THE AR-15

PART III

So, You Want to Build an AR? Part 2

ROCKWELL COLLINS - TUSTIN SHOOTING CLUB

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THE LOWER RECEIVER

THE LOWER RECEIVER

- The Lower Receiver carries the firearms **Serial Number**
  - **This odd-shaped, and innocent-looking, piece of metal is therefore considered a firearm and must be treated as such**
  - **Purchase of a stripped Lower Receiver is bound by all laws pertaining to the purchase of a centerfire rifle**
    - **Dealer Record of Sale (DROS) paperwork**
    - **10-day waiting period**
  - **Purchase of more than two (2) stripped Lower Receivers at one time has garnered the attention of the BATF in the recent past**

- The AR-15 Stripped Lower Receiver might be the cheapest firearm you ever purchase!
  - **Anderson Manufacturing Lowers are currently advertised for $43 each!**
  - **Of course, that's just the entry fee…**

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VARIOUS MANUFACTURING PROCESSES

- Forged and Machined – **This is the 'Mil-Spec' version**
  - **Forged to near-net shape without any holes or cut-outs**
  - **Requires finish machining**
- Machined Billet
  - **Machined in entirety starting from a blank piece of metal – i.e. a 'billet'**
- Cast and Machined
  - **Casting to net shape, including features and (some) holes**
  - **Requires finish machining, including final hole sizing**
- Injection Molded?
  - **Yes, indeed. Injection molded to final shape and hole size**
- 3-D Printer?
  - **Yep. It has been done. Printed to final shape and hole size.**
  - **Just don't use it to bash open a door during an entry…**

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FORGED RECEIVERS

- Forged from raw stock aluminum alloy
- The Forging Process
  - http://anchorharvey.com/the_process.html

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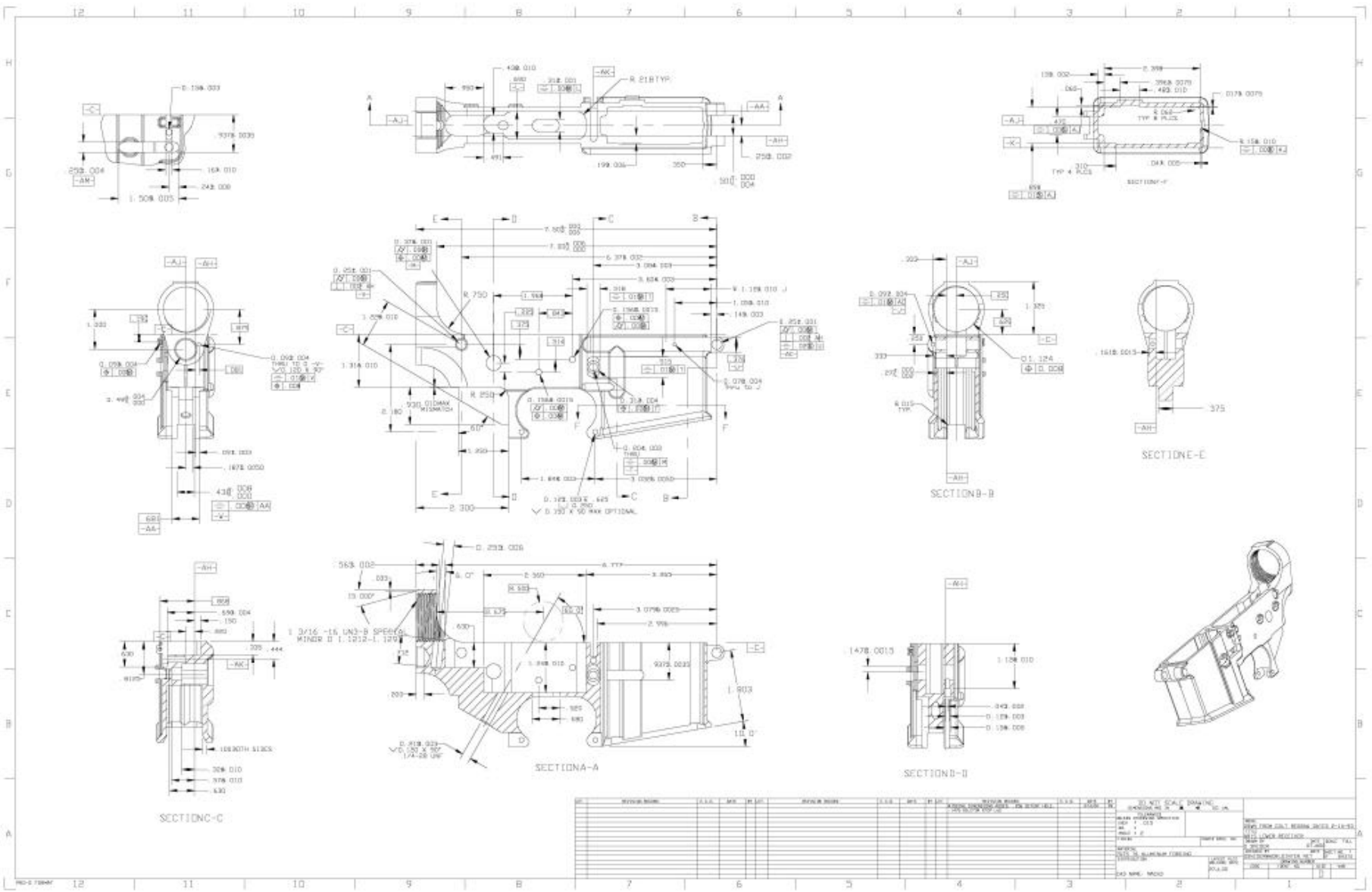
MACHINING A FORGED “MIL-SPEC” RECEIVER



