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DEVELOPMENT OF AN ALGORITHM FOR FEATURE BASED PRISMATIC PART

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ABSTRACT

The generation of an efficient algorithm for easy understanding of machining features in a CAPP is much difficult. A simple logic is always needed for complex machining features. The CAPPS module contains feature extraction; feature recognition and machining process planning for each and every hole are discussed. In this paper a framework has been engendered for the integration efficient setup sequencing for machining of 2.5 Dimension prismatic parts considering each and every hole as a feature. An efficient algorithm has been developed to easy understanding the task. These algorithms can be applied for automated process planning of2.5D parts irrespective of the nature of fixture used. In addition, an improved version of CNC has been presented along with J2EE software programme. The algorithms have been implemented as part of a feature-based CAD/CAM environment, G and M codes have been generated for a selected model and simulation for entire operations also presented. The cutting tools, machining parameters, setups and fixture configurations evaluated. Finally, the rationality of the process has been verified by experiment considering a wooden block of specified dimension and results have been discussed.

KEYWORDS:

Algorithm, computer aided process planning, feature based, 2.5D, holes and cylinders, machining

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1. INTRODUCTION

The entry of CAD/CAM and their integration tremendously shortened the manufacturing era. It has to the highest degree extended the span of manufacturing processes and techniques. Many researchers worked in the field, still a lot of space to research in a typical Feature-based CAD/CAM environment. Computer aided process planning [CAPP] is the perfect mediator between CAD-CAM families. CAPP involves a number of steps such as feature recognition, selection and sequencing of setups, fixture planning and decomposition of features into machining operations.

"S" is the Distance between two points.

"F_{H_n}" Volume of the n^{th} feature.

"H_n" Diameter of the n^{th} hole.

"n" is a natural number.

"p" temporary variable

"A" is total number of holes.

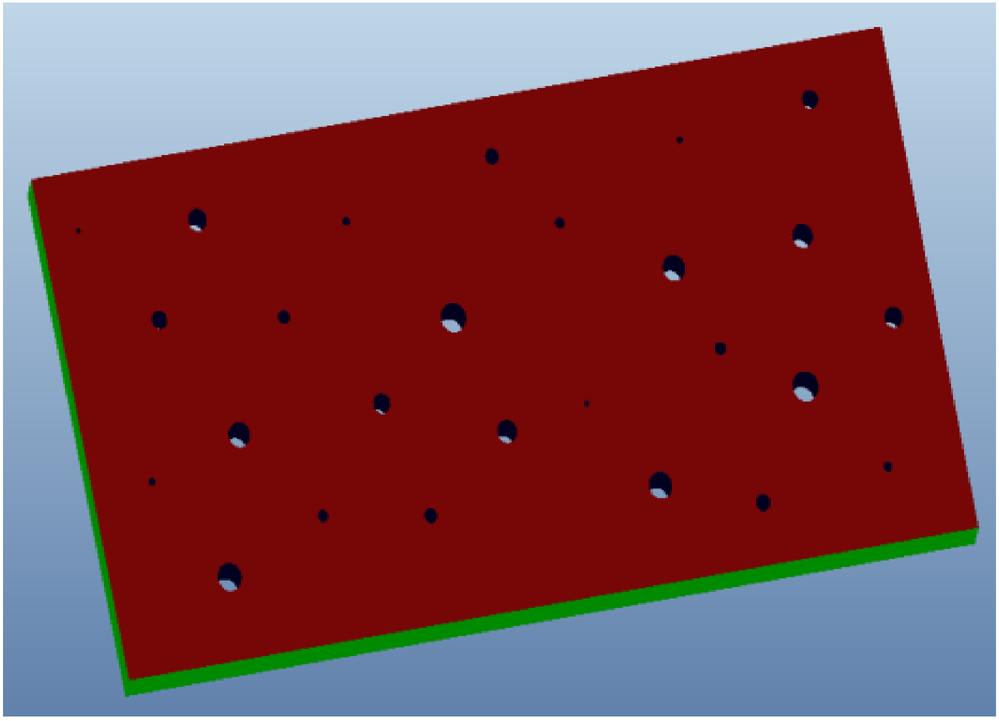


Figure 1. Proposed part with variety of hole sizes

The development of CAD and CAM technology significantly increased efficiency in each individual area. The independent development, however, greatly restrained the improvement of overall efficiency from design to manufacturing. The communication between CAD and CAM systems has become a bottleneck for further improvement of production efficiency [1]. The first effort to break the isolation of CAD and CAM systems was to reuse the product model designed in CAD systems in CAM systems [2]. It made CAM systems able to directly manipulate CAD models, either the wire frame or solid model. The current trend is feature-based systems. Features play a key role in the recent integration of CAD/CAM systems. A group of application independent geometric tools and algorithms is provided which can be used to query/analyze the model to obtain unambiguous results. These tools can be used or combined with other application specific tools to perform the required task. The issues related to data structures and geometric algorithms, their efficiency, reliability and robustness also form an important aspect of solid modeling. The academic effort in solid modeling utilizes several disciplines in many applications. That is including algebraic geometry and topology, differential geometry and topology, combinatorial topology, computer science, and numerical analysis [2].

The part design is introduced through CAD software and it is represented as a solid model by using CSG technique as a design tool [3]. The solid model of the part design consists of small and different solid primitives combined together to form the required part design [4, 5 and 6]. The CAD software generates and provides the geometrical information of the part design in the form of an ASCII file (IGES) that is used as standard format which provides the proposed methodology the ability to communicate with the different CAD/CAM systems [5][10]. The boundary (B-rep) geometrical information of the part design is analyzed by a feature recognition program that is created specifically to extract the features from the geometrical information based on the geometric reasoning and object oriented approaches. The feature recognition program is able to recognize these features: slots (through, blind, and round corners), pockets (through, blind, and round corners), inclined surfaces, holes (blind and through) and steps (through, blind, and round corners), etc. These features are called manufacturing information that are mapped to process planning as an application for CAM [6]. [7.8 and 9]

1.1. Development of a new approach:

Drilling of through holes with varying diameters is a challenging task, especially in mass production. Random drilling of holes in a mass production without an effective machining logic cannot fulfill the demand of Global Markets, Dispatch Delay Time increases and in some cases losses may occur. In order to satisfy the core criteria an attempt is made for dynamic drilling of holes considering the machine feature of hole as cylindrical machine features. Machining of through holes by the implementation of a special Logical sequence. In the traditional way of drilling, “First recognized input was given first consideration and performing machining operations immediately at corresponding location” respectively one after another. Here All Diameters of holes are arranged in ascending order, every Diameter is addressed with a letter (H_n) and cylindrical features are created.

By foreseeing some of the practically generating issues like Tool life, Tool changing time, etc. The completion of total task can be achieved by three successive steps.

Step1. Since Minimum diameter is common for all given holes, at all hole needed locations minimum diameter hole is made.

Step 2. All different diameter holes are drilled.

Step 3. Holes having repeated diameters are drilled.

1.2. Benefits of Proposed Methodology:

1. Ascending order of diameters:

- Gives clarity about total machining process.
- All required drill bits can be easily identified.
- Machining setup arrangement will be simple to understand and conveniently made with little time consumption.

