation, at fracture, hardness, and electrical conductivity of the aluminum alloy in their as received condition.The alloy were thermally exposed in these metallurgical conditions. The sample were thermally exposed in air at 180° C, 230° C, and 290° C for 0.1, 0.5,2,10,100 and 1000 hour.
After sample were thermally exposed, they were tested for tensile strength, hardness, and electrical conductivity at room temperature. Schematic of the tensile specimen dimension. All test points were performed in triplicate and unless otherwise specified, the data presented here is the average of three measurements. Hardness tests were performed on the grip sections of the tensile sample using a Rockwell B scale. Conductivity is reported in the international Annealed Copper Standard (%IACS) measured using a Hocking (Hocking NDT Ltd., Huru, Germany) Auto Sigma 3000DL conductivity, a flat surface was machined on the end of each sample. Tensile tests were conducted on an Instron (Norwood, MA) Model 4505 unit.
The room temperature tensile strength of all the alloys decreased as a result of thermal exposure. The 2099T6 die forgings, 2099-T83 extrusion, and 2397-T87 plate were generally stronger and remained stronger after thermal exposure. Higher exposure temperature and longer exposure times resulted in lower ultimate and yield strength values for all alloys.

It should be noted that substantial scatter was observed in the yield strength values for 2099_T83 extrusion at most points.
The tensile strength values of the 2099-T6 die forgings, 2099-T83 extrusion decreased after 10 hour. At exposure temperature of 180° C, the average tensile strength of the 2099-T83 extrusion decreased by up to 18% after 100 hour. The yield and ultimate strength of the 2009-T83 extrusion decreased by 21% and 14% respectively, between 100 and 1000 hour (Ref. 31). However, the yield strength values of the 2099-T83 extrusion at all three exposure temperature had excessive variation among the triplet sample.
The hardness of these alloy was measured using the Rockwell B hardness scale. The decrease in hardness was synchronous to the decrease in tensile strength. A good correlation between hardness and strength was determined for all the alloys. All the alloys exhibited an r^2 value of greater than 0.9 indicating a high probability of correlation between hardness and tensile strength.
The elongation of the 2099-T6 die forgings, 2099-T83 extrusion and 2397-T87 plate for all tempers has less as compared to 7085-T7452 die forgings and 7085-T7651 plate had the highest percent elongation.
The electrical conductivity of the 7075-T7651 plate, 7085-T7452 die forgings and 7085-
T7651 plate increased with time and temperature, where the electrical conductivity of the 2099-T6 die forging, 2099-T83 extrusion and 2397-T87 plate remained relatively constant. When thermally exposed at 180°C, 230° C and 290° C, the ultimate and yield tensile strength of all the alloys decreased over time. This is likely due to over aging because the alloys were in the peak-aged or overaged conditions. After 100hour of thermal exposure, the ultimate and yield strength decreased only slightly, and each alloy reached a quasi-constant plateau value .A strong correlation between tensile strength and hardness was observed for all the alloys. The alloys became more ductile with longer exposure times and higher exposure temperatures. The 7075-T7651 plate, 7085-T7452 die forging and 7085-T7651 pate were more ductile than the 2009-T6 die forging, 2009-T83 extrusion and 2397-T87 plate, as measured by the percent elongation at fracture in tension. The electrical conductivity of the 2009-T6 die forgings, 2099-T83 extrusions, and 2397-T87 plate were nearly the same and remained relatively constant over time at all exposure temperatures. The electrical conductivity of the 7075-T7651 plate, 7085-T7452 die forgings and 7085-T7651 plate increased with time, with the increase occurring earlier in time at the higher exposure temperatures.

