



**ACT** *Advanced  
Spiral  
Technology*  
Revolutionary *TruHelix™* Flight Forming System

*Flight Forming Technology  
Lifts the cloak on an old 'Black Art'*

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## *The Black Art of Forming Flights*

Until the advent of Advanced Spiral Technology's TruHelix™ Flight Forming System helical screw “pitch” dependent dies in various forming machines primarily formed flights. The accuracy and consistency of the helical form was largely a function of the die pitches, the experience of the press operator and the accuracy of the cut annulus from which the helix was formed.

All of this cloaked the Black Art that was “Flight Forming”.

**The Black Art** – the use of restrictive pitch dependent forming dies that require numerous sets of Right Hand tools and the equivalent sets of Left Hand tools.

**The Black Art** – tools and dies constantly wear and require regular maintenance.

**The Black Art** – means heavy tools that take up lots of space and need mechanical lifting, valuable production time is lost swapping over tool sets.

**The Black Art** – relies heavily on the operator's experience, attitude and attention to detail to achieve an adequate result. Lack of experience can result in an inferior product. If an operator is not giving the operation his full attention it can show in the finished product.

**The Black Art** – always refers to the 'book of sizes', takes an educated guess, try CAD program developments regardless of the technique the confidence in obtaining an accurate result first time is low so trials are needed to ultimately achieve an acceptable, but not always accurate, outcome.

**The Black Art** – is often deforming which then requires multiple runs and several reworks by the 'expert' operator to at least achieve a satisfactory result. Fit on the centre tube and matching at the flight ends is often compromised and material and time is wasted.

**The Black Art** – a machine that is potentially dangerous to use.

With the release of Advanced Spiral Technology TruHelix™ Flight Forming System, The Black Art is now a thing of the past.



## *What is the TruHelix™ System?*

AST™ TruHelix™ Flight Forming System revolutionises flight design and manufacture.

**TruHelix™** – Doesn't use heavy pitch dependant forming dies. It uses a pack of lightweight forming plates that can produce flights of unprecedented quality regardless of the pitch, outside diameter and inside diameter. The same plates produce both left and right hand flights. Our patented systems uses Young's-Modulos, Brinell Scale and other scientific data built into the software to ensure the accuracy of the forming process dependant on sizes and materials to be cut and formed.

**TruHelix™** – the forming plates cost less to produce, wear and maintenance is minimal.

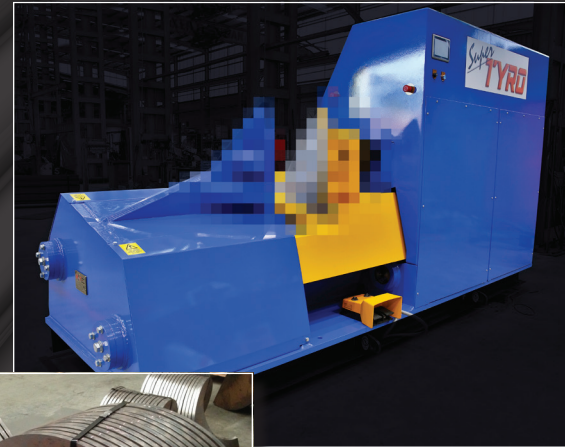
**TruHelix™** – tools take up a fraction of the space required for conventional dies, can be changed by hand in a matter of minutes.

**TruHelix™** – Operator training to reach full production capability is measured in days not years, producing top quality flights three to five times faster than old methods.

**TruHelix™** – the Flight Blank Designer program will accurately calculate the perfect blank size based on inputting the finished size of your required flight, The Machine Configuration Tool shows the operator exactly how to set up the forming plates and what information to put into the SuperTyro™ Forming machine controls to produce consistent quality flights time after time, accuracy is assured.

**TruHelix™** – the system forms (not deforms) the material to achieve a pure true helix shape, operator input is negligible. Fitting to centre tube and flight ends is improved and additional savings made by flights consistently fitting better requiring less labour time.