2. All similar diameter holes can be drilled consecutively in a single turn selection of corresponding Drill bit.

3. Drilling of large diameter holes in a single pass causes unnecessary vibrations. Pre-drilling of Minimum diameter hole at all drill locations reduces a lot of machine tool effort, enhances the tool life and reduces initial wear of large size drill bits.

4. Quick feedback obtain by back tracking inspection with CMM immediately after completely drilling of each and every hole, flaws can be rectified there itself without changing initial setup.

5. Tool life increase

6. Constant feed can use for all drills

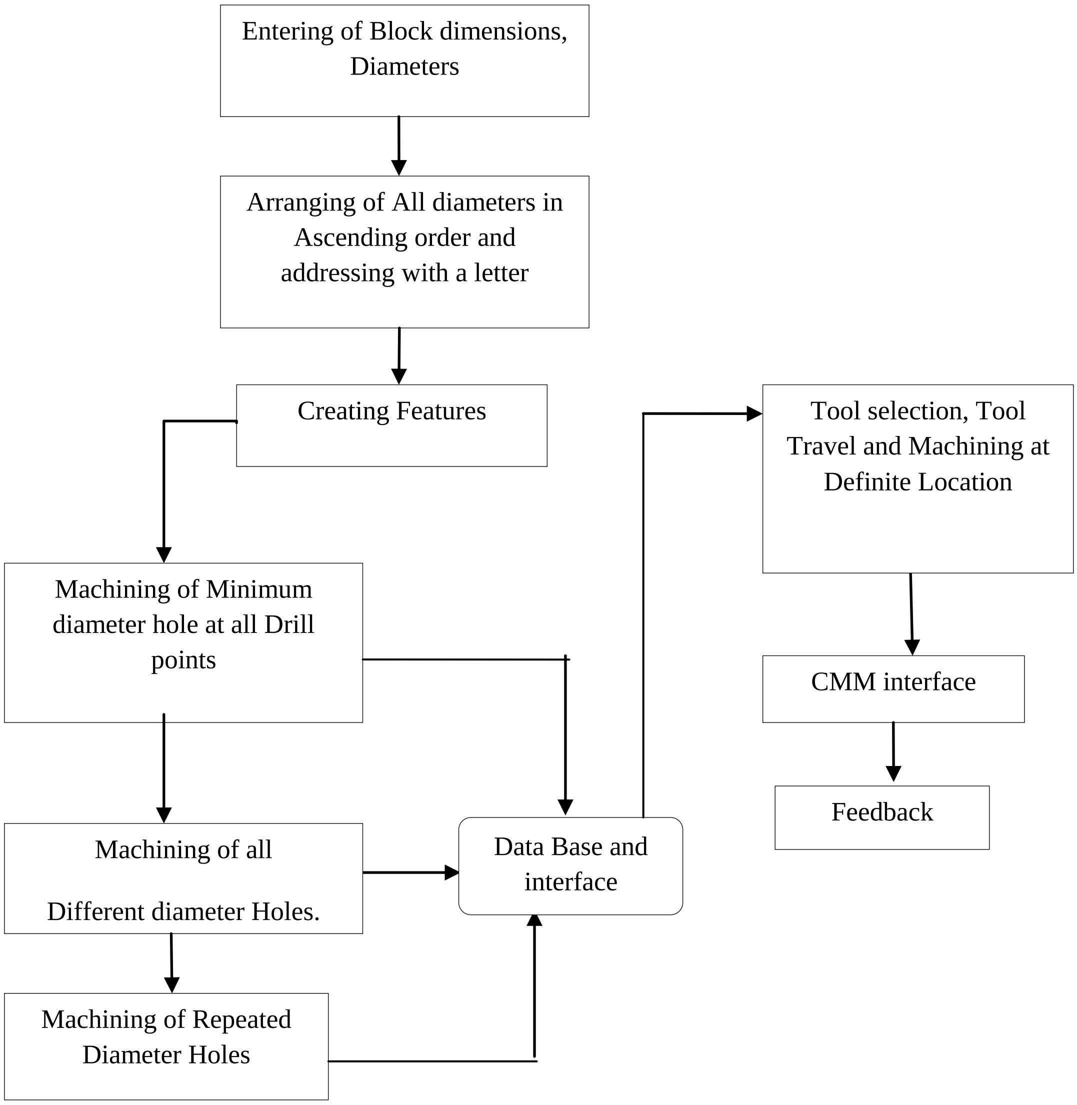
7. Defective parts of “No Go” answering eliminated.

8. Customer requirement fulfil 100%.

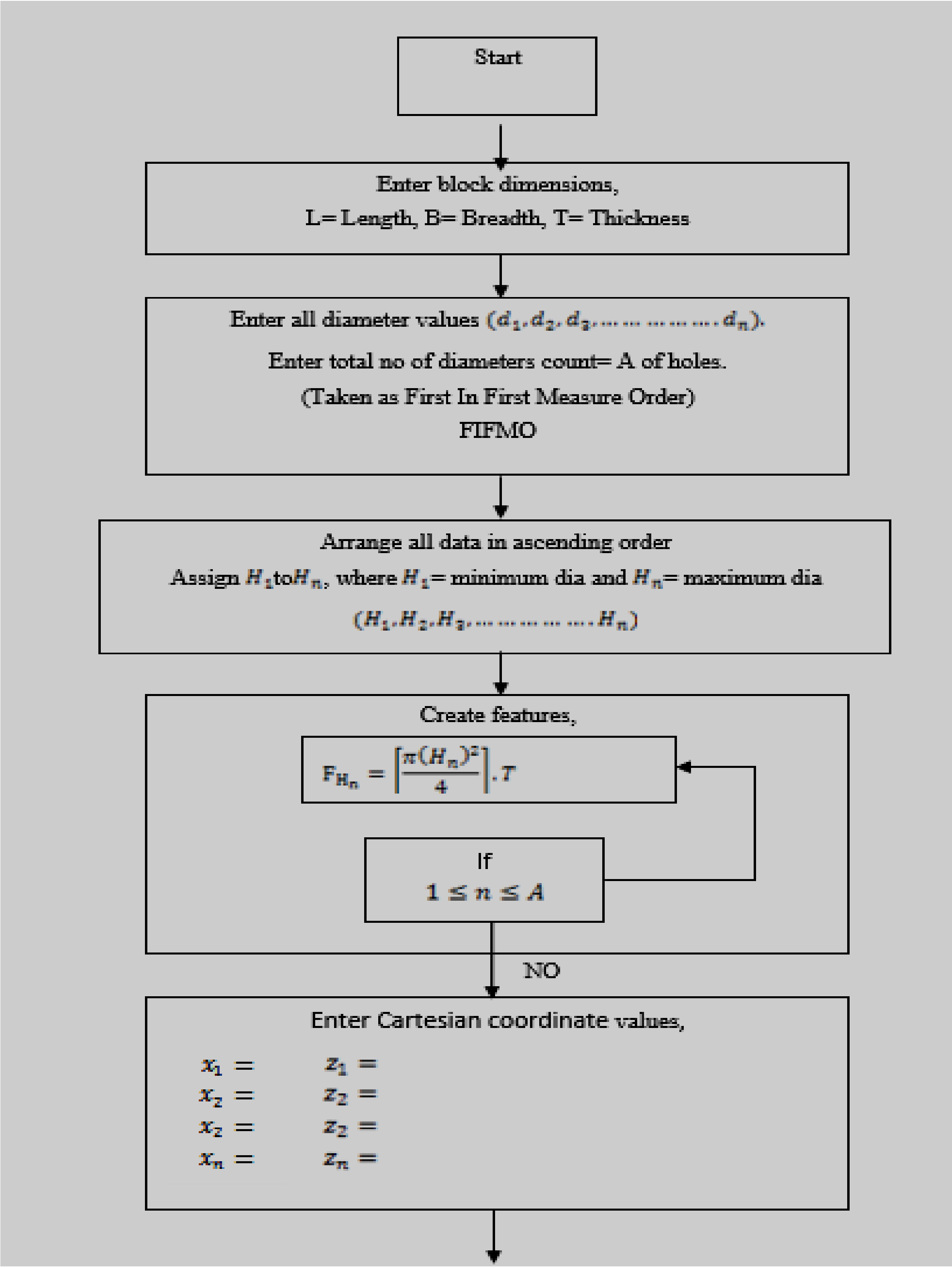
9. The no of hole done at a cycle at different coordination.