S.C. Bergsma et al. 1998 [Ref. 20]All of the alloys used in this study were supplied by Northwest Aluminum (NAW; The Dalles, OR), unless otherwise indicated. The composition of the 6069 and 6061 alloys used in this study are listed in table. Several composition range is listed in the form of direct chill-cat ingots using Wagstaff Airspil™ tooling. Ingots in this study (including those used for extrusion) typically varied from 89 to 110 mm diameter The as-cast NWA air slip direct chill cast alloy is composed of α-AlFeVCrSi (Chinese script) and Q-phase having the approximate composition Al5Cu2MG8Si7. Since both of the phase form as the result of a liquid-to-solid transformation, they tend to be coarse, approximately 2μm along the longest dimension. Mg2Si particles were observed in center parts of dendrites. The solidus temperature of 6069 was determined to be approximately 587°C and was before all of the Mg2Si was dissolved. Conventional tensile testing was usually performed in an Instron 4505 at ambient temperature, typically at a strain rate of 6.67X10^-4s^-1. Fatigue specimen were tested on a servo-hydraulic Instron 8521. The corrosion fatigue procedure is described in (REF 21). Koon-Hall in Portland OR performed a few of the reported tensile test (REF22) Transmission electron microscopy (TEM) was performed on 6061 and 6069 T6 determine the strengthening phase. The compositions were consistent with TABLE Three-mm disks were extracted from 6061 and 6069 ingots with a 6069 T6 of 568°C, solution anneal for 2 hour, water quenched and aged at 171°C and aged at 117°C for 8 hour. Disks were ground to a thickness of 200μm and electro polished ro perforation using a Fischione jet polishing unit, with a 5% per chloric acid,65% methanol, and 35% butoxy ethanol at -20°C and 35 V. All foils were oriented with the [100] parallel to the beam using a [020] g vector. Precipitate density was calculated as a number per unit volume at a fixed (1/2) extinction distance. TEM was performed on a JEOL 200CX located at the National Center for Electron Microscopy at Lawrence Berkeley National Laboratory. The T6 procedure varied slightly thought out this investigation but typical practice included solution anneal at 566-571°C for 1-2 hour, 177° C age for 16-20 hour, or age of 171° C for 16-24 hour. Overall, the best T6 may be 563-568 C solution anneal for 1.5 hour, with a 171° C, 16 hour age. This may improve the ductility by 1-2% without a change in strength over the above T6 range. The slight Variability creates, in some case the appearance of scatter, but for indicate ingot and T6 practice the mechanical properties were within 1-2%.
Tensile properties of ingots and extrusions; Overall, the result of the collective extrusion tests emphasize that the mechanical properties of 6069 extruded alloys appear extrusion-temperature dependent and configuration dependent. A summary of 6069 extrusion and ingot data are compared with data from other aluminum alloys (REF 23-25). Overall, 6069-T6 appears to have superior tensile properties to 6013 and 6061-T6 and comparable properties to 2024-T3 and 7129-T6.
Fracture toughness, sustained load cracking, and stress corrosion cracking:
Preliminary fracture toughness tests on 6069-T6 by other investigators (Private communication, G, Bhuyan Power Tech, Vancouver, Canada, August 1994) using specimens extracted from a cold impact extruded ingot, into high-pressure gas cylinders, indicate a K(ic) of 35-40 MPa m(1/2), 10-20% higher than for similar extrusion of 6061-T6.Power Tech Labs, evaluated the sustained load cracking (SLC) resistance of cold impact forged 6069-T6 cylindrical (Ref. 26). Based on the test results, it was is consistantent with earlier 6069-T6 test on cold impact extruded high-pressure gas cylinders (Ref. 27)

Stress corrosion cracking (SCC) tests were also performed using 30 g/l NaCl and 5g/l HCl and it was found that the 6069-T6 form cold impact high-pressure gas cylinders were immune as reported in (Ref.27,28)
A new 6069 alloy was developed for application in hot and cold extrusion and forging. The alloy has favorable formability, with nominal tensile properties after hot or cold extrusion ranging from 39 to 476 MPa UTS, 353 to 448 MPa yield strength and 14-20% elongation.The 6069-T6 strengthening over conventional 6061-T6 is mostly due to increased β precipitates.Favorable fatigue and corrosion- fatigue properties are also evident as compared to other alloys.Favorable fracture toughness, stress-corrosion cracking, and sustained- load cracking resistance is observed in studies at other laboratories.

