

CNC 공작기계의 프로그램 설계 보고서(IV)

Program Design Report of the CNC Machine Tool(IV)

KAERI



제 출 문

한국원자력연구원장 귀하

본 보고서를 “원자력기기장치개발지원” 과제의 일환으로 수행된 “CNC 공작기계의 프로그램 설계”에 대한 기술보고서로 제출합니다.



2009년 월 일

주 저 자 ; 장치개발팀 염 기 언

공 저 자 ; 장치개발팀 이 인 배

 염 정 현

요 약 문

I. 제 목

CNC 공작기계의 프로그램 설계 보고서 (IV)

II. 연구개발의 목적 및 필요성

과학기술의 발전과 더불어 공작기계 분야도 고속·고능률 가공을 위한 공작기계와 절삭공구가 눈부시게 발전되고 가공방식도 다양화되어 감에 따라 CNC 공작기계의 활용범위는 광범위하게 확대되어 가고 있다.

원자력기기장치 개발지원업무와 관련된 “연구기기의 제작 및 보수”업무를 보다 효율적이고 안정적으로 수행하기 위해서는 생산설계 및 가공기술의 지속적인 기술개발이 병행되어야 하며 특히, 인력감소에 따른 문제점을 해소하고 생산성 및 품질 향상을 위해서는 CNC 공작기계의 활용이 매우 중요하다. 이와 관련하여 과제 수행 중에 생산된 CNC 공작기계의 프로그램과 도면을 기술보고서로 발간하므로써 원자력기기장치·부품의 CNC 프로그램 설계 및 가공기술향상을 위해 활용하는데 그 중요성이 있다.

III. 연구개발의 내용 및 범위

본 연구는 원자력기기장치·부품의 생산성 및 품질향상을 위하여 활용 빈도가 증가하고 있는 CNC 공작기계(선반, 밀링)와 관련한

- CNC 공작기계 개요
- 과제 수행 중에 생산된 CNC 프로그램과 도면
- 원자력기기장치·부품가공에 많이 활용되는 각종 재료의 JIS 규격에 대한 KS 규격 변환자료 등을 내용으로 한다.

IV. 연구개발 결과

기계가공분야의 생산방식이 수요자의 요구에 따라 소품종 다량생산 체제에서 다품종 소량생산 체제로 급속히 전환되면서 고속, 고능률, 고정밀 가공으로의 기술개발이 꾸준히 진행되고 있다. 특히, 컴퓨터 기술이 발달하면서 공작기계 분야에도 컴퓨터 활용 범위가 증가하여 생산성 향상과 제조공정 개선 및 인건비 절감 등에도 크게 기여하고 있다.

이와 같은 변화에 적응하면서 원자력 연구기기개발지원 업무를 효율적으로 생산설계, 제작 및 보수하기 위해서는 범용기계에만 의존하던 제조공정 시스템을

범용 공작기계와 CNC를 접목함으로써 정밀성, 생산성 향상 등을 통하여 고객만족을 보다 체계적으로 보완하여 DNC(Direct Numerical Control)와 FMS(Flexible Manufacturing System)으로 점진적인 발전을 기대 할 수 있다.

V. 연구개발 결과의 활용계획

CNC 공작기계의 프로그램 설계 보고서는 전문성이 필요한 programming 교육 자료로 활용 할 수 있으며, CNC 공작기계의 활용도를 극대화함으로써 다기능, 고정밀화 되어 가는 원자력 연구기기 및 부품의 제작 업무에 효율적으로 활용 할 예정이다.



SUMMARY

I. Project Title

Program design report of the CNC machine tool(IV)

II. Objectives and Importance of the Project

The application of CNC machine tool being widely expanded according to variety of machine work method and rapid growth of machine tool, cutting tool for high speed efficient machine work.

Production design and machine work technology are continually developed for which service of the manufacture and maintenance for nuclear laboratory equipment are efficiently performed.

The application of CNC machine tool is very important for the improvement of productivity, quality, clearing up a manpower shortage.

We publish technical report which it includes CNC machine tool program and drawing, it contributes to the systematic development of CNC program design and machine work technology.

III. Scope and Contents of the Project

Program design of the CNC machine tool

- An outline of the CNC machine tool
- CNC machine tool program & drawing
- Reference data of KS and JIS metal material specification

IV. Results

In order to meet demand of user in production method of machine work, we convert a item large quantity production system to many items small quantity production system.

Therefore we continually developing high speed, efficiency and precision machine work technology. especially, as computer technology is being developed, it contributes to production efficiency, improvement of manufacturing process and saving personnel expenses in machine tool field.

In order to support task of development and manufacture of the nuclear Laboratory equipment, we use general purpose machine tool together with CNC machine tool.

We expect precision, productivity, direct numerical control and flexible manufacturing system in fabrication process. also, meet user satisfaction.

V. Proposal for Applications

Program design of the machine tool by this study are direct used for CNC machine tool programming instruction of expert and applied to the for development and fabrication of the nuclear laboratory equipment.



Contents

Summary	v
Contents	vii
Chapter 1 Introduction	1
Chapter 2 Main subject	3
Section 1 Abstract of CNC machine tool	3
Section 2 Program & drawing of CNC	6
(1) Target of the radioisotope production	7
(2) Expanding tube of irradiation target	24
(3) Zr & Al small capsule	34
(4) Ir-192 NDT irradiation target	42
(5) Laser alignment	62
(6) ITER blanket qualification mock-up	69
(7) Compression bentonite titanium mold	77
(8) Guide field rod for REF-V	86
(9) Aluminium-1050 welding specimen	92
(10) Storage vessel for oxidized sample	103
(11) In-situ high pressure container	117
(12) Coated particle tray	125
Section 3 Metal material comparison table of KS with JIS	129
Chapter 3 Conclusion	147

목 차

요 약 문	iii
목 차	viii
제 1 장 서론	1
제 2 장 본론	3
제 1 절 CNC 공작기계의 개요	3
제 2 절 CNC 프로그램 및 도면	6
(1) 동위원소 조사표적 제작	7
(2) 조사표적 확산 튜브 제작	24
(3) Zr & Al 소형캡슐 제작	34
(4) Ir-192 NDT 선원 조사표적 제작	42
(5) Laser alignment 제작	62
(6) ITER blanket qualification mock-up 제작	69
(7) 압축 벤토나이트 티타늄 몰드 제작	77
(8) REF-V용 가이드 필드용 rod 제작	86
(9) Aluminium-1050 용접시편 제작	92
(10) 산화물 시료 저장용기 제작	103
(11) In-situ 고압 시료용기 제작	117
(12) Coated particle tray 제작	125
제 3 절 KS 와 JIS 금속재료 비교표	129
제 3 장 결론	147

제 1 장 서 론

모든 산업기술의 발전과 더불어 공작기계분야도 고속·고능률 가공을 위한 공작기계와 절삭공구로 크게 발전함에 따라 CNC 공작기계의 활용범위는 광범위하게 확대되어 가고 있다.

NC(Numerical Control : 수치제어)는 “부호와 수치로써 구성된 수치정보로 기계의 운전을 자동으로 제어하는 것”을 의미한다. 즉, 사람이 이해할 수 있게 작성된 설계와 도면을 기계가 받아들일 수 있는 고유의 언어로 정보화하고 이를 천공 tape 또는 floppy disk 등을 이용하여 수치제어장치에 입력시켜 입력된 정보대로 기계를 자동제어 하는 것을 말한다.