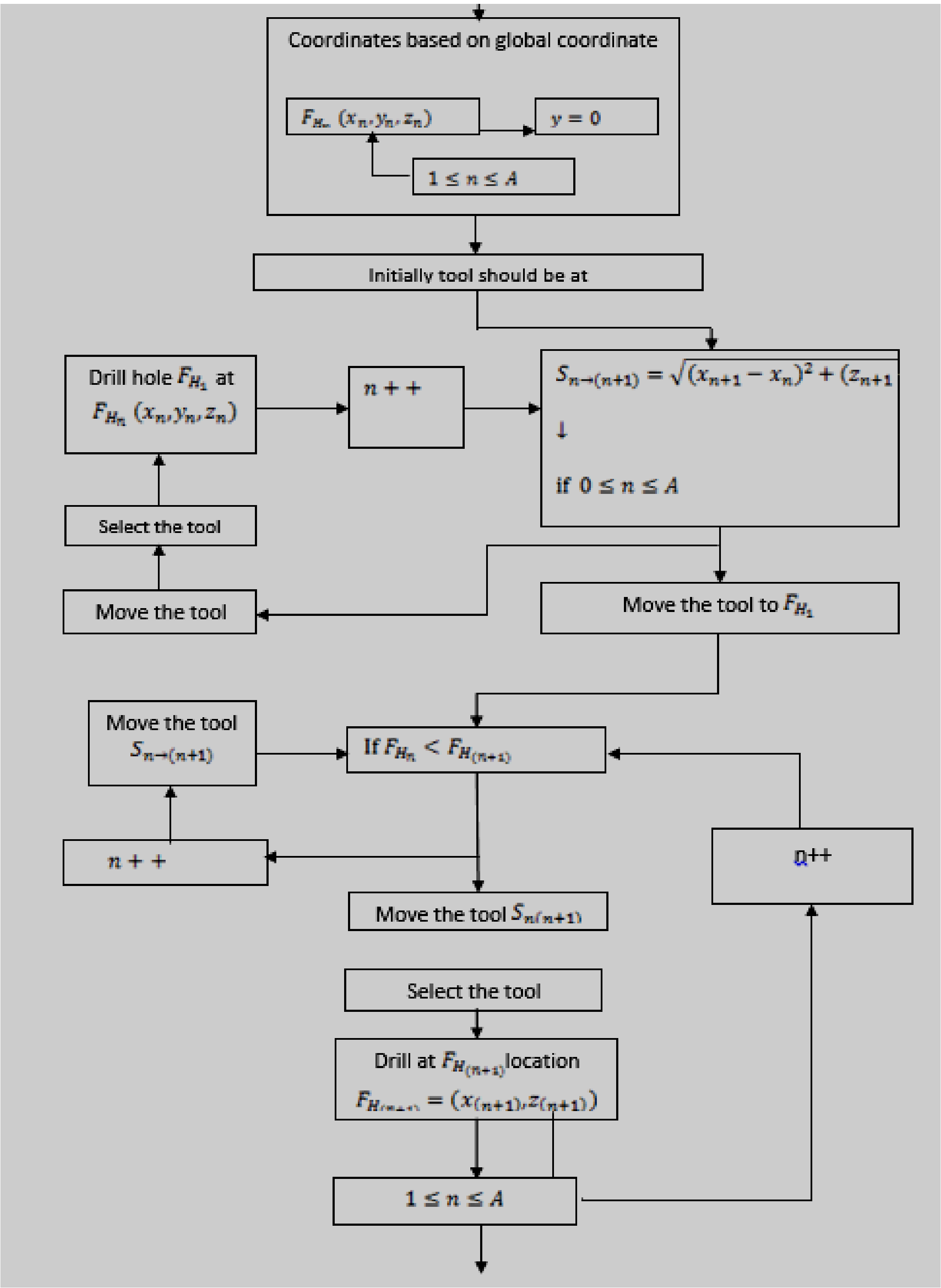
10. Cycle time reduced compare to using single drill.

2. HIERARCH OF THE PROPOSED MODEL



3. FLOW CHART FOR PROPOSED METHODOLOGY




Coordinates based on global coordinate
F_{H_n} (x_n, y_n, z_n)
$y = 0$
$1 \le n \le A$
Initially tool should be at
Drill hole F_{H_1} at
F_{H_n} (x_n, y_n, z_n)
$n++$
$S_{n\to(n+1)} = \sqrt{(x_{n+1} - x_n)^2 + (z_{n+1}}$
if $0 \le n \le A$
Select the tool
Move the tool
Move the tool to F_{H_1}
Move the tool
$S_{n\to(n+1)}$
If $F_{H_n} < F_{H_{(n+1)}}$
$n++$
n++
Move the tool $S_{n(n+1)}$
Select the tool
Drill at $F_{H_{(n+1)}}$ location
$1 \le n \le A$