M.Langseth et al, [Ref. 29]The objective of the investigation was to study the energy the absorption of square thin-walled aluminum extrusion of alloy AA6060 tempers T4 and T6 subjected to axial impact. The test specimens were clamped at the lower end and were free at the top. The impact tests were carried out by means of a pneumatic accelerator consisting of a reservoir of compressed air and an accelerator tube. During testing a rigid projectile with a mass of 56 kg was fired against an aluminum cover resting on the top of the specimens. The cover, which had a mass of 0.74 kg was used to ensure a central impact. The clamping support was obtained by means of two plates 1 and 2 fixed to a rigid support, and a wooden piece 3 adjusted to the inside periphery of the test specimens.
The projectile was instrumented by strain gauge that were used to measure the interface force between projectile and test specimen. Assuming the projectile and cover as rigid bodies, the displacement of the specimens was calculated by means of double integration of the force-time history after filtering out the high frequency elastic vibration setup in the filtering might reduce the measured peak load somewhat depending on the filer cut-off frequency. Comparing the calculated permanent displacement of the test specimens with that measured on the test specimens after impact, the accuracy of the measurement was estimated to ± 5%. A more detailed description of the test rig and instrumentation system is given in (Ref. 29)
The variation of the impact energy T with respect to the permanent axial displacement w(p) for all test specimens. An almost linear relationship is found between energy and displacement for temper T4 and tests performed with the same impact energy give approximately the same percent axial displacement. The latter implies that the difference in energy absorption between a symmetric and a mixed (sym. and asym.) mode within the parametric range studied is indistinguishable from a practical point of view, which is also shown analytically by Abramowicz and Jones (Ref. 30). For temper T6 however, scatter in the measurement permanent displacement is found for parallel tests, especially for the 2.5mm thick tubes. The reason for this scatter is assumed to be related to the appreence of extension; modes in combination with symmetric and asymmetric.
The energy absorption in axially loaded square thin-walled aluminium extrusion in alloy AA6060 tempers T4 and T6 has been studied experimentally and the result can be summarized as follows:
An almost linear relationship is found between the impact energy and the permanent axial displacement for temper T4 as only symmetric and asymmetric deformation modes are observed .For temper T6, however, scatter in the measured permanent displacement is found for parallel tests due to the appearance of extensional modes in combination with symmetric and asymmetric modes.A reduced energy absorption is found when introducing geometrical imperfertion obtained from static buckling tests. The peak load is reduced and an almost constant mean load is found with respect to the axial displacement.Only numerical analysis carried with LS-DYNA3D show reasonable agreement with test data.Only symmetric deformation modes are observed for the static tests, and the number of lobes is a function of the strain hardening.

T.Minoda and H. Yoshida 2002 [Ref. 3] The 6061 aluminum alloy billet was prepared by direct chill casting with diameter of 250 mm and homogenized at 550° C. After homogenization, the billet was heated to 520° C for about 300 seconds using an induction heater was extruded into the shape. At speed of 133 mm/s. The extrusion was then press quenched with water. Artificial aging was carried out at 175° C for 8 hour.
To clarify the differences in the intergranular corrosion behavior between the surface of the extrusion and the center thickness, the specimen was ground to half-thickness and polished with a #1200 abrasive paper and then the intergranular corrosion test was carried out for 24 hours.
To identify the misorientation angle of the boundaries, which easily exhibit intergranular corrosion, a polished L-ST cress section of the extrusion underwent intergranular corrosion testing. After the test, the specimens was desmutted with concentrated nitric acid and etched with dilute HF solution and the grain boundary misorientation angle were measured with an SEM with EBSD
For purpose of investigating the effect of decreasing low-angle boundaries on the intergranular corrosion behavior, two specimens of 6061-T4 extrusion after press quenching were ground to a 3 mm thickness. One specimen was cold rolled with a reduction of 25 pet and other was not cold rolled. A solution heat treatment at 520° C for 1 hour followed by quenching into water and artificial aging at 175° C for 8 hour was than carried out on both specimen. The specimens next underwent intergranular corrosion testing measurement of the [111] pole figure and observation of the optical microscope (OM) and TEM structures. Moreover, the grain boundary misorientation angle of the cold-rolled specimen after artificial aging were measured using the scanning electron microscopy (SEM) with electron backscattered diffraction (EBSD).
The results of the intergranular corrosion test with a specimen that was ground to half-thickness. The result show that the surface resistance to intergranular corrosion was different in the surface layer and inside the extrusion,that is

intergranular corrosion easily occurred in the surface layer, while it hardly occurred in side of extrusion as shown in the microstructure of the surface layer, and center of extrusion. It is seem that the amount of the precipitates in the surface layer and in the center of the extrusion is same. The TEM microscopy and the selected area diffraction pattern of the precipitates. Both precipitates is identified as Mg2Si. The amount of Mg2Si precipitates is almost the same in the surface layer and in the center of the extrusion and the difference of the resistance to intergranular corrosion did not result from the distribution of the specimen. The TEM microscopy of the specimen. Precipitates-free zones (PFZ) were clearly observed at most of the grain boundaries in the surface layer, while they were not clearly observed at most of the grain boundaries in the center of the specimens.

The grain show clear contrast in the surface layer of the extrusion, which is not observed at the center of specimens. It appear that recrystallized grains are presented in the surface layer because hear stress and heat genera ration caused by the friction against the die bearing were greater than those inside the extrusion. The most of boundaries are higher than 0.26 rad and (15deg) at the surface while 60pct of the boundaries were lower than 0.26 rad (15deg) at center of the extrusion.