MACHINING A FORGED "MIL-SPEC" RECEIVER

- Some interesting links
  - **Machining a forged receiver in a home shop**
    - http://www.metalworkingfun.com/showthread.php?tid=520
  - **How to do it so you can make money in the process**
    - http://www.calguns.net/calgunforum/showthread.php?t=662273
    - https://www.youtube.com/watch?v=xQw50w_JWzk

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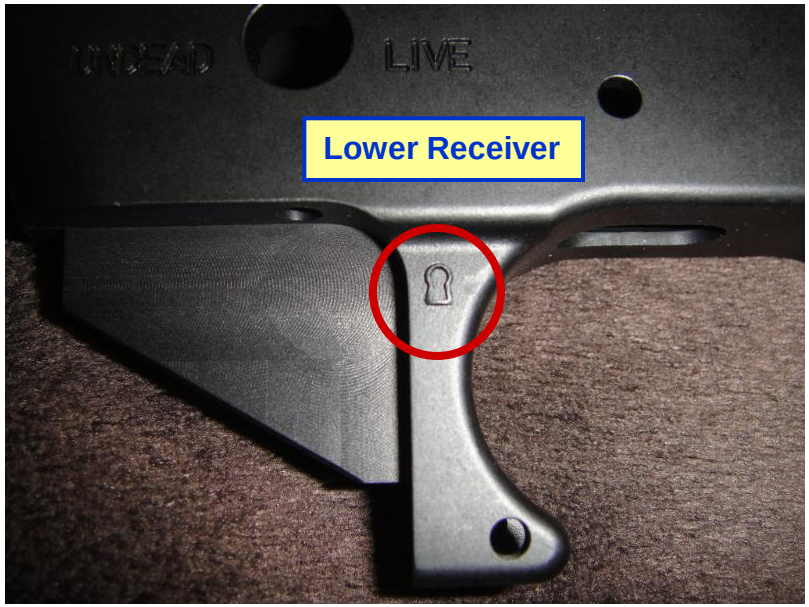
AR-15 RECEIVER FORGING MARKINGS

- Ever see the symbols on the side of your AR-15 Upper or Lower Receiver and wonder what they meant? The mark corresponds to which company made the raw aluminum forging that later became the Receiver.
- The Receiver forgings are all essentially the same, they simply come from different forging houses. The quality of the Receiver ultimately comes from the Manufacturer that CNC machines the raw forging into the finished Receiver.
- The company that performs the anodizing (or other finish process) is then responsible for how well the finish of the Receiver becomes.