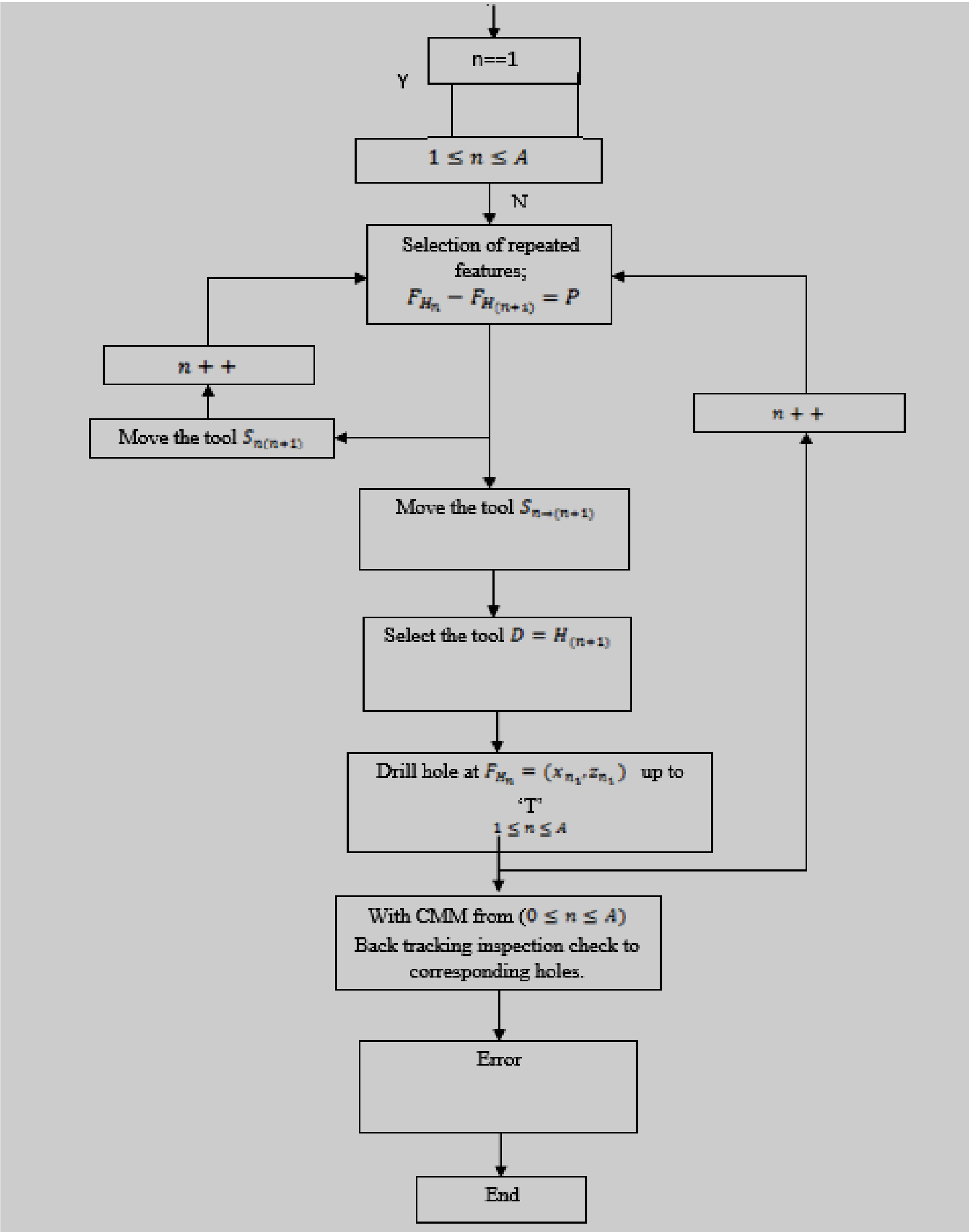


Figure 3. Flow Chart for Proposed Methodology

Table1. Coordinates of total holes

Coordinates HOLE No.1 to 26: coordinates - X & Y stated from the origin where Y [constant equal to thickness of the component in negative direction			
Hole No.	**Hole size (mm)**	**X-Axis**	**Y-Axis**
1	5	42.14	372.74
2	6	620.72	150.65
3	7	776.44	303.88
4	8	143.4	144.78
5	9	416.94	303.88
6	10	928.58	102.92
7	11	597.36	283.05
8	12	289.31	97.29
9	13	777.68	198.61
10	14	229.2	271.79
11	15	441.48	114.18
12	16	536	324.33
13	17	773.93	65.39
14	18	110.24	281.17
15	19	950.49	299.93
16	20	381.35	202.37
17	21	959.89	185.48
18	22	234.84	361.85
19	23	512.84	179.85
20	24	864.71	254.9
21	25	265.52	191.11
22	26	695.38	232.71
23	27	676.09	88.79
24	28	167.6	59.67
25	29	487.61	250.75
26	30	839.79	154.31

4. ALGORITHMS FOR PROPOSED METHODOLOGY:

4.1. The blank dimensions is noted and the values L= Length, B= Breadth, T= Thickness entered the volume of the blank is the first input of the machining operation.

4.2. In the next step, enter all diameter values $(d_1, d_2, d_3, \dots \dots \dots \dots \dots . d_n)$.3.The total no of diameters count is constraint to some value and is symbolized as A of holes by considering the First in First Measure Order [FIFMO]

4.4. In the third step all the dimensional data of the each and every hole will be positioned in ascending order accordingly, then the diameter of the particular hole if minimal is considered as minimum diameter and symbolize Assign H_1 to H_n, where H_1 = minimum dia and H_n = maximum dia

$(H_1, H_2, H_3, \ldots \ldots \ldots \ldots \ldots . H_n) \leq A.$

The hole is converted into a feature such as a cylindrical part by using the formula

$F_{H_n} = \left[\frac{\pi (H_n)^2}{4}\right] . T$[With increment of 1 extract the total features condition is that **1≤n≤A***]

**Where A is the total no of feature or holes*

4.5. Initially Tool should be at (0, 0, and 0).

4.6. Tool movement in (x, z) direction can be controlled by distance formula $S_{n \rightarrow (n+1)} = \sqrt{(x_{n+1} - x_n)^2 + (z_{n+1} - z_n)^2}$

4.7. Total holes are going to be sequentially drilled after passing through three successive loops.

4.8. Loop 1.

- In this loop Drill bit (H_1) having Minimum diameter is selected. Since small hole's diameter is within lower limit or exactly equal to all given hole diameters. So, at all drill points Holes with diameter H_1 is made.
- If "n" value fall within the interval [1, A], go for an increment n+1.
- Otherwise loop terminates and Further steps to be continued.
- At the end of first loop drilling of "n" number of holes with H_1 diameter are completed.

4.9. Loop 2:

- Now by the implementation of "Feature Volume comparison condition".
  [if $F_{H_n} < F_{H_{(n+1)}}$].
- All features having different diameters are drilled with respective Drill bits.
- Some repeated diameter features are remaining incomplete.
- If "n" value fall within the interval [1, A], goes for an incrementn+1.
- Otherwise loop terminates and Further steps to be continued.
- At the end of this loop all non-repeated diameter holes and only one **among** the repeated diameter holes are drilled completely.

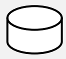
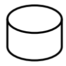
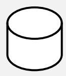
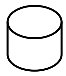
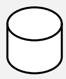
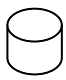
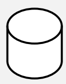
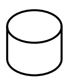
4.10. Loop 3:

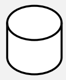
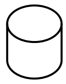
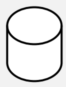
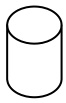
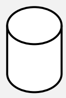
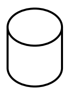
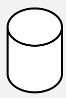
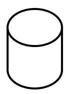
- In this last loop with the aid of condition "selection of equal volumes, $F_{H_n} - F_{H_{(n+1)}} = P$" [If P=0].
- If condition is satisfied, tool with diameter D=$\mathbf{H_{n+1}}$ is selected.
- It is moved to a distance S_{n-n+1}, drilling operation is performed at location$F_{H_n} = (x_{n_1}, z_{n_1})$.
- If "n" value fall within the interval [1, A], go for an increment n+1.
- Otherwise loop terminates and Further steps to be continued.