최근에는 컴퓨터의 발달로 NC 공작기계에 computer를 내장한 CNC(Computer Numerical Control)공작기계가 널리 이용되고 있으며 통상 NC라고 하면 CNC를 지칭하고 있다.

CNC는 여러 분야의 공작기계에 적용되어 사용되고 있으며 특히, 현대사회의 급격한 정보화, 전문화에 따른 다품종 소량생산 체제가 요구되고 원가절감 및 품질·생산성 향상으로 경쟁력을 갖추기 위하여 CNC 공작기계가 널리 사용되고 있으며 여러 대의 CNC 공작기계에 공작물이나 공구 등을 운반하는 자동 반송장치와 자동화 창고, 로봇 등과 연결하여 이들을 computer로 관리하는 공장 자동화도 급속도로 보급되고 있다.

이상과 같은 CNC 공작기계의 활용범위가 확대되고 있으나 우리과제에 의뢰되고 있는 업무는 시제품 성격인 1~2개의 제작의뢰가 많으므로 범용 공작기계의 활용을 배제할 수 없는 실정이기 때문에 CNC와 범용 공작기계를 유연성 있고 적절하게 운영하여 효율적으로 대처하고 있다.

우리 과제에서는 CNC 공작기계를 이용하여 하나로 에서 생산하고 있는 진단, 치료 및 산업용 각종 동위원소 생산에 필요한 여러 형태의 조사용기 및 조사표적 등을 품질보증은 물론 생산성 향상을 통하여 안정적으로 전량 생산, 공급하고 있으며, 그 외에도 가공형태 및 정밀도가 요구되는 연구개발 기기, 부품 등을 가공하는 등 활용범위는 계속 증가하고 있다.

제 2 장 본 론

제1절 CNC 공작기계 개요

1. CNC 란?

NC는 numerical control의 약자로서 “공작물에 대한 공구의 위치를 부호와 수치로써 구성된 수치정보로 자동제어 하는 것”을 말한다.

즉, 가공물의 형상이나 가공조건의 정보를 편칭한 지령테이프(NC 프로그램)를 만들고 이것을 정보처리회로가 인식하여 지령 펄스를 발생시켜 서보기구(servo motor)를 구동시킴으로써 지령한대로 자동적으로 가공하는 제어방식이다.

CNC란 computer numerical control의 약자로서 computer를 내장한 NC를 말한다. NC와 CNC는 다소 차이가 있으나 최근 생산되는 CNC를 통상 NC라 부르고, NC와 CNC를 외관상으로 쉽게 구별하는 방법은 모니터가 있는 것과 없는 것으로 구별할 수 있다.

일반적으로 범용 공작기계는 사람이 두뇌로써 도면을 이해하고, 눈으로 끊임없이 공구의 끝을 감시하면서 손과 발로서 기계를 운전하여 원하는 가공물을 완성한다. 그러나 CNC 공작기계는 범용 공작기계에서 사람이 하는 일을 컴퓨터가 대신한다. CNC의 정보처리 회로에서는 사람의 두뇌와 같이 외부에서 주어지는 모든 자료들을 계산하고 순서대로 진행시켜 원하는 가공물이 조금도 틀림없이 가공될 수 있도록 한다. 외부에서 CNC 장치로 주어지는 모든 자료들이 data bus를 통하여 CPU(중앙제어장치 : central processing unit)에 들어가면 CPU에서 정보처리를 하고, 기계의 모든 작동원리 및 순서 등을 기억하고 있는 ROM에게 어떻게 어떠한 순서대로 출력할 것인가 자문을 얻은 다음 address bus를 통하여 정보 처리된 결과를 출력한다.

CNC는 공구 이동경로와 형상에 따라 다음 3가지로 분류할 수 있다.

가. 위치결정 회로 ; 공구의 최후 위치만을 제어하는 것으로 도중의 경로는 무시하고 다음 위치까지 얼마나 빠르게, 정확하게 이동시킬 수 있는가 하는 것이 문제가 된다.

나. 정보처리 회로 : 간단하고 프로그램이 지령하는 이동거리 기억회로와 테이블이 재위치 기억회로, 그리고 이 두 가지를 비교하는 회로로 구성되어 있다. 위치결정 NC와 비슷하지만 이동 중에 소재를 절삭하기 때문에 도중의 경로가 문제된다. 단, 그 경로는 직선에만 해당된다. 공구치수의 보정, 주축의 속도변화, 공구의 선택 등과 같은 기능이 추가되기 때문에 정보처리회로는 위치결정 NC보다

복잡하게 구성되어있다.

다. 연속절삭 회로 ; S자형 경로나 크랭크형 경로 등 어떠한 경로라도 자유자재로 공구를 이동시켜 연속절삭을 한다. 위치결정 회로, 정보처리 회로는 가감산을 할 수 있는 회로에 불과하지만 연속절삭 회로는 가감산은 물론 승제산까지 할 수 있는 회로를 갖추고 있다. 그러므로 일정의 컴퓨터가 필요하게 되었고 그러한 연산을 하면서 항상 공구의 이동을 감시하고 있으므로 S자형 같은 복잡한 경로를 이동시킬 수 있는 것이다. 종래의 범용 공작기계에서 공구의 움직임은 수동핸들 조작에 의해 이루어졌지만 CNC공작기계는 그 움직임을 CNC 프로그램에 의해 자동 제어한다. 또한 종래의 기계는 복잡한 2차원, 3차원 형상을 가공할 때는 동시에 2개 혹은 3개의 핸들을 서로 관련을 유지하면서 조작해야만 했다. 때문에 작업이 어려울 뿐 아니라 정밀도도 좋지 않고 작업시간도 많이 소요되었다. 반면에 CNC 공작기계는 수동핸들 대신 서보모터를 구동시켜 2축, 3축을 동시에 제어하여 복잡한 형상도 정밀하게 단시간에 가공할 수 있게 되었다. 이와 같이 프로그램에 의하여 자동으로 작동되는 공작기계를 CNC 공작기계라 한다.

CNC 공작기계의 초기 목적은 복잡한 형상의 것을 높은 정밀도로 가공하기 위해 밀링이나 선반 등에 많이 적용되었지만, 최근에는 생산성 향상의 목적으로 CNC 공작기계를 사용하며 적용기계도 선반이나 머시닝센터 외에 대부분의 공작기계에 적용된다. 특히 최근에는 wire Cut, 방전가공, laser 가공기, 가스 절단기, 목공기계, 측정기 등 모든 산업기계 분야에도 CNC가 폭넓게 적용되고 있다.

2. CNC의 장·단점

① 장점

- 제품의 균일성
- 품질의 향상
- 검사의 생략
- 재고 비용 절약
- 제조원가 및 인건비 절감
- 생산성 및 가공성 향상
- 한사람이 여러대 가동 가능

② 단점

- 기계 가격이 고가
- 관리비용의 과다
- 프로그래머가 필요
- 소량 가공에는 제조원가 상승

3. CNC 제어 시스템

가. 개방 회로 방식(open loop system)

- 감지기가 현재 위치를 검출하여 비교하는 기능을 삭제 방식으로

정밀도가 낮기 때문에 오늘날 CNC 공작 기계에서는 거의 사용되지 않는다.