**TruHelix™** – conforms to all known OH&S requirements and meets CE (European Community) requirements for safety.



*Flight Forming is now using 21st Century technology.*

## *Features of the TruHelix™ System*

Flight Blank Designer Software produces first time every time perfect annular shape to enable a perfect helix to be formed – this saves the costs of having a tertiary qualified engineer employed and ensures that material is not wasted.

Drawing files produced by the Flight Blank Designer software can be sent directly to the cutting table set-up computer in .dxf format for nesting – this speeds up the production process saving cost of production and quicker turn around of projects.

Machine Configuration Setup Software - By simply inputting the final flight specifications required the program produces a set-up instruction for the SuperTyro™ press and gives the data to enter for all pressures and speeds – no need for exclusive book of sizes and specialised operators with years of experience a dextrous and motivated person can be trained in a matter of days and have double the productivity of the old style press operator.

Multiple use Forming Packs offer literally billions of flight size configurations from a box measuring less than one cubic metre and weighing only 500-kilograms, tooling can be changed by one man in minutes and left and right hand are interchangeable from the same forming plates – saves the cost of valuable factory space, reduces costs of production time, offers tremendous flexibility from one set of tools.

Forming Plates require minimal maintenance – there is virtually no maintenance costs provided plates are treated with care the tooling will last a lifetime.

Speed of set-up and production is approximately two to three times faster than conventional pressing – improves productivity and reduces cost of manufacture.

All Setting up files and programs can be saved and re-used for the next production run – de-skills the setting up operation and virtually anyone can easily run the system saving high cost of specialist engineers and operators.

The SuperTyro™ Pressing machine takes up very little floor space yet exerts the same forming pressures of large vertical presses.

Ethernet connection directly to the SuperTyro™ and on-line support of all software – this allows fast response times in case of difficulty and priceless peace of mind for the user.

AST™ only use well known high quality components – parts are available in all developed countries and most under-developed with many distributors of the components having off-the-shelf stock available locally – in the unlikely event of a component failure you do not have to wait for long expensive freight delays.

In-house training available by AST™ expert – while not absolutely necessary it is highly recommended that the new user chooses to have a AST™ expert train their staff in the use of the system – gives the new user a quicker pay back time.



## *The Technology That Forms a TruHelix™ System*

### **Forming Parameters Program**

Eliminates the reliance on operator skill by setting the machine to the correct outputs ensuring consistent outcomes all of the time every time providing superior high volume productivity. You simply key into the control panel the finished flight parameters of Outside Diameter, Inside Diameter, Pitch, Thickness and Material and your flight-forming machine will automatically set the speed, pressure and travel set points applicable to flight to be formed.

### **Platen Sets**

The removable Platen Sets work in pairs to provide the correct set up and fixing relationship between the Forming Plates and the Forming Machine. They enable the forming plates to be adjustable and interchangeable maximizing the functionality and capacity of the Forming Machine and the System. They are especially hardened for long life. In most instances two (2) sets – one (1) for longer pitches and one (1) for standard and/or shorter pitches will be all that is required.

### **Centre Forming Plate Sets**

Act as a control to maximise the consistency of helical shape through the whole of the flight.

### **Adjustable Centre Forming Plate**

Has been specifically designed for fine adjustment to enable the user to achieve an accurate cant angle during the forming process while working to maximise the consistency of helical shape through the whole of the flight.

### **Flight Blank Support Bar Sets**

Are designed with fine adjustment and work in conjunction with the Forming Plates allowing the operator to correctly position the flight in the machine for forming. They incorporate special hardened supports (roller model available at additional cost) and also act as a load supporting device ensuring that the machine carries the weight during the forming process not the operator.

### **Forming Plate Sets**

Four (4) especially hardened interchangeable plates make up a Forming Plate Set. Something in the order of 41 sets will enable you to produce the full complement of typical flight sizes (tens of thousands of different flight combinations) applicable to the SuperTyro™ machine.