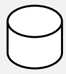
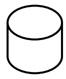
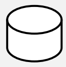
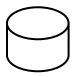
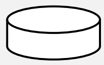
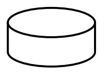
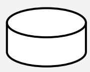
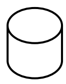
- All the remaining repeated diameter features are machined.

4.11. Coordinates measuring machine from $(0 \leq n \leq A)$ Back tracking inspection check corresponding holes.

5. FEATURE CONVERSION TABLE ALONG WITH FEATURE CO-ORDINATES:

Hole No	**Hole dimension in mm**	**Feature conversion as cylinder in mm**	**Volume in mm³**	**x-coordinate**	**Y-coordinate**
1	d=5 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H1} = \pi [H_1]^2.T/4$ = 3.14159*[5]²*25/4		*42.14*	*372.74*
2	d=6 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H2} = \pi [H_2]^2.T/4$ = 3.14159*[6]²*25/4		*620.72*	*150.65*
3	d=7 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H3} = \pi [H_3]^2.T/4$ = 3.14159*[7]²*25/4		*776.44*	*303.88*
4	d=8 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H4} = \pi [H_4]^2.T/4$ = 3.14159*[8]²*25/4		*143.4*	*144.78*
5	d=9 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H5} = \pi [H_5]^2.T/4$ = 3.14159*[9]²*25/4		*416.94*	*303.88*
6	d=10 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H6} = \pi [H_6]^2.T/4$ = 3.14159*[10]²*25/4		*928.58*	*102.92*
7	d=11 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H7} = \pi [H_7]^2.T/4$ = 3.14159*[11]²*25/4		*597.36*	*283.05*
8	d=12 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H8} = \pi [H_8]^2.T/4$		*289.31*	*97.29*

		= 3.14159*$[12]^2$*25/4			
9	d=13 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H9} = \pi\,[H_9]^2.T/4$ = 3.14159*$[13]^2$*25/4		*777.68*	*198.61*
10	d=14 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H10} = \pi\,[H_{10}]^2.T/4$ = 3.14159*$[14]^2$*25/4		*229.2*	*271.79*
11	d=15 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H11} = \pi\,[H_{11}]^2.T/4$ = 3.14159*$[15]^2$*25/4		*441.48*	*114.18*
12	d=16 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H12} = \pi\,[H_{12}]^2.T/4$ = 3.14159*$[16]^2$*25/4		*536*	*324.33*
13	d=17 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H13} = \pi\,[H_{13}]^2.T/4$ = 3.14159*$[117]^2$*25/4		*773.93*	*65.39*
14	d=18 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H14} = \pi\,[H_{14}]^2.T/4$ = 3.14159*$[18]^2$*25/4		*110.24*	*281.17*
15	d=19 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H15} = \pi\,[H_{15}]^2.T/4$ = 3.14159*$[19]^2$*25/4		*950.49*	*299.93*
16	d=20 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H16} = \pi\,[H_{16}]^2.T/4$ = 3.14159*$[20]^2$*25/4		*381.35*	*202.37*

17	d=21 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H17} = \pi\ [H_{21}]^2.T/4$ = $3.14159*[21]^2*25/4$		*959.89*	*185.48*
18	d=22 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H18} = \pi\ [H_{18}]^2.T/4$ = $3.14159*[22]^2*25/4$		*234.84*	*361.85*
19	d=23 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H19} = \pi\ [H_{19}]^2.T/4$ = $3.14159*[23]^2*25/4$		*512.84*	*179.85*
20	d=24 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H20} = \pi\ [H_6]^2.T/4$ = $3.14159*[10]^2*25/4$		*864.71*	*254.9*
21	d=25 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H21} = \pi\ [H_{21}]^2.T/4$ = $3.14159*[25]^2*25/4$		*265.52*	*191.11*
22	d=26 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H22} = \pi\ [H_{22}]^2.T/4$ = $3.14159*[26]^2*25/4$		*695.38*	*232.71*
23	d=27 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H23} = \pi\ [H_{23}]^2.T/4$ = $3.14159*[27]^2*25/4$		*676.09*	*88.79*
24	d=28 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H24} = \pi\ [H_{24}]^2.T/4$ = $3.14159*[28]^2*25/4$		*167.6*	*59.67*

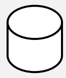
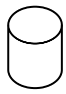
25	d=29 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H25} = \pi\ [H_{25}]^2.T/4$ = $3.14159*[29]^2*25/4$		*487.61*	*250.75*
26	d=30 T=25	$F_{H_n} = \left[\frac{\pi(H_n)^2}{4}\right].T$ $F_{H26} = \pi\ [H_{26}]^2.T/4$ = $3.14159*[26]^2*25/4$		*839.79*	*154.31*

Figure 4. Feature conversion table along with feature co-ordinates

6. Java programme for the proposed part

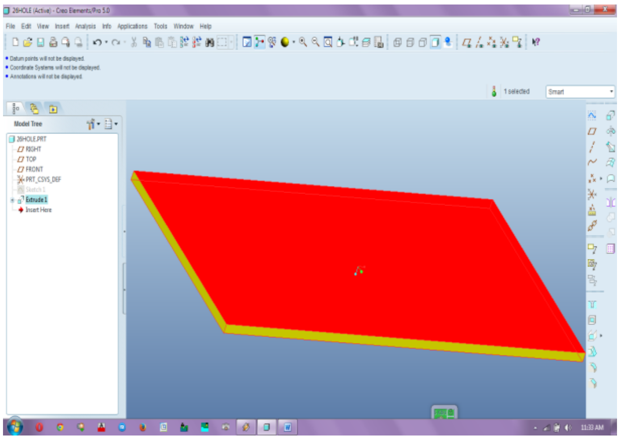
```
package cncmachinedesign;

import java.util.Scanner;

import java.math.MathContext;

/**

 *

 * @author Viswa Mohan Pedagopu

 */

public class Main {

/**

* @paramargs the command line arguments

*/

public static void main(String[] args) {

float L,B,T;

int A=0;

int X,Y;

System.out.println("Please enter the Number of holes you want to Drill:");

Scanner c =new Scanner(System.in);

A=c.nextInt();

for(int k=0;k<=A;++k)

{

/*user data entry*/

System.out.println("Enter the measurements for hole:"+A);

System.out.println ("Please enter the Hole Length:");

 Scanner l =new Scanner (System.in);

L=c.nextInt ();

System.out.println("Please enter the Hole Breadth:");

Scanner b =new Scanner(System.in);

 B=c.nextInt();

System.out.println("Please enter the Hole Thickness:");

 Scanner t =new Scanner(System.in);

 T=c.nextInt();

 }

 /*creating feature*/

if(1<=A)
```

```
{
doubleFeature hole;
/* Feature hole=|(3.14(B/2*B/2))/4 |T; */
}
if(1!=A)
{
for (int h=0;h<=A;A++)
{
System.out.println ("Enter the Coordinates values:");
System.out.println ("Enter the Coordinates values x:"+A);
X=c.nextInt();
System.out.println ("Enter the Coordinates values z:"+A);
Y=c.nextInt();
/* global coordinates setting*/
X=0;
Y=0;
int Z=0;
/*Feature creation FH (x,y,z) */
for(int f=0;f<=A;f++)
{
if(Y==0)
{
System.out.println("Coordinates setting is under ");
}
}
/* if the coordinates get selected
setting tool initially at (0,0,0)*/
X=0;
Y=0;
Z=0;
int n=0;
if(n==0)
{
/*applying distance formula to calculate next hole position on the metallic sheet*/
for(int w=0;w<=n;w++)
{
float d=0;
d=√((Xn+1)-Xn))*((Xn+1)-Xn))+((Zn+1)-Zn))*((Zn+1)-Zn));
}
}
System.out.println("Moving tool ");
System.out.println("Selecting the tool D=H1 ");
System.out.println ("Drilling is under processingup to T Thickness ");
System.out.println("Moving tool to FH1 ");
}
int n=0,FHn=0;
if( n==1)
{
if(FHn<FHn+1)
{
/*moving the tool to next position */
System.out.println("Moving the tool to Sn+1 position");
System.out.println("Selecting the tool");
System.out.println("Drilling the holes FHn+1 location");
}
if(n<=A)
{
if(n==2)
{
/*selection of repeated feature*/
```