나. 반 폐쇄 회로 방식(semi-close loop system)

- 모터 축의 회전 각도를 검출하거나 ball screw 의 회전 각도를 검출하는 방식으로 테이블 직선운동을 회전운동으로 바꾸어 검출한다. 오늘날 대부분 CNC 공작기계에서는 높은 정밀도의 ball screw 가 개발되어 있어 실용상의 정밀도가 문제되지 않아 대부분 이 방식을 채택하고 있다.

다. 폐쇄 회로 방식(close loop system)

- 테이블에 스케일을 부착하여 위치를 검출한 후 위치 편차를 피드백 하여 사용한다. 즉 이 방식은 ball screw의 백래쉬량의 변화 등을 정확히 제어 할 수 있다는 장점이 있다. 하지만 이 방식은 기계의 강성을 높이고 마찰 상태를 원활하게 하여 비틀림이 없어야 된다. 특별히 정밀도를 요하는 정밀 공작기계나 대형 기계에 사용된다.

라. 복합 제어 방식(hybrid loop system)

- 반폐쇄 및 폐쇄 회로 방식을 절충한 것으로 정밀도를 향상시킬 수 있어 대형의 공작기계에서 많이 사용되고 있다.

4. CNC 공작 기계의 구조

CNC 공작기계를 구성하고 있는 주요 요소는 다음과 같다.

가. 컨트롤러 : 명령을 처리하여 제어.

나. 강전반 : 기계의 구동, 공구 선택, 주축 제어.

다. 서보기구 : 정밀도와 아주 관계가 깊은 X, Y, Z 등 각 축을 제어.

라. 기계본체 : 베드, 칼럼 등 기계의 구조적 골격.

마. 볼스크류 : 회전운동을 직선운동으로 바꾸어 주는 장치 등.

5. CNC 공작기계의 변화

NC → CNC → DNC → FMS → CIM

* DNC : Direct Numerical Control / Distributed NC.

* FMS : Flexible Manufacturing System

* CIM : Computer Integrated Manufacturing

제 2 절 CNC 프로그램 및 도면

2008년도 우리 과제에서 수행한 제작업무 내용 중 CNC 선반 및 machining center 를 활용한 프로그램 및 도면 목록은 다음과 같다.

가. CNC program & drawing list

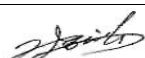
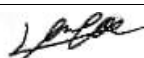
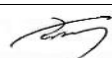
Job. name	Code no.	Name of parts	
(1) 동위원소 조사표적 제작	08-L009-1-C-IC	Inner capsule cap	7
	08-L009-2-C-IB	Inner capsule body	11
	08-L009-3-C-OC	Outer capsule cap	16
	08-L009-4-C-OB	Outer capsule body	20
(2) 조사표적 확관튜브 제작	08-L090-1-E-IT	Enlarge inner tube	24
	08-L090-2-E-OT	Enlarge outer tube	29
(3) Zr & Al 소형캡슐 제작	08-L113-1-SC-B	Small capsule bottle	34
	08-L113-2-SC-C	Small capsule cap	38
(4) Ir-192 NDT 선원 조사표적 제작	08-L115-1-T-C	Target cap	42
	08-L115-2-T-B	Target body	46
	08-L115-3-T-Bt	Target body(tail)	51
	08-L115-4-T-H	Target holder	54
	08-L115-5-T-HC	Target holder cap	58
(5) Laser alignment 제작	08-L279-1-LA-C	Alignment cap	62
	08-L279-2-LA-G	Alignment guide	66
(6) ITER blanket qualification mock-up 제작	08-L283-1-SP-T-SS	Tensile specimen(SS)	69
	08-L283-2-SP-T-Cu/SS	Tensile specimen(Cu/SS)	73
(7) 압축 벤토나이트 티타늄 몰드 제작	08-L384-1-M-Bo	Mold body	77
	08-L384-2-M-Ba	Mold base	81
(8) REF-V 가이드 필드 용 rod 제작	08-L388-1-RG-C	Guide color	86
	08-L388-2-RG-S	Guide support	89
(8) Al-1050 용접시편 제작	08-L443-1-WSP-I	Inner welding specimen	92
	08-L443-2-WSP-O	Outer welding specimen	98
(10) 산화물 시료 저장 용기 제작	08-L445-1-V(170)	Vessel - 170	103
	08-L445-2-VC-A	Vessel cap - A	108
	08-L445-3-VC-B	Vessel cap - B	113
(11) In-situ 고압 시료 용기 제작	08-L529-1-SB-O	Sample bottle	117
	08-L529-2-SB-C	Sample bottle cap	121
(12) Coated particle tray 제작	08-M164-1-PT	Tray	125

나. CNC program

(1) 동위원소 조사표적 제작

(가) Inner capsule cap

1/3

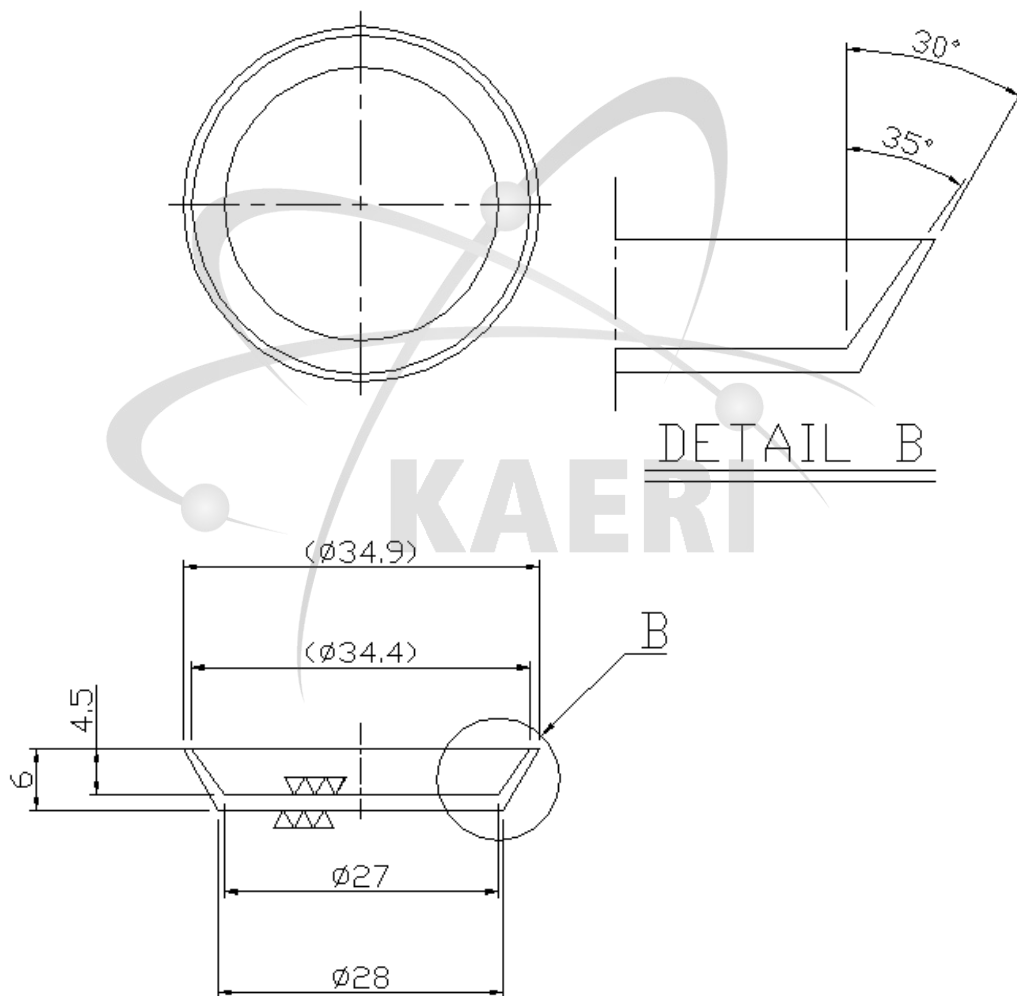
CODE NO.	08 - L009 - 1 - C - IC		
NAME of PARTS	Inner capsule cap		
MATERIAL	Al - 1050		
<pre> % :0091(08-01-009-1) N00 (ZERO POINT 40.5 [29.5]) G98 G28U0.W0. G50X300.000Z198.000T0400 G00X150.Z90. X0.Z15. G98G01Z-15.F700 /M69 G01W11. G04U2. /M68 G01W22. G00X150.Z90. G28U0.W0. M01 N01 (26MM SOLID DRILL 100) G99 G28U0.W0. G50X300.000Z142.800S2000T0200 G97S800T0202 G00X150.Z100. X0.Z3.M10 G01Z-5.2F0.12 G00Z30.M12 X150.Z100. G28U0.W0.T0200 M01 N02 (S12M SCLCR06 CCGT 060204 50) G28U0.W0. G50X317.100Z207.000S3000T1000 G97S2200T1010 G00X150.Z150. X12.Z4.M10 G01Z-5.1F0.10 G00Z20. X16.Z2. G01Z-5.1 G00Z20. X20.Z2. G01Z-5.1 G00Z20. X33.8Z2. G01X24.Z-5.1 </pre>			
PROGRAM		CHECKED	
		APPROVED	