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AR-15 RECEIVER FORGE MARKINGS

A (SPLINTERED) = ANCHOR HARVEY ALUMINUM
AF = ALCOA FORGE
C AF = COLT ALCO FORGE
C MB = COLT / MUELLER BRASS
CARDINAL (STYLIZED) = CARDINAL FORGE
CH = COLT HARVEY ALUMINUM
CIRCLE/CROSSHAIRS W/ "AR" = ARMALITE
CK = COLT / KAISER ALUMINUM
CM = COLT / MARTIN MARIETTA
D (STYLIZED) = DIEMACO
DK = DIEMACO / KAISER ALUMINUM
E = EMCO
EK = EMCO / KAISER
E MB = EMCO / MUELLER BRASS
F KEYHOLE = FNMI / CERRO FORGE FA = FNMI / ANCHOR HARVEY
FK = FNMI / KAISER ALUMINUM
FM = FN/MARTIN MARIETTA
FMB = FNMI / MUELLER BRASS
KEYHOLE = CERRO FORGE
L = LEWIS MACHINE & TOOL
LK = LAR / KAISER ALUMINUM
LM = LAR / MARTIN MARIETTA
M (UNDER DIAMOND) = MUELLER INDUSTRIES
PA = CAPCO / ANCHOR HARVEY
PM = CAPCO / MARTIN MARIETTA
SQUARE = BRASS ALUMINUM FORGING ENTERPRISES

THE TWO MOST POPULAR SYMBOLS YOU WILL SEE ON AR RECEIVERS ARE THE **'KEYHOLE' (CERRO FORGE)** AND THE **'SQUARE' (BRASS ALUMINUM FORGING ENTERPRISES)**

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LOWER RECEIVER MANUFACTURERS

- There is only a small number of manufacturers that actually produce lower receivers for the AR market. **Remember, manufacture of the <u>finished</u> lower receiver constitutes manufacture of a firearm and requires specific licensing.**
- CMT, LMT, LAR and MMS produce the majority of receivers for the market. In addition to their own brand, they are contracted by many other companies
  - **They receive orders from many licensed manufacturers who obtain an ATF variance to have them machine receivers and add a logo on their behalf.**

- **These companies do machine work only. They are not foundries, and do not make forgings.**
- They start with either a raw forging, and do the finish machining, or they start with a blank billet (chunk) of material and machine the entire receiver

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AR-15 LOWER RECEIVER MANUFACTURERS

- AND THE COMPANIES THEY MANUFACTURER FOR

Aero Precision
- Aero Precision
- Surplus Ammo and Arms
- Palmetto State Armory

Continental Machine Tool
- Stag
- Rock River Arms
- High Standard
- Noveske
- Century (New)
- Global Tactical
- CLE
- S&W
- MGI
- Wilson Tactical
- Grenadier Precision
- Colt

JVP
- Double Star
- LRB
- Charles Daly

LAR Manufacturing
- LAR
- Bushmaster
- Ametec
- DPMS
- CMMG
- Double Star
- Fulton Armory
- Spike's Tactical

Lewis Machine & Tool
- LMT
- Lauer
- DS Arms
- PWA
- Eagle
- Armalite
- Knights Armament
- Barrett

Mega Machine Shop
- Mega
- GSE
- Dalphon
- POF
- Alexander Arms

Olympic
- Olympic
- SGW
- Tromix
- Palmetto
- Dalphon
- Frankford
- Century (Old)

Sun Devil
- Sun Devil
- Lone Star Armory

NOTE: The companies listed in Bold font perform **machining**. They do not make forgings. See the list of forging identification marks for the actual foundry.