### **System Software License**

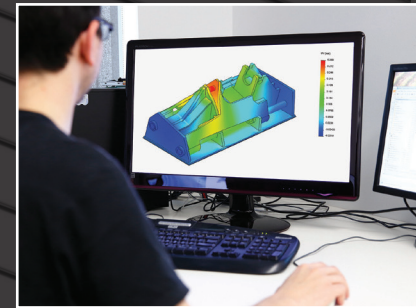
An ongoing program to further develop and improve the system continues, so the costs associated with the components of the system continue to accrue and need to be funded by the beneficiaries (AST™ and its 'Partners'). The System Software License (Flight Blank Designer - FBD & Machine Configuration - MCT) is an obligatory fee for the first five (5) years of the agreement. After the five-year period it is at the discretion of the customer whether they continue with this service or not.

You are provided with unrestricted copies of the most up to date version of AST's™ Flight Blank Designer Program and AST's™ Machine Configuration Program. All software upgrades are automatically passed through free to all License 'Partners' and all technical documents and specifications relating to hardware improvements/upgrades are provided for the License 'Partner' to implement if they desire.

Every Licensee 'Partner' receives full technical support via our technical helpdesk

### **Training**

An AST™ expert will attend your facility to provide training on the system.



## SuperTyro™ a Machine with the Skills Built-In

### Machine Configuration Program

The inputs to this program are:

- a) outside diameter
- b) inside diameter
- c) pitch
- d) material thickness
- e) Cant angle (we can form a flight that fits at an angle to the centre tube)
- f) material type

Note on material type: The program is preloaded with most common material types, however new materials can be added at any time.

Built into the program is Young's Modulus, 0.2% Proof Stress (Yield Strength for mild steel) and the materials Proportionality Limits. This provides a computation that scientifically considers "spring back".

Once calibrated specifically to a site the Machine Configuration Program will select the correct forming plates, from the database of available plates, also making allowance for the varying "spring back" of materials.

This gives the production team ultimate flexibility and control even when faced with varying quality of materials.

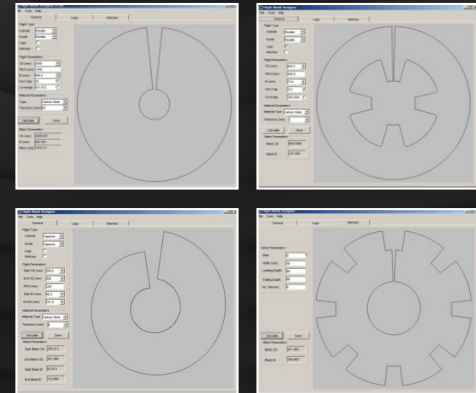
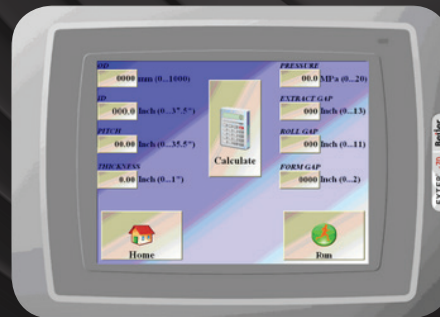
The program also calculates the exact position of the forming plates and the flight blank support bars and displays a set up procedure that can be printed out (with the scope of work) and given to the machine operator to set the forming plates correctly in the machine. At this point any operator can form the flight.

It is important to mention that another critical part of this process is addressed by another software program we refer to as "Flight Blank Designer Program". Into this programme you input your finished flight parameters and the cutting sizes for the flat flight blank are outputted, both graphically on the screen and as a .dxf file to transfer to your cutting machine.

The SuperTyro™ has been designed and built with the specific objective of covering the vast majority of all sectional screw flight requirements - 150mm diameter to 1200mm diameter up to 25mm thick.

In some circumstances (dependant on a certain factors) the SuperTyro™ also has the flexibility to manufacture sectional screw flights larger than 1200mm diameter for example when the flight land (outside diameter minus inside diameter divide by 2) is 635mm or less.

Long pitch flights and exotic materials are easily accommodated.