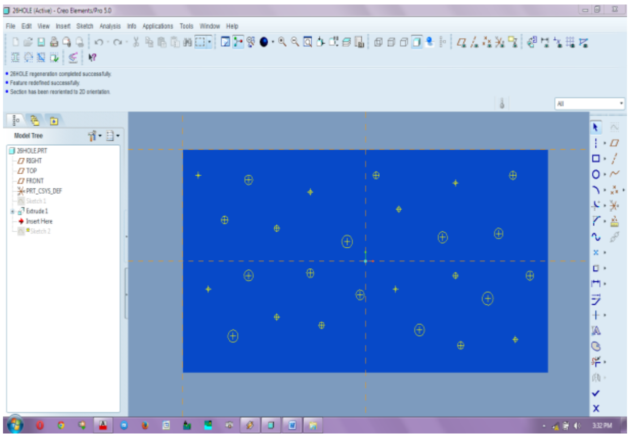
```
System.out.println("Selecting the feature FHn-FHn+1=P");
    }
    }
int P=0;
if(P==0)
   {
System.out.println("Moving the tool to Sn+1 position");
System.out.println("Selecting the tool D=H(n+1)");
   }
else
   {
System.out.println("Incrementing n=(n+1)");
    }
    }
System.out.println("Hole drilling FHn is under processing");
int P=0;
if( P!=0)
  {
     /*next hole finding*/
     n=n+1;
  }
System.out.println("By Coordinate Measuring Machine tracking inspection check to corresponding holes");
 // TODO code application logic here
int error=0;
if( error==1)
 {
System.out.println("Repeating the process from begging");
  }
else
 {
System.out.println("Drilling process initiating......!");
 }
 }
System.out.println("Drilling process initiating......!");
 }
}
```