CODE NO.	08 - L009 - 1 - C - IC
X18.	G01X32.
G00Z50.	G00X48.3
X35.Z2.	Z2.3
G01Z0.3	G01X33.3Z-10.2F0.12
X27.Z-5.15	Z-10.5
X10.	X38.
G00Z50.	X40.Z-11.5
X42.Z2.	G00X50.Z50.
G01Z0.2	X38.3Z0.
X36.8	G01X27.Z-9.1
X27.4Z-5.2	Z-10.5
X0.	X38.
G00Z50.M12	X40.Z-11.5
X150.Z150.	G00X150.
G28U0.W0.T1000	W-15.
M01	X41.
N03	G01Z-10.5F0.15
(SDJCR M11 DCGT 11T302 FL K10)	X27.
G28U0.W0.	Z-9.1
G50X241.860Z253.420S3000T0500	X38.3Z0.
G97S2200T0505	X18.
G00X120.Z110.	G00X50.Z50.M12
X44.Z-5.5M10	X150.Z150.
G01X36.F0.08	G28U0.W0.T0500
G00X44.	M01
Z-8.	N04
G01X34.	(SDJCR M11 DCMT 11T304 CT3000)
G00X44.	G28U0.W0.
Z-10.5	G50X241.770Z254.900S3000T0900




CODE NO.	08 - L009 - 1 - C - IC
G97S2200T0909	G28U0.W0.
G00X120.Z110.	G50X230.900Z265.310S2500T0300
X33.Z2.M10	G96S700T0303
G01Z-0.05F0.08	G00X110.Z115.
X37.1	X44.Z-6.2M10
X26.7Z-8.45	G01X29.F0.3
G00X44.	X27.5Z-6.7F0.01
Z2.	/M19
X33.	G01X17.5F0.12
G01Z0.	X7.5F0.08
X37.1	X3.F0.04
X26.7Z-8.4	X-1.2F0.01
Z-10.5	G04U2.
X38.	/M20
X40.Z-11.5	G00X150.
G00X150.	W-15.
W-15.	X42.
X41.	G01Z-6.F1.8
G01Z-9.F3.	X0.
X29.	Z30.
X40.Z0.	G00X50.M12
X33.F0.05	X150.Z200.
G00X10.M12	G28U0.W0.T0300
X50.Z50.	M30(02 52)
X150.Z150.	%
G28U0.W0.T0900	
M01	
N05	
(GVR2525-3 GV503 P20)	

DRAWING of CNC MANUFACTURING

CODE NO.	08 - L009 - 1 - C - IC
NAME of PARTS	Inner capsule cap
MATERIAL	Al - 1050

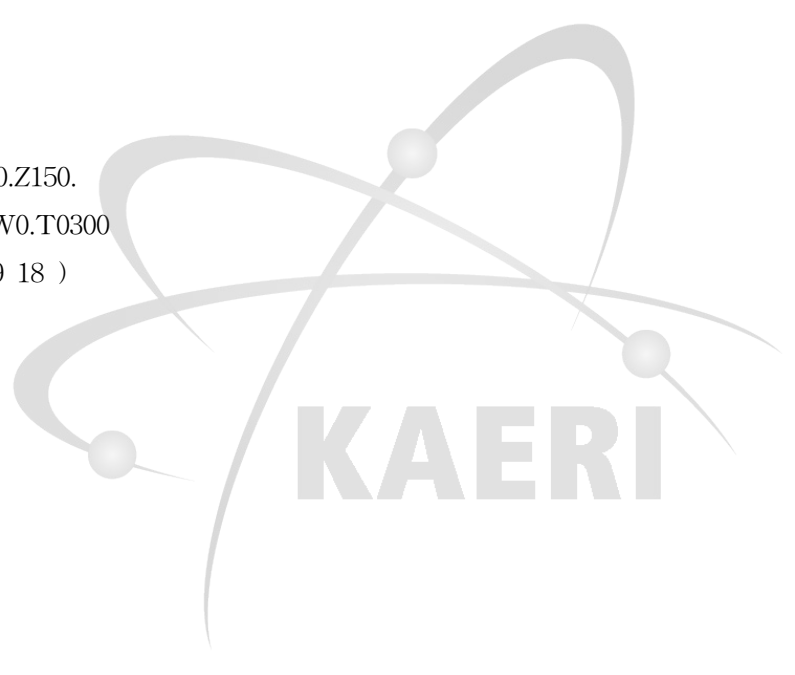


DRAWN		CHECKED		APPROVED	
-------	--	---------	--	----------	--

CODE NO.	08 - L009 - 2 - C - IB		
NAME of PARTS	Inner capsule body		
MATERIAL	Al - 1050		
&HE:%	Z20.F8.		
:0092(08-01-009-2)	Z-39.		
N00	Z-60.F0.12		
(STOPPER BAR 120)	Z20.F8.		
G28U0.W0.	Z-59.		
G50X306.000Z170.000T0200	Z-70.F0.12		
G00X150.Z100.	Z20.F8.		
X0.Z10.	Z-69.		
Z0.	Z-77.F0.12		
/M69	Z20.F8.		
G04U2.	Z-76.		
/M68	Z-83.5F0.12		
G04U2.	Z20.F8.		
G00Z10.	G00X150.Z100.M12		
X150.Z100.	G28U0.W0.T1200		
G28U0.W0.	N02		
N01	(25MM CARBIDE ENDMILL 130)		
(26MM SOLID DRILL 138)	G28U0.W0.		
G28U0.W0.	G50X306.000Z160.400S1000T0800		
G50X305.800Z152.080S2000T1200	G97S800T0808		
G97S800T1212	G00X150.Z100.		
G00X150.Z100.	X0.Z3.M10		
X0.Z3.M10	G01Z-75.F8.		
G01Z-20.F0.10	Z-83.7F0.12		
W1.	G04U1.		
Z-40.	G00Z10.M12		
PROGRAM		CHECKED	
		APPROVED	