The intergranular corrosion test of the 6061-T6 extrusion indicated that every intergranular corrosion to a 300μm depth occurred at 24 hours. However, the corrosion depth did not increase with time and then corrosion propagated into the matrix for long period.The PFZ were clearly observed at the surface layer, while they were not clearly observed in the center of the sample. It apparent that the dissolution of the PFZs occur during the intergranular corrosion test because of the potential gap between the matrix, grain boundary precipitate and PFZs.Most of the boundaries were higher than 0.26 rad (15deg) in the surface layer while 60 pct of grain boundaries were lower than 0.26 rad (15deg) in the inside of the extrusion.

O.Reiso,2004 [Ref. 1]The different process step in the production of aluminum extrusion:

Melt treatment and alloys.DC casting of extrusion ingots (pillets or robbin) and homogenization of the ingots are all done in the cast house.Then the ingots are shipped to the extrusion plants where they are first preheated to desired extrusion temperature, extruded, cooled, stretched and aged. The temperature and time-course through the same process steps with indications temperature and times used during extrusion of AlMgSi alloys. Note that the scale varies a lot for the different steps and also note the high heating rate encountered during the extrusion operation.The productivity in an extrusion plant may be limited from numerous reason. Considering the press itself, the extrusion speed may be limited by factors such as available pressure, unbalanced metals flow (for example different speeds of extrusions in a multiple hole die), geometric tolerance and the occurrence of defects (die line, pick-ups, tearing and hot shortness, and spalling) in the surface of the extruded section. From a metallurgical point of view it is especially the limitation from the occurrence of the surface defects that are of main interest.

The melting reaction in an AlMgSi alloy where large Mg2Si particle have precipitated during slow cooling of the alloy from the homogenization temperature. Upon rapid heating of the alloy in a salt bath these Mg2Si particle together with their surrounding matrix melts as the eutectic temperature is exceeded. If the sample is redrawn from the salt bath before the Mg and Si in liquid diffuse into the Al matrix the melt will form a eutectic structure in the subsequent solidification reaction. The reaction rates for such local melting reaction have been found to be very high [Ref. 32,33] and may thus take place also during the very high heating rates encountered during the extrusion operation.

This paper has put emphasis on the important role of the extrusion process and in particular extrusion of AlMgSi alloys in the aluminum industry.Local melting reaction in the material during extrusion are identified as a factor determining the productivity limit for AlMgSi alloys. The effects of alloys chemistry billet preheating practice and homogenization practice on productivity and product properties during extrusion of AlMgSi alloys have been discussed.Here microstructure of alloying element of Mg and Si is determined by factors such as alloy composition and the whole thermal and thermos-mechanical history of the material this means that in order to optimize productivity and product properties the process chain from melt to finished extrusion must be considered as a whole and that what occurs at one-stage in the process chain is not independent of the other stages.

III. CONCLUSION

Nano-structure of Al-7.5Mg alloy powder with unmlled powder show similar nano-stucture in TEM after blended and extrusion. Where with respect to yield strength, ultimate tensile strength and elongation. Cryomilled of Al-7.5Mg have four time yield strength than conventional Al-alloy. Unmilled proportion of 15% and 30% increasing may than decrease yield strength 1.7% and 13.6% respectively. The result show that there are similarities between elongation and proportion of unmilled powder. To increase in yield strength, ultimate tensile strength, elongation percent of conventional Al- alloy in extrusion process, it should be processed as Al-7.5Mg alloy powder (cryomilled) is done. But in optimum cost and similarities in nano-struture as well.

With respect to2099-T83 extrusion with thermal exposure (with time and temp.) again in room temperature tensile strength decrease. Ultimate tensile strength and yield strength decrease after 10 hour at 180° C and 18% after 100 hours. As the tensile strength decrease which is correlated with decrease in hardness. Electrical conductivity remains constant. Furthermore, studies is require in material to overcome with thermal exposure.

Now, 6069-T6 alloy has been developed for uses in hot and cold extrusion with suitable mechanical properties. Ultimate tensile strength range is from 39 to 475 MPa, yield strength 353 to 448 MPa and elongation is 14-20% with superior

tensile properties than 6013 and 6061-T3, 2024-T3 and 7127-T6. As studied and developed of 6069 alloy same likewise other alloy should be enhanced its mechanical properties.
*A reduced energy absorption there need geometrical perfection. Which reduce high load distribution it symmetrically.
***** Precipitates-free zones (PFZ) were clearly observed at most of the grain boundaries in the surface layer, while they were not clearly observed at most of the grain boundaries in the center of the specimens. Therefore, equal distribution load and friction at the center in extrusion processes.

IV. FUTURE SCOPE

The aim of this review paper is to current and future application of Al-alloy in structure and transportation industry including requirement or alteration of alloy properties and production technology. Also to evaluate the response of various Al-alloy to prolonged thermal exposure, material mechanical properties, TEM, SEM, while performing extrusion process to get product.

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