7. DEVELOPMENT OF PART COMPUTER based design and manufacturing

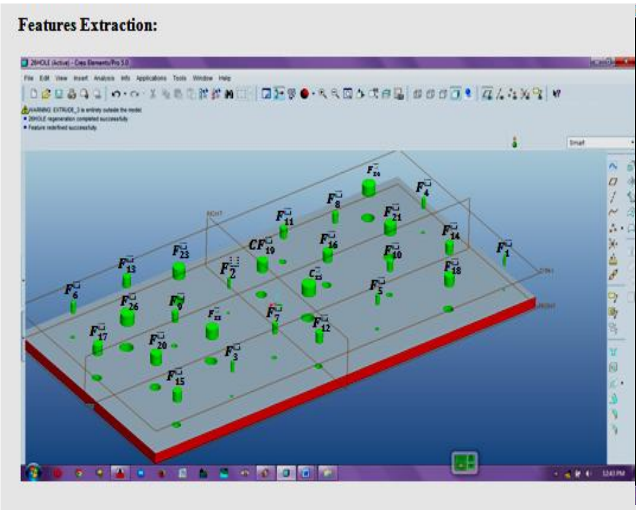
7.1 View of the Job Block

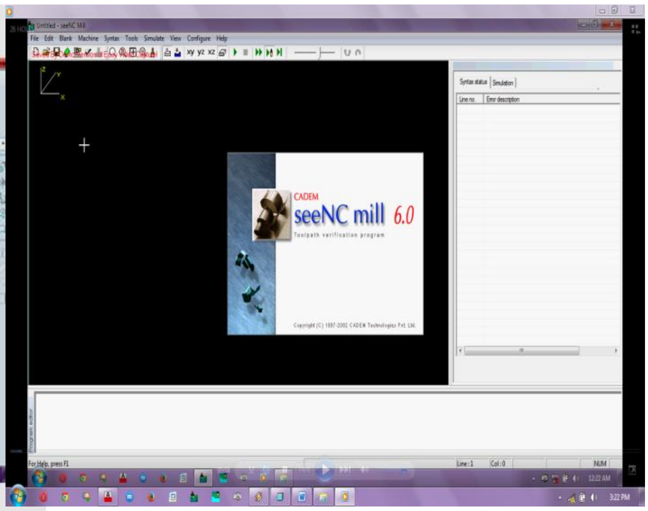


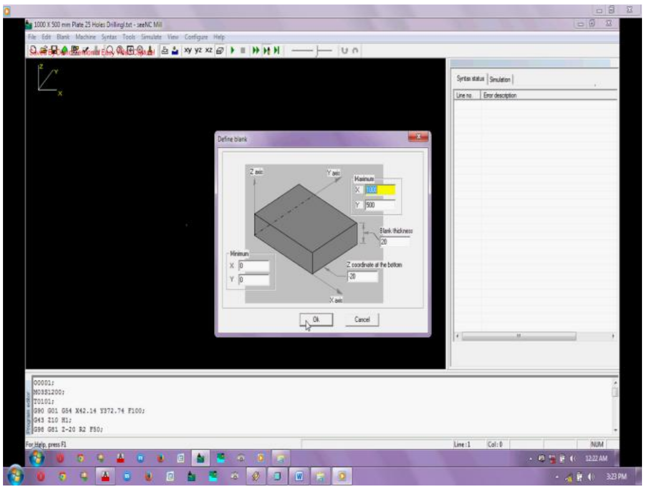
View of the Job Block

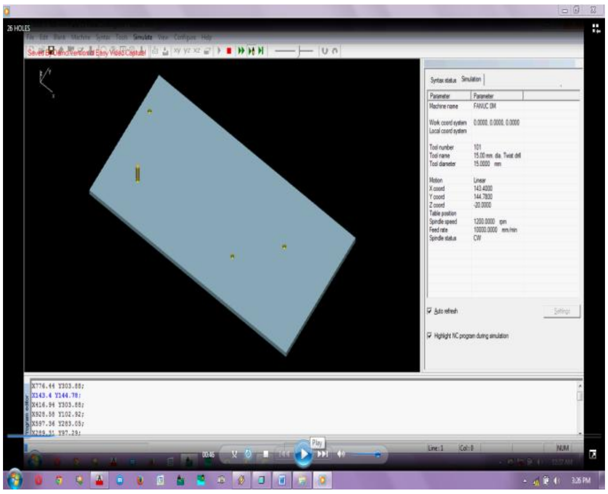


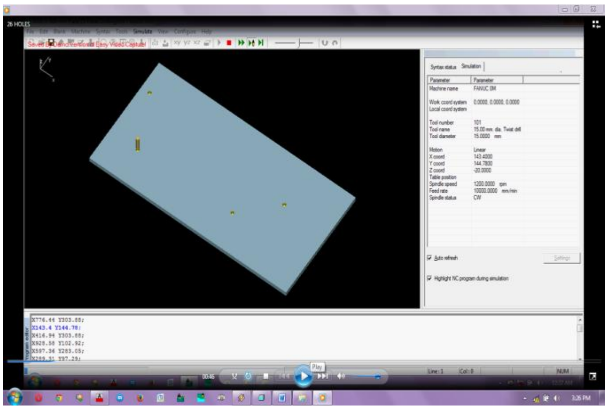
7.2. Top View of the Job

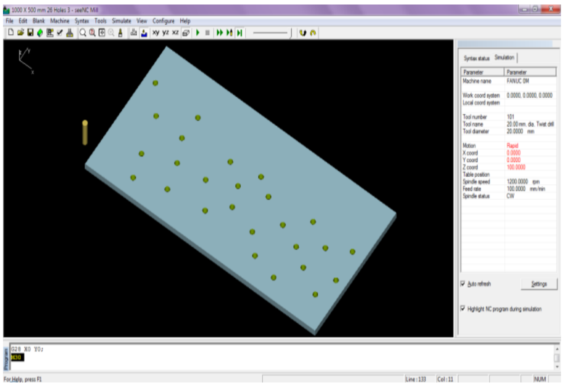












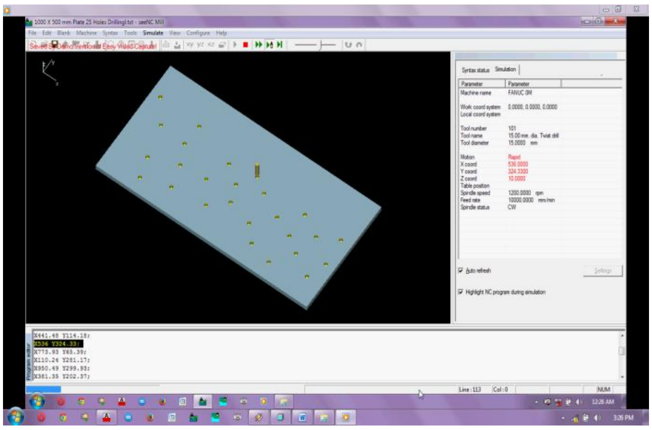


Figure 5. Hole geomentry mariking images

8. Hole description

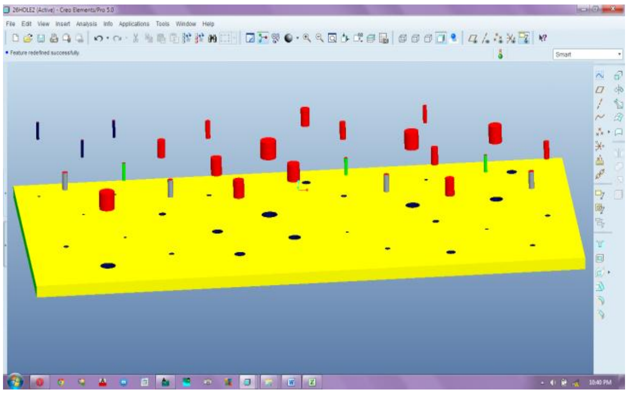
I. Holes With Various Diameters and Depth of Cut				
Hole Table : Coordinate				
Hole No.	Hole size (mm)	X-Axis	Y-Axis	Z-Axis
1	5	42.14	372.74	-5
2	6	620.72	150.65	-15
3	7	776.44	303.88	-20
4	8	143.4	144.78	-13
5	9	416.94	303.88	-13
6	10	928.58	102.92	-6
7	11	597.36	283.05	-16
8	12	289.31	97.29	-21
9	13	777.68	198.61	-12
10	14	229.2	271.79	-30
11	15	441.48	114.18	-7
12	16	536	324.33	-17
13	17	773.93	65.39	-22
14	18	110.24	281.17	-30
15	19	950.49	299.93	-14
16	20	381.35	202.37	-8
17	21	959.89	185.48	-18
18	22	234.84	361.85	-23
19	23	512.84	179.85	-11
20	24	864.71	254.9	-30
21	25	265.52	191.11	-9
22	26	695.38	232.71	-19
23	27	676.09	88.79	-24
24	28	167.6	59.67	-30
25	29	487.61	250.75	-25
26	30	839.79	154.31	-10

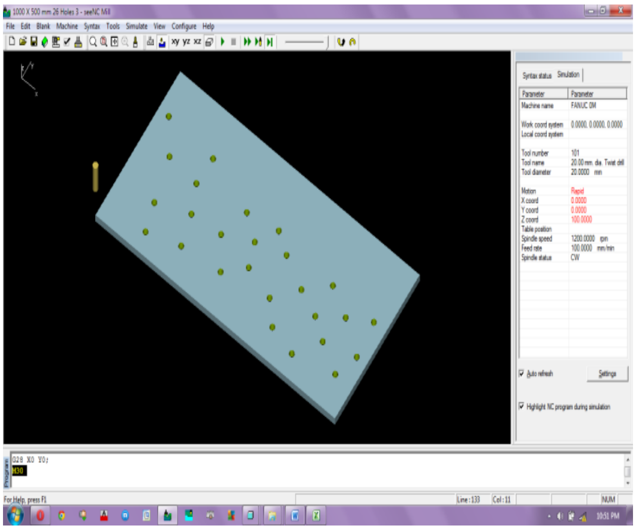
II. Through Hole With Repeated Diameter			
Hole Table : Coordinate			
Hole No.	**Hole size (mm)**	**X-Axis**	**Y-Axis**
1	5	42.14	372.74
2	6	620.72	150.65
3	7	776.44	303.88
4	10	143.4	144.78
5	9	416.94	303.88
6	10	928.58	102.92
7	11	597.36	283.05
8	10	289.31	97.29
9	13	777.68	198.61
10	14	229.2	271.79
11	20	441.48	114.18
12	16	536	324.33
13	17	773.93	65.39
14	5	110.24	281.17
15	19	950.49	299.93
16	20	381.35	202.37
17	10	959.89	185.48
18	5	234.84	361.85
19	23	512.84	179.85
20	24	864.71	254.9
21	6	265.52	191.11
22	26	695.38	232.71
23	10	676.09	88.79
24	28	167.6	59.67
25	29	487.61	250.75
26	6	839.79	154.31

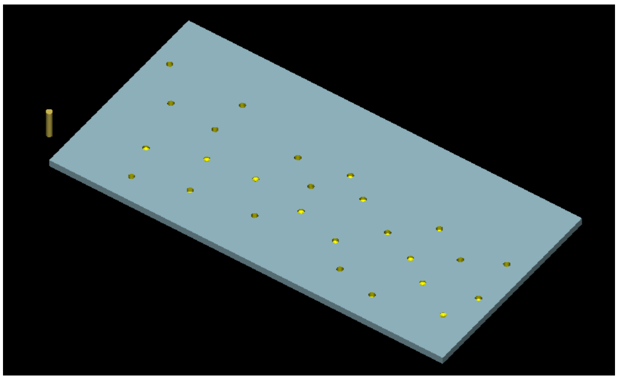
III. HOLES WITH VARIOUS –DIAMETER-DOC-REPEATED DIA

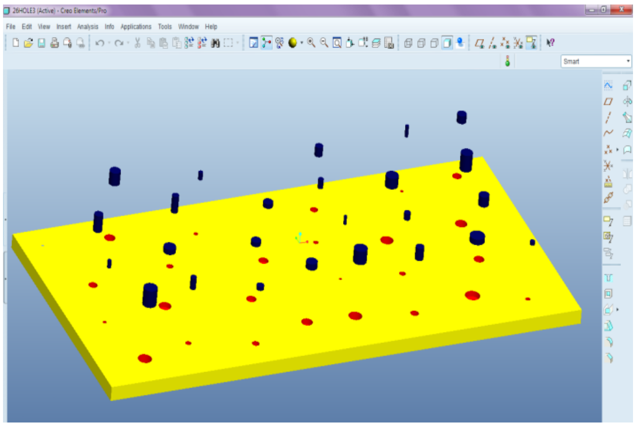
HOLE TABLE : COORDINATE

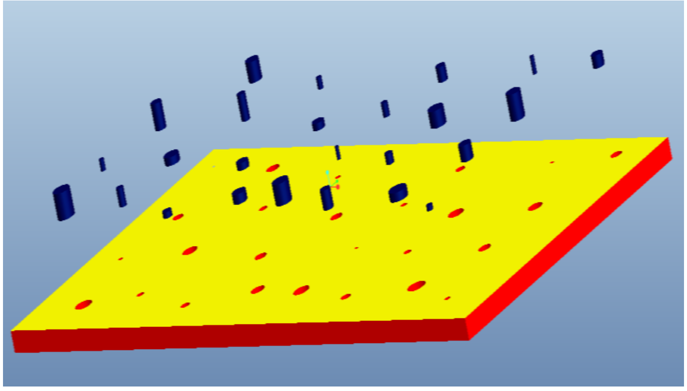
Hole No.	Hole size (mm)	X-Axis	Y-Axis	Z-Axis
1	5	42.14	372.74	-35
2	6	620.72	150.65	-15
3	7	776.44	303.88	-20
4	8	143.4	144.78	-13
5	9	416.94	303.88	-35
6	15	928.58	102.92	-6
7	11	597.36	283.05	-16
8	12	289.31	97.29	-21
9	13	777.68	198.61	-12
10	8	229.2	271.79	-35
11	15	441.48	114.18	-35
12	16	536	324.33	-17
13	17	773.93	65.39	-22
14	18	110.24	281.17	-30
15	6	950.49	299.93	-35
16	20	381.35	202.37	-8
17	21	959.89	185.48	-18
18	22	234.84	361.85	-35
19	23	512.84	179.85	-11
20	8	864.71	254.9	-35
21	25	265.52	191.11	-9
22	26	695.38	232.71	-19
23	27	676.09	88.79	-24
24	15	167.6	59.67	-35
25	29	487.61	250.75	-25
26	6	839.79	154.31	-10

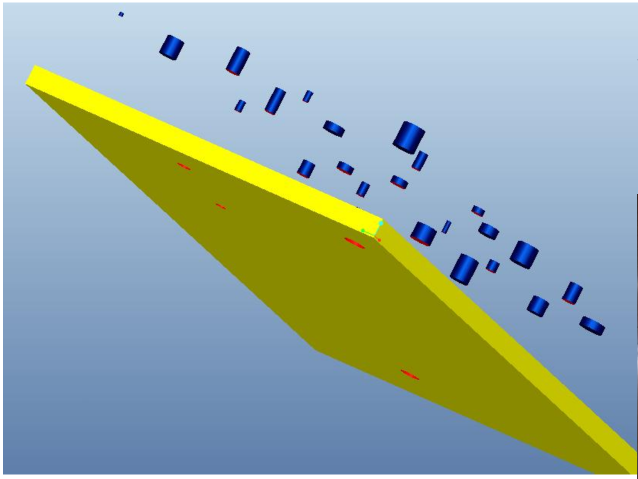












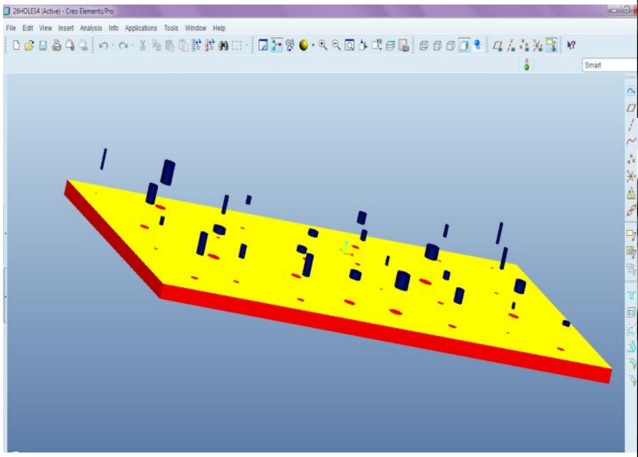


Figure 6. Hole geometry of features images

9. Validation and verification [rationality of the process] Execution of CNC program in CNC machine tool. Tool setup arrangement with all required drill bits.

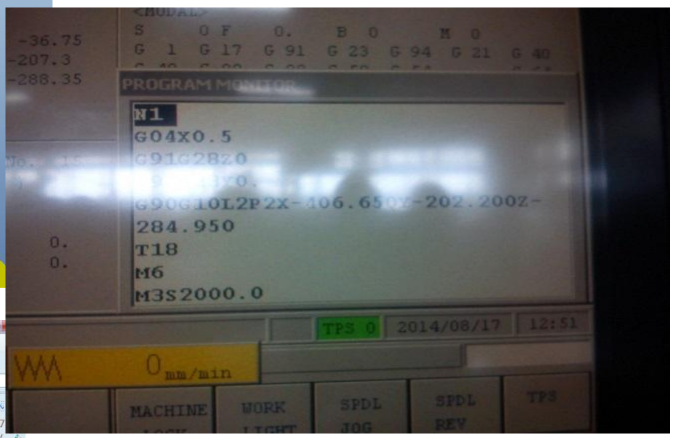


Figure7. Experimental images on wood e block

10. CONCLUSION

A feature-based modeling is discussed considering all holes of the job as features of 2.5 Dimensional prismatic parts. An efficient algorithm has been implemented for CAD/CAM integration system. Therefore, feature conversion contains every aspect feature about the component, not only geometrical features hole as a feature. In this paper a much focus on geometrical features that is the hole-series feature conversion for any hole type components and developed an approach to convert the design feature model into the machining feature model, in order to realize the integration of feature-based CAD and CAPP activities. In according to the no holes the entire holes converted into features and various diameters mentioned for different hole s can be easily identified. An efficient algorithm has been developed to easy understanding the task. These algorithms can be applied for automated process planning of 2.5D parts irrespective of the nature of fixture used. In addition, an improved version of CNC has been presented along with J2EE software programme.

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Author's Profile

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