## *Who are AST™?*

Since the 3rd century BC the helix has been the principal element in a myriad of machines from water pumps to screw conveyors to earth boring augers, the efficiency of these machines relies heavily on the accuracy of the helical form. Since this time craftsmen and engineers have been trying to “blacksmith” out this complex shape with varying degrees of success.

Our founding directors in Sydney and Melbourne started working in their fathers engineering businesses over forty years ago after completing engineering degrees at university.

Combining these companies 14-years ago to form BulkNet Pty Ltd who specialise in the design and manufacture of quality robust equipment for the industrial and agricultural Bulk Materials Handling market.

Our Melbourne factory had been producing helical flights for many years before this using traditional fixed die methods while realising there must be a better more scientific method that did not rely on high maintenance dies and specialist personnel with their secret books of sizes.

The combination of the two companies showed the true meaning of the word synergy and work was started on developing a new more exacting and yet simpler way of producing helical flights.

After many years developing both software and hardware to refine the process a workable system was produced and was being used in-house only.

A chance approach by a European company that had seen the technology on YouTube merely to show what could be achieved started a landslide of interest from all around the globe.

Companies that had for years struggled with known methods of manufacture that were slow, dangerous and high maintenance realised there was a far better way to produce flights without the cost of specialist design engineers and secretive craftsmen, huge pressing machines and dies taking up large areas of their factory space.

Of course the story does not stop here AST™ are constantly working on new and improved machine designs for smaller and larger flights, more intuitive software and the use of new component technology to enhance our patented designs.

We look forward to hearing from OEM and specialist flight design companies keen to find quicker, simpler more exacting ways to increase productivity, provide a superior product quicker, cheaper and safer for their employees.

AST™ are leading the way lifting the cloak on the dark art and we invite you to follow.

## *How will this help the customer?*

### **The benefits of the TruHelix™ Flight Forming technology are**

- Ensured consistently as every flight is produced identically.
- Eliminates any need for reliance on operator input or experience.

### **TruHelix™ Flight Blank Programme has many benefits in that it**

- Correct and accurate flights first time every time with no material wastage.
- No expensive non-production time lost due to trials.
- No experience required while at the same time producing perfect results consistently.

# Flight Forming Matrix

|           |       | Super Tyro™ System Starter Package |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
|-----------|-------|------------------------------------|---------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|------------|-------------|--|--|
| OD        | ID    | Pitch                              |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
|           |       | 2° 50mm                            | 3° 75mm | 4° 100mm | 5° 125mm | 6° 150mm | 7° 175mm | 8° 200mm | 9° 225mm | 10° 250mm | 11° 275mm | 12° 300mm | 14° 350mm | 16° 400mm | 18° 450mm | 20° 500mm | 24° 600mm | 30° 750mm | 36° 900mm | 40° 1000mm | 48° 1200mm | 60° 1500mm | 72° 1800mm | 96° 2400mm | 120° 3000mm |  |  |
| 40"       | 5.5"  |                                    |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 1000mm    | 36"   |                                    |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 36" 900mm | 5"    |                                    |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 36" 900mm | 32.3" |                                    |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 30" 750mm | 4"    |                                    |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 24" 600mm | 26.4" |                                    |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 24" 600mm | 3.5"  |                                    |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 20" 500mm | 22"   |                                    |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 20" 500mm | 3"    |                                    |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 18" 450mm | 18"   |                                    |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 18" 450mm | 3"    |                                    |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 18" 450mm | 16"   |                                    |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 16" 400mm | 2.4"  |                                    |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 16" 400mm | 14"   |                                    |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 14" 350mm | 2.4"  |                                    |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 14" 350mm | 13"   |                                    |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 12" 300mm | 2.4"  |                                    |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 12" 300mm | 11"   |                                    |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 11" 275mm | 2.4"  |                                    |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 11" 275mm | 10"   |                                    |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 10" 250mm | 2.4"  |                                    |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 10" 250mm | 9"    |                                    |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |

|           |       | Super Tyro™ System Professional Forming Package |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
|-----------|-------|---|---------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|------------|-------------|--|--|
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| 48"       | 10.3" |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 1200mm    | 43.3" |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 40"       | 5.5"  |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 1000mm    | 36"   |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 36" 900mm | 5"    |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 36" 900mm | 32.3" |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 30" 750mm | 4"    |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 30" 750mm | 26.4" |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 24" 600mm | 3.5"  |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 24" 600mm | 22"   |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 20" 500mm | 3"    |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 20" 500mm | 18"   |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 18" 450mm | 3"    |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 18" 450mm | 16"   |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 16" 400mm | 2.4"  |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 16" 400mm | 14"   |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 14" 350mm | 2.4"  |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 14" 350mm | 13"   |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 12" 300mm | 2.4"  |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
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| 11" 275mm | 10"   |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 10" 250mm | 2.4"  |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 10" 250mm | 9"    |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 9" 225mm  | 80    |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 9" 225mm  | 8"    |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 8" 200mm  | 2.4"  |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 8" 200mm  | 7"    |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 7" 175mm  | 2.4"  |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 7" 175mm  | 6"    |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 6" 150mm  | 2.4"  |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |
| 6" 150mm  | 5"    |   |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |  |  |



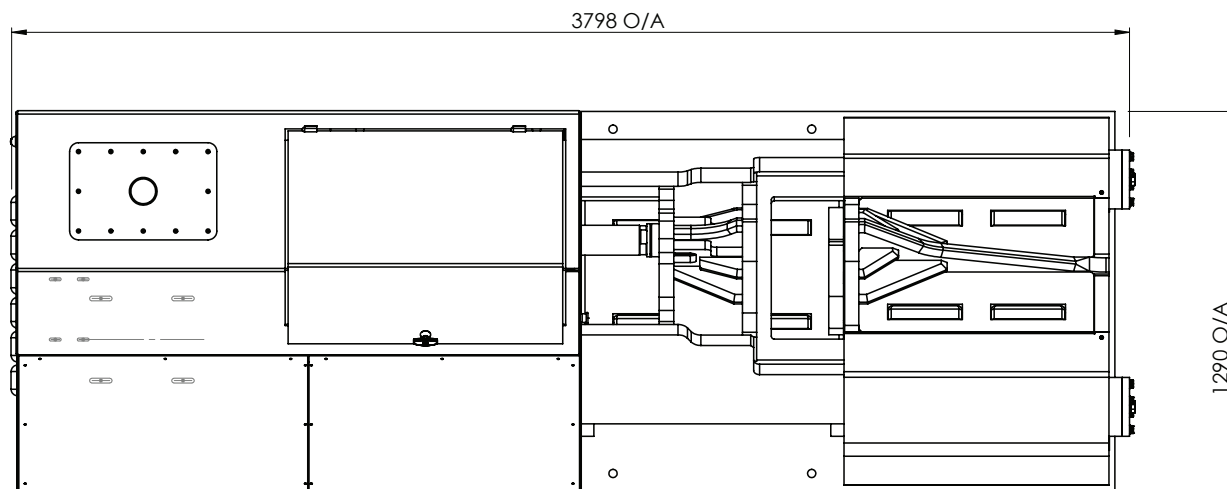
# Flight Forming Matrix

|           |       | Super Tyro™ System Micro Forming Extenda Package |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |   |
|-----------|-------|--|---------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|------------|-------------|---|
| OD        | ID    | Pitch  |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |   |
|           |       | 2" 50mm  | 3" 75mm | 4" 100mm | 5" 125mm | 6" 150mm | 7" 175mm | 8" 200mm | 9" 225mm | 10" 250mm | 11" 275mm | 12" 300mm | 14" 350mm | 16" 400mm | 18" 450mm | 20" 500mm | 24" 600mm | 30" 750mm | 36" 900mm | 40" 1000mm | 48" 1200mm | 60" 1500mm | 72" 1800mm | 96" 2400mm | 120" 3000mm |   |
| 12" 300mm | 1.6"  | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
|           | 1.1"  | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
| 11" 275mm | 1.6"  | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
|           | 1.0"  | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
| 10" 250mm | 1.4"  | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
|           | 3"    | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
| 9" 225mm  | 1.4"  | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
|           | 8"    | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
| 8" 200mm  | 1.2"  | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
|           | 7"    | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
| 7" 175mm  | 1.2"  | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
|           | 6"    | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
| 6" 150mm  | 1"    | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
|           | 5"    | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
| 5" 125mm  | 1"    | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
|           | 4"    | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
| 4" 100mm  | 1"    | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
|           | 3"    | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
| 3" 75mm   | 0.75" | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
|           | 2.2"  | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |

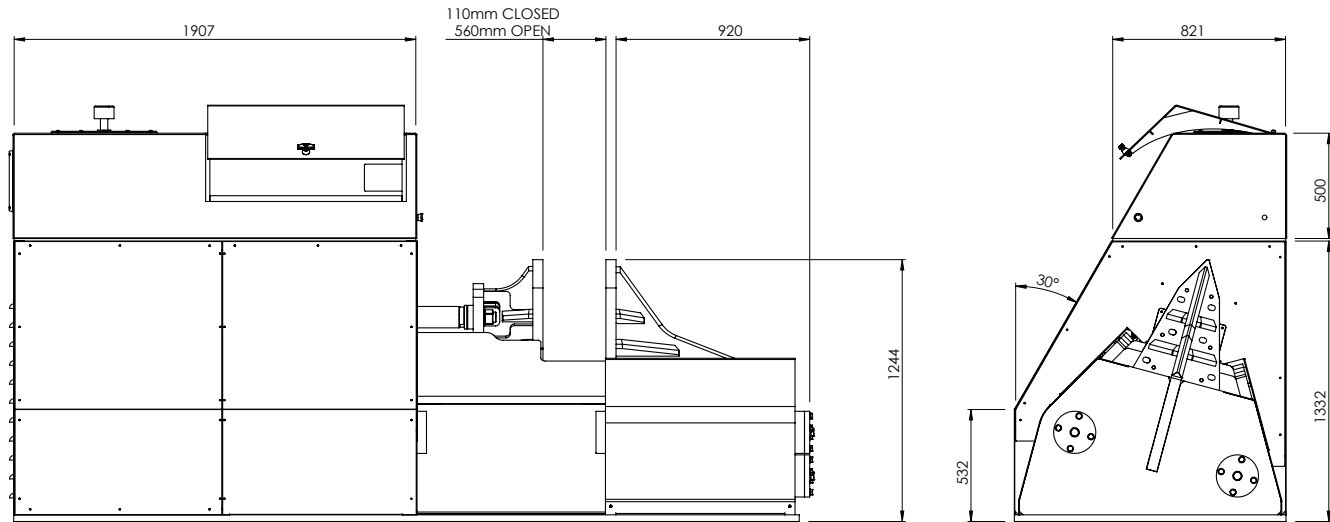
  

|        |       | Super Tyro™ System Magna Forming Extenda Package |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |   |
|--------|-------|--|---------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|------------|-------------|---|
| OD     | ID    | Pitch  |         |          |          |          |          |          |          |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |             |   |
|        |       | 2" 50mm  | 3" 75mm | 4" 100mm | 5" 125mm | 6" 150mm | 7" 175mm | 8" 200mm | 9" 225mm | 10" 250mm | 11" 275mm | 12" 300mm | 14" 350mm | 16" 400mm | 18" 450mm | 20" 500mm | 24" 600mm | 30" 750mm | 36" 900mm | 40" 1000mm | 48" 1200mm | 60" 1500mm | 72" 1800mm | 96" 2400mm | 120" 3000mm |   |
| 72"    | 8"    | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
| 1800mm | 67"   | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
| 60"    | 6"    | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
| 1500mm | 55"   | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
| 48"    | 5"    | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
| 1200mm | 43.3" | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
| 40"    | 4"    | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |
| 1000mm | 36"   | ✓  | ✓       | ✓        | ✓        | ✓        | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓ |

## General Assembly Diagram



# General Assembly Diagram



# **AST** *Advanced Spiral Technology*

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*Revolutionary - Consistency - Accurate - Quality - Efficiency - Safety*