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FORGED “MIL-SPEC” VS. MACHINED “BILLET”

- Why Forging?
  - **Cost**
    - **$43.00 Anderson Mfg. forged receiver vs. the $300 Noveske machined billet receiver**
  - **Strength**
  - **Production volume/throughput**
  - **At the time the original AR-15 receiver was designed, high-speed CNC machines were not available**

- Why Machined “Billet”?
  - **If you don’t have expensive forging equipment, it’s all you have**
  - **Cost-effective for smaller production runs**
  - **Highly customizable!**
    - **Add/modify features**
    - **Cosmetic changes**

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FORGED “MIL-SPEC” VS. MACHINED “BILLET”

- Compare Features of Machined Receiver to Forged Receiver
  - **Example - 80% Machined Lower from Optimus Defense**
  - http://www.calguns.net/calgunforum/showthread.php?t=860393
  - **Changes from Mil-Spec**

    * Precision machined out of 7075-T651 **aluminum plate** by a California company that manufactures parts for major aerospace companies.
    * **Flared and slightly oversized mag-well** with a **25 degree taper angle for smooth/fast magazine loading/unloading** of both mil-spec metal magazines and also polymer magazines (tend to be slightly larger).
    * Front of receiver is about 1/2" longer than mil-spec to allow for a better hold when using gloves or if you have big fingers.
    * **Solid and oversized winter trigger guard** that is compatible with most gloves.
    * **Reinforced around buffer tube thread.**
    * **Exterior edges are CNC chamfered to eliminate sharp corners or edges** that can snag on clothing/gear or be uncomfortable to your hands.
    * Tight fit (small side of mil-spec tolerances) for pivot & take-down pin holes, upper receiver lug slots, and upper mating profile. Reduces slop and rattle of lower to upper interface.
    * Vibro finished to remove sharp edges and machining marks.
    * Marked: CAL. MULTI
    * Compatible with mil-spec lower parts.
    * Compatible with most pistol grips including grips that have a front tab, such as TangoDown grips.
    * Compatible with mil-spec metal magazine and polymer magazines including Magpul Gen3 PMAGs.

MACHINED "BILLET"

- Billet
  - **"Ingot and billet are cast from molten aluminum. In the cast house, crucibles of molten aluminum empty their silvery liquid either directly into molds or into a holding furnace where the metal is kept molten at temperatures between 1200 and 1500 degrees F. Alloying elements are then added."**
  - **"Ingot and billet play an integral part in the production of almost all other aluminum products. Plate, sheet, foil, wire, rod, and bar products are all produced by pressing or rolling ingot and billet."**

- Machined "Billet" Receivers are really machined from **Aluminum Alloy Plate**

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MACHINED “BILLET” RECEIVER (80% COMPLETE)