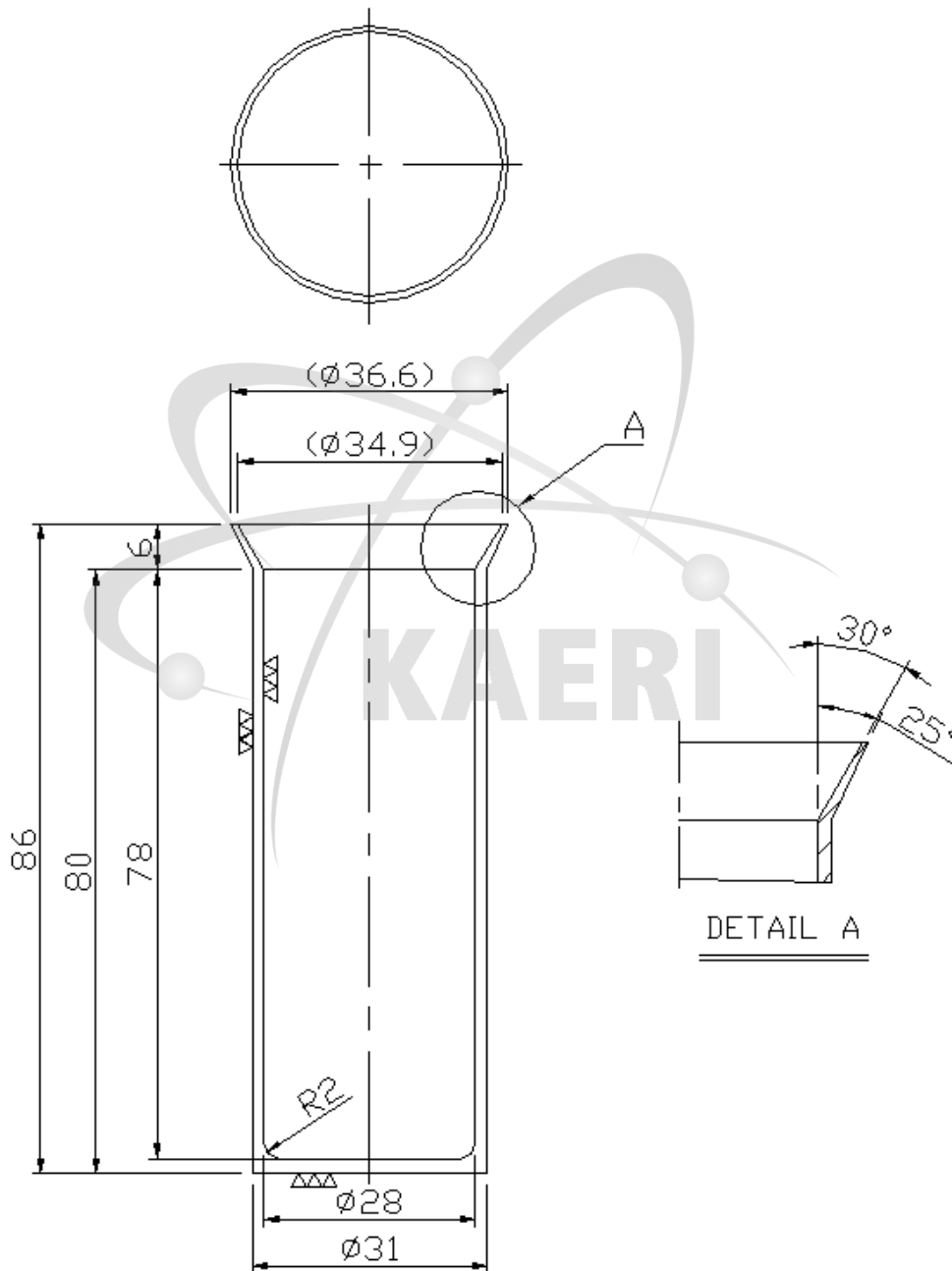
CODE NO.	08 - L009 - 2 - C - IB
X150.Z100.	W-5.
G28U0.W0.T0800	G00X150.
N03	W-15.
(SDJCR M11 DCGT 11T302 FL K10)	X42.
G28U0.W0.	Z-88.
G50X267.750Z287.750S3000T0100	X35.
G97S2200T0101	G01Z-10.F1.5
G00X150.Z150.	X41.Z2.
X26.Z2.M10	G00X0.
G01Z0.2F0.12	Z100.
X44.3	X39.5Z1.
G00Z1.5	G01X31.2Z-8.F0.12
G01X36.Z-7.5	Z-88.
Z-90.	X28.77
X39.9	Z-90.
W-5.	X39.7
G00X150.	W-5.
W-15.	G00X150.
X42.	W-15.
Z-88.	X41.
X38.	Z-89.
G01Z-10.F1.5	X33.
X44.Z2.	G01Z-9.F1.5
G00X0.	X44.Z2.
Z100.	G00X0.
X41.3Z1.5	Z100.
G01X33.Z-7.5F0.12	X39.8Z0.3
Z-90.	G01X31.5Z-7.7F0.12
X39.8	G00X44.M12

CODE NO.	08 - L009 - 2 - C - IB
X150.Z120.	(C20S SCLCR 09 CCGT 04 130)
G28U0.W0.T0100	G28U0.W0.
N04	G50X331.740Z161.700S3000T0600
(S20S SCLCR 09 CCGT 04 130)	G97S2200T0606
G28U0.W0.	G00X150.Z100.
G50X331.480Z162.360S3000T0400	X32.Z3.M10
G97S2200T0404	G01Z0.2F0.12
G00X150.Z100.	X44.
X27.95Z3.M10	G00X38.59Z1.5
G01X27.91Z-82.3F0.12	G01X28.0Z-7.
G03X24.85W-1.5R1.5F0.05	X27.96Z-82.3F0.12
G00Z6.	G03X24.95W-1.5R1.5F0.05
X35.39	G00Z50.M12
G01X25.F0.12	X150.Z100.
G00Z4.5	G28U0.W0.T0600
X35.39	N06
G01X25.Z-4.5	(C16R STFRCR 11 TCMT 04 100)
G00Z3.	G28U0.W0.
X35.39	G50X327.630Z191.440S3000T1000
G01X25.Z-6.	G97S2200T1010
Z-13.	G00X150.Z100.
G00Z0.7	X18.Z3.M10
X35.39	G01Z-77.F3.
G01X25.Z-8.3	Z-83.F0.12
Z-13.	X27.5
G00Z20.M12	G01Z30.F3.
X150.Z100.	G00Z100.M12
G28U0.W0.T0400	G28U0.W0.T1000
N05	N07

CODE NO.	08 - L009 - 2 - C - IB
<p>G28U0.W0. G50X249.770Z298.700S2200T0300 G96S700T0303 G00X150.Z150. X44.Z-86.M10 /M19 G01X-1.2F0.04 G00X66.M12 W-7. G04U2. /M20 G00X150.Z150. G28U0.W0.T0300 M30(09 18) %</p>  The logo for KAERI (Korea Atomic Energy Research Institute) is centered on the page. It features a stylized atomic symbol with three elliptical orbits and three spheres representing protons and neutrons. Below the symbol, the word "KAERI" is written in a bold, sans-serif font.	

DRAWING of CNC MANUFACTURING



CODE NO.	08 - L009 - 2 - C - IB
NAME of PARTS	Inner capsule body
MATERIAL	Al - 1050



DRAWN	<i>[Signature]</i>	CHECKED	<i>[Signature]</i>
		APPROVED	<i>[Signature]</i>

(다) Outer capsule cap

1/3

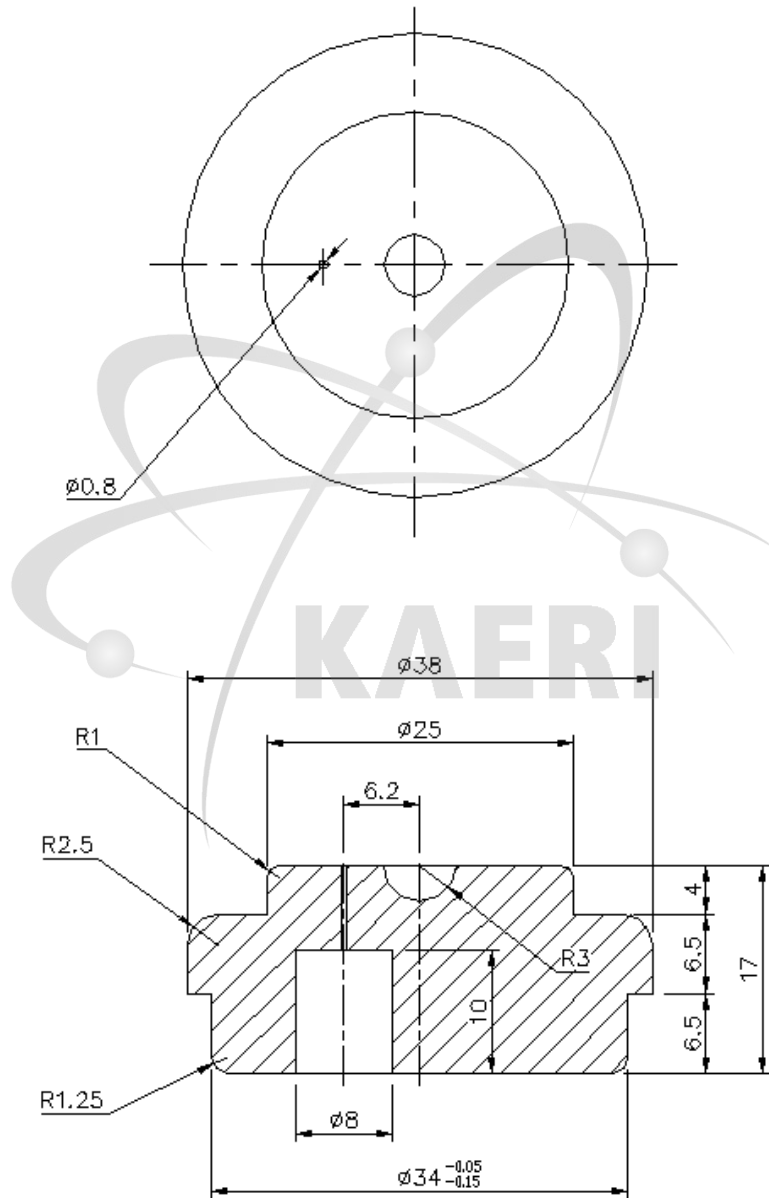
CODE NO.	08 - L009 - 3 - C - OC		
NAME of PARTS	Outer capsule cap		
MATERIAL	Al - 1050		
%	G01Z0.1F0.12M10		
:0093(08-01-009-3)	X-1.2		
N00	G00X42.Z3.		
(ZERO POINT 50.5 [30.0])	X38.5		
G98	G01Z-6.		
G28U0.W0.	G00X42.Z3		
G50X300.000Z198.000T0400	X36.5		
G00X150.Z90.	G01Z-6.		
X0.Z15.	G00X42.Z3.		
G98G01Z-15.F700	X34.5		
/M69	G01Z-6.		
G01W20.5	X38.5		
G04U2.	G01Z-21.		
/M68	X42.5Z-24.		
G01W22.	G00X180.		
G00X150.Z90.	Z-40.		
G28U0.W0.	G01X41.F2.		
M01	G01Z-19.		
N01	X39.		
(SDJCR M11 DCGT 11T302 FL K10)	Z2.		
G99	G00X0.M12		
G28U0.W0.	G00X120.Z110.		
G50X241.800Z243.200S3000T0500	G28U0.W0.T0500		
G97S2200T0505	M01		
G00X120.Z110.	N02		
X42.Z3.	(T-C TTER 2525-3 TDT 3E-0.4)		
PROGRAM		CHECKED	
		APPROVED	

CODE NO.	08 - L009 - 3 - C - OC
G28U0.W0.	G01Z-6.5
G50X241.150Z254.800S3000T0700	X37.38
G97S2200T0707	X37.98Z-6.8
G00X120.Z130.	Z-15.
X44.Z10.	G00X44.Z3.M12
Z-13.2	X120.Z110.
G01X25.5F0.05M10	G28U0.W0.T0900
G00X44.	M01
Z-15.7	N04
G01X25.5	(T-C TTER 2525-3 TDT 3E-0.4)
G00X44.	G28U0.W0.
Z-17.2	G50X241.500Z254.450S3000T1100
G01X18.	G97S2200T1111
G00X44.M12	G00X125.Z120.
Z50.	X38.5Z3.
X120.Z130.	G01X38.05Z-9.5F0.03M10
G28U0.W0.T0700	G03X31.05W-3.5R3.5
M01	G01X25.
N03	Z-15.3
(SDJCR M11 DCMT 11T304 CT3000)	G03X21.4W-1.8R1.8
G28U0.W0.	G00X44.M12
G50X241.840Z244.630S3000T0900	X125.Z120.
G97S2200T0909	G28U0.W0.T1100
G00X120.Z110.	M01
X4.Z3.	N05
G01X0.F0.08M10	(GVR2525-3 GV503 P20)
Z0.	G28U0.W0.
X31.08	G50X230.800Z254.730S3000T0300
G03X33.88W-1.4R1.4	G97S2200T0303

CODE NO.	08 - L009 - 3 - C - OC
G00X110.Z115. X40.Z10. G01Z-17.F0.8M10 X28. /M19 G01X-1.2F0.03 G04U2. /M20 G00X44. Z4.M12 X110.Z115. G28U0.W0.T0300 M30(03 04) %	 The logo for KAERI (Korea Atomic Energy Research Institute) is centered on the page. It features a stylized atomic symbol with three elliptical orbits and three spheres representing protons and neutrons. Below the symbol, the word "KAERI" is written in a bold, sans-serif font.

DRAWING of CNC MANUFACTURING

CODE NO.	08 - L009 - 3 - C - OC
NAME of PARTS	Outer capsule cap
MATERIAL	Al - 1050



DRAWN		CHECKED	
		APPROVED	

(라) Outer capsule body

1/3

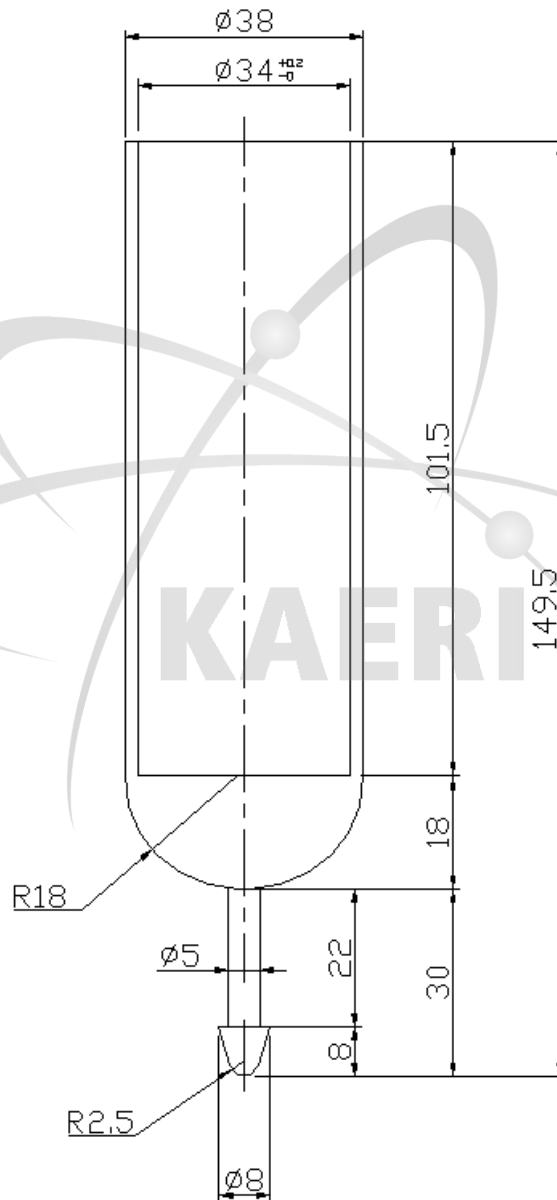
CODE NO.	08 - L009 - 4 - C - OB		
NAME of PARTS	Outer capsule body		
MATERIAL	Al - 1050		
&HE:%	Z-30.F0.15		
:0094(08-01-009-4)	Z20.F8.		
N00	Z-29.		
(STOPPER BAR 170)	Z-45.F0.15		
G28U0.W0.	Z20.F8.		
G50X300.000Z120.000T0200	Z-44.		
G00X150.Z60.	Z-60.F0.15		
X40.Z10.	Z20.F8.		
Z0.5	Z-59.		
/M69	Z-70.F0.12		
G04U3.	Z20.F8.		
/M68	Z-69.		
G04U1.	Z-80.F0.12		
G00Z10.	Z20.F8.		
X150.Z60.	Z-79.		
G28U0.W0.	Z-90.F0.12		
N01	Z20.F8.		
(32MM SOLID DRILL 140)	Z-89.		
G28U0.W0.	Z-97.F0.10		
G50X305.500Z101.600S2000T1200	Z20.F8.		
G97S800T1212	Z-96.		
G00X150.Z50.	Z-101.3F0.10		
X0.Z3.M10	G00Z10.M12		
G01Z-15.F0.15	X150.Z50.		
Z20.F8.	G28U0.W0.T1200		
Z-14.	N02		
PROGRAM		CHECKED	
		APPROVED	

CODE NO.	08 - L009 - 4 - C - OB
(30MM CARBIDE ENDMILL 122)	G01X34.00Z-101.3
G28U0.W0.	G00Z10.M12
G50X305.700Z118.700S1000T0800	X150.Z50.
G97S800T0808	G28U0.W0.T0400
G00X150.Z60.	N04
X0.Z3.M10	(SDJCR M11 DCGT 11T302 FL K10)
G01Z-90.F8.	G28U0.W0.
Z-97.F0.15	G50X267.920Z237.800S3000T0100
Z-101.5F0.08	G97S2500T0101
G04U2.	G00X200.Z200.
G00Z10.M12	X29.Z3.9M10
X150.Z60.	G01X39.Z-1.1F0.12
G28U0.W0.T0800	G00Z2.
N03	X38.10
(S20S SCLCR 09 CCGT 04 130)	G01X38.02Z-153.5
G28U0.W0.	X39.8
G50X331.600Z112.110S3000T0400	W-5.
G97S2500T0404	X43.8W-2.
G00X150.Z50.	G00X150.
X44.Z5.M10	W-3.
G01Z0.05F0.12	X43.
X31.85	G01X41.2
G01Z-93.F3.3	W10.5F8.
Z-101.0F0.15	X40.
G00U-0.5Z50.	Z5.
X42.	G00X150.Z200.M12
Z0.	G28U0.W0.T0100
G01X36.00	N05
G02X34.05W-1.0R1.0	(SDJCR M11 DCMT 11T304 CT3000)

CODE NO.	08 - L009 - 4 - C - OB
G28U0.W0.	G01Z-99.F1.8
G50X268.700Z237.600S3000T0500	X34.05Z-101.50F0.12
G97S2200T0505	X13.F0.04
G00X150.Z200.	G00Z10.M12
X37.95Z3.M10	X150.Z55.
G01X37.87Z-153.5F0.12	G28U0.W0.T0400
G00X43.Z10.M12	N08
X150.Z200.	(GVR2525-4 GV504 P20)
G28U0.W0.T0500	G28U0.W0.
N06	G50X253.770Z248.880S2200T0300
(S20S STF CR11 TCMT 04 KP500)	G96S700T0303
G28U0.W0.	G00X150.Z150.
G50X331.320Z112.220S3000T0600	X44.Z-150.M10
G97S2200T0606	/M19
G00X150.Z55.	G01X-1.2F0.03
X34.10Z2.M10	G00X66.M12
G01X34.05Z-101.4F0.12	W-7.
X13.	/M20
G00Z25.M12	G00X150.Z150.
X150.Z55.	G28U0.W0.T0300
G28U0.W0.T0600	M30(07 17)
M01	%
N07	
(S20S SCLCR 09 CCGT 04 130)	
G28U0.W0.	
G50X331.600Z112.110S3000T0400	
G97S2200T0404	
G00X150.Z55.	
X33.65Z5.M10	

DRAWING of CNC MANUFACTURING

CODE NO.	08 - L009 - 4 - C - OB
NAME of PARTS	Outer capsule body
MATERIAL	Al - 1050




DRAWN		CHECKED		APPROVED	
-------	--	---------	--	----------	--

(2) 조사표적 확관 튜브 제작

(가) Enlarge inner tube

1/4

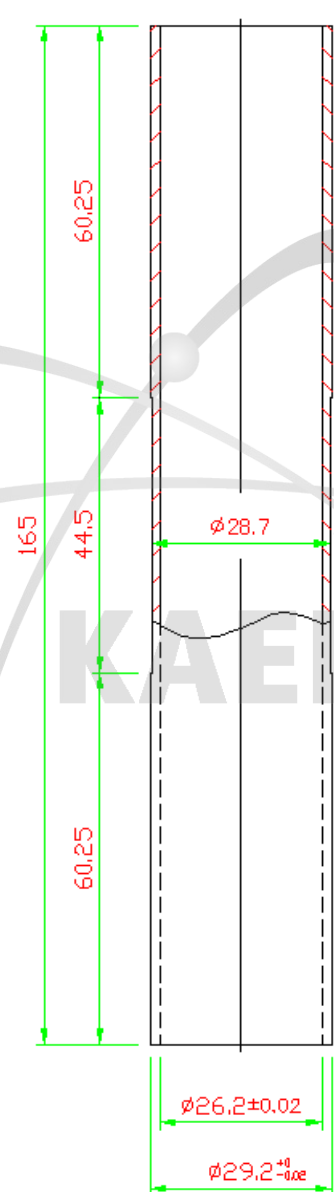



CODE NO.	08 - L090 - 1 - E - IT				
NAME of PARTS	Enlarge inner tube				
MATERIAL	Al - 1050				
&HE:%	Z-18.				
:0901(08-03-090-1)	Z-40.F0.12				
N00	Z30.F5.				
(STOPPER BAR 190)	Z-38.				
G28U0.W0.	Z-60.F0.12				
G50X300.000Z100.000T0200	Z30.F5.				
G00X155.Z50.	Z-58.				
X45.Z10.	Z-80.F0.12				
Z0.5	Z30.F5.				
/M69	Z-78.				
G04U3.	Z-100.F0.12				
/M68	Z30.F5.				
G04U1.	Z-98.				
G00Z10.	Z-120.F0.08				
X155.Z50.	Z30.F5.				
G28U0.W0.	Z-118.				
N01	Z-140.F0.08				
(22MM SOLID DRILL)	Z30.F5.				
G28U0.W0.	G00X155.M12				
G50X305.500Z061.000S1500T1200	G28U0.W0.T1200				
G97S1000T1212	N02				
G00X155.Z30.	(24.3 MM DRILL)				
X0.Z5.M10	G28U0.W0.				
G01Z-20.F0.12	G50X305.500Z039.000S1500T1000				
Z30.F5.	G97S1300T1010				
PROGRAM		CHECKED		APPROVED	

CODE NO.	08 - L090 - 1 - E - IT
G00X155.Z18.	Z-155.F0.08
X0.Z5.M10	Z18.F5.
G01Z-30.F0.12	Z-153.
Z18.F5.	Z-160.F0.08
Z-28.	Z18.F5.
Z-60.F0.12	M01
Z18.F5.	Z-158.
Z-58.	Z-163.F0.08
Z-90.F0.12	Z18.F5.
Z18.F5.	Z-161.
Z-88.	Z-166.F0.08
Z-120.F0.12	Z18.F5.
Z18.F5.	Z-164.
Z-118.	Z-168.F0.08
Z-130.F0.12	Z18.F5.
Z18.F5.	Z-166.
Z-128.	Z-170.F0.08
Z-140.F0.08	Z18.F5.
Z18.F5.	Z-168.
M01	Z-172.F0.08
S800	Z18.F5.
Z-138.	Z-170.
Z-145.F0.08	Z-174.F0.08
Z18.F5.	Z18.F5.
Z-143.	G00X155.M12
Z-150.F0.08	G28U0.W0.T1000
Z18.F5.	N03
M01	(PCLNR M12 CCGT 04 FL K10)
Z-148.	G28U0.W0.

CODE NO.	08 - L090 - 1 - E - IT
G50X269.000Z217.780S3000T1100	(C20S SCLCR09 CCGT 04 FL 175)
G97S1300T1111	G28U0.W0.
G00X135.Z115.	G50X331.480Z047.150S2200T0400
X44.Z3.M10	G97S1300T0404
G01Z0.1F0.05	G00X165.Z22.
X24.	X25.6Z4.M10
G00X37.8Z3.	G01X25.53Z-118.F0.12
G01X37.7Z-168.F0.12	G00U-0.5Z22.
X41.4Z-170.	X180.
G00X44.Z3.	M01
X35.6	G00X25.43
G01X35.5Z-168.	Z4.
X41.5Z-171.	G01X25.53Z-116.F1.3
G00X44.Z3.	X25.4Z-167.F0.12
X33.4	G00U-0.5Z4.M12
G01X33.3Z-168.	X165.Z22.
X41.3Z-172.	G28U0.W0.T0400
G00X44.Z3.	N05
X31.2	(C20S SCLCR09 CCGT 04 FL 175)
G01X31.1Z-167.5	G28U0.W0.
X41.1Z-172.5	G50X331.480Z047.150S2200T0400
G00X44.Z3.	G97S1300T0404
X29.50	G00X165.Z22.
G01X29.40Z-167.5	X26.0Z4.M10
X39.30Z-172.5	G01X25.93Z-118.F0.12
G00X44.Z3.M12	G00U-0.5Z22.
X135.Z115.	X180.
G28U0.W0.T1100	M01
N04	G00X25.83

CODE NO.	08 - L090 - 1 - E - IT
Z4.	G00X44.M12
G01X25.93Z-116.F1.3	Z10.
X25.9Z-167.F0.12	X135.Z115.
G00U-0.5Z4.M12	G28U0.W0.T0500
X165.Z22.	N07
G28U0.W0.T0400	(S20S STF11 TCMT 04 KP500)
N06	G28U0.W0.
(SDJCR M11 DCMT 11T304 CT3000)	G50X331.230Z047.160S2200T0600
G28U0.W0.	G97S300T0606
G50X268.730Z217.750S2500T0500	G00X165.Z22.
G97S900T0505	X30.15Z1.5M10
G00X135.Z115.	G01X26.15Z-0.5F0.10
X24.Z3.M10	X26.14Z-16.
G01Z0.1F0.10	S600
X31.	X26.13Z-32.
G00X25.30Z1.6	S900
G01X29.30Z-0.4	X26.11Z-64.F0.12
S300	S1200
G01X29.29Z-20.	X26.09Z-96.
S600	S1500
G01X29.28Z-40.	X26.06Z-166.F0.15
S900	G00U-0.5Z4.M12
X29.28Z-60.65F0.12	X165.Z22.
X28.78Z-60.90	G28U0.W0.T0600
S1200	M01
X28.76Z-104.80F0.15	N08
X29.26Z-105.05	(S20S STF11 TCMT 04 KP500)
S1500	G28U0.W0.
X29.24Z-168.F0.12	%

DRAWING of CNC MANUFACTURING

CODE NO.	08 - L090 - 1 - E - IT				
NAME of PARTS	Enlarge inner tube				
MATERIAL	Al - 1050				
 <p>The drawing shows a vertical cylindrical part with the following dimensions:<ul style="list-style-type: none">Total length: 165Length of the top section: 60.25Length of the middle section: 44.5Length of the bottom section: 60.25Outer diameter of the middle section: $\phi 28.7$Inner diameter of the bottom section: $\phi 26.2 \pm 0.02$Outer diameter of the bottom section: $\phi 29.2^{+0}_{-0.02}$</p>					
DRAWN		CHECKED		APPROVED	