REFERENCES

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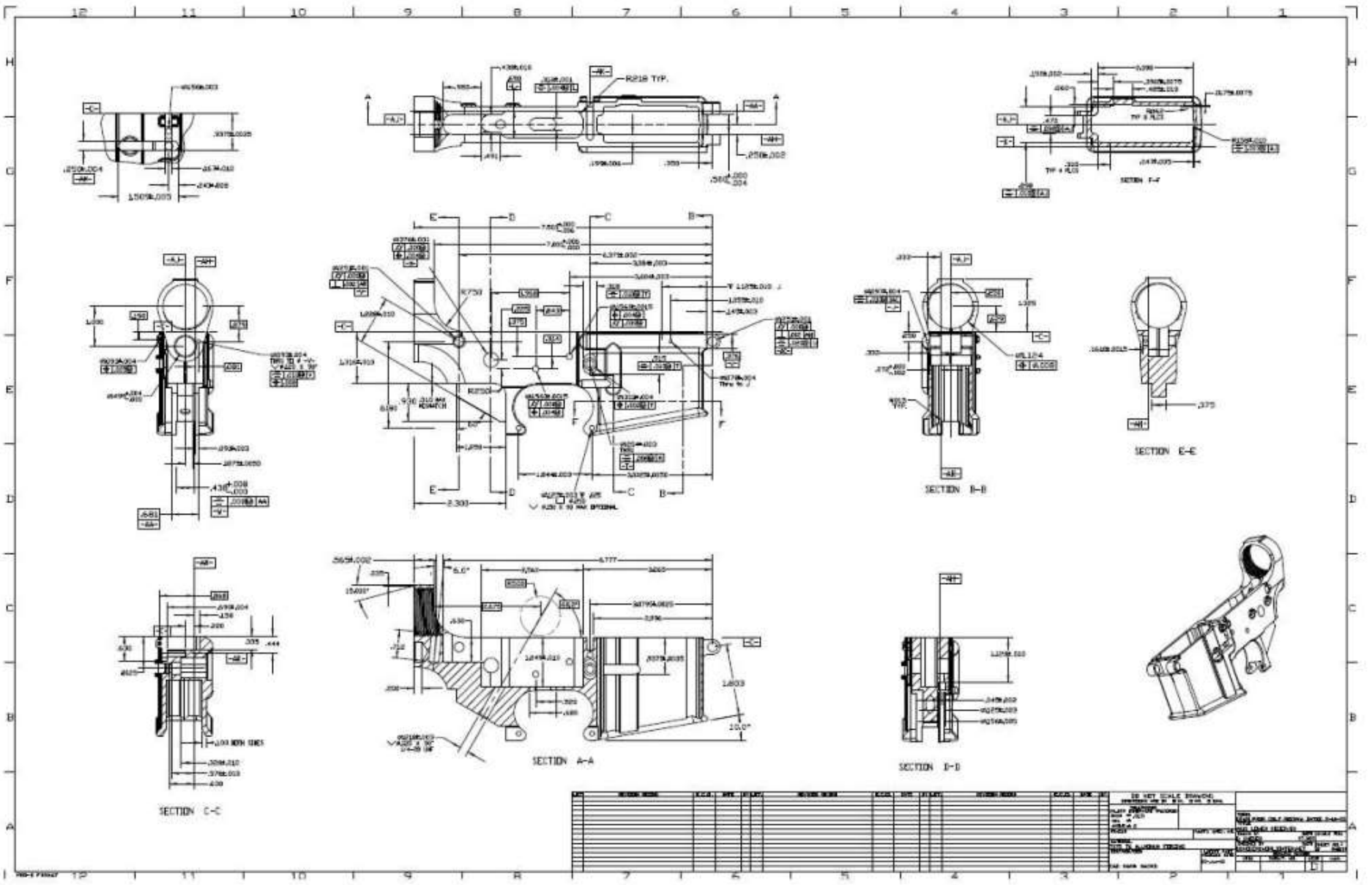

VARIOUS MATERIALS USED

- Forged and Machined
  - **7075-T6 Aluminum Alloy**
  - **6061-T6 Aluminum Alloy**
  - **202?...**
- Machined Billet
  - **7075-T6 Aluminum Alloy**
  - **6061-T6 Aluminum Alloy**
  - **Steel (Yes! Check out Turnbull Manufacturing AR, with true color case-hardening!)**
- Cast and Machined
  - **Casting to net shape, including features and (some) holes**
  - **Requires finish machining, including final hole sizing**
- Injection Molded?
  - **Yes, indeed. Injection molded to final shape and hole size**
- 3-D Printer?
  - **Yep. It has been done. Printed to final shape and hole size.**
  - **Just don't use it to bash open a door during an entry…**

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VARIOUS MATERIALS USED

- **Steel (Yes! Check out T… color case-hardening!)**
- Cast and Machined
- Injection Molded?
  - **Cavalry Arms Corp, CAV-15** Coyote Br…
    16" M4 barrel w/AimPoint and A2 flash suppr…

- 3-D Printer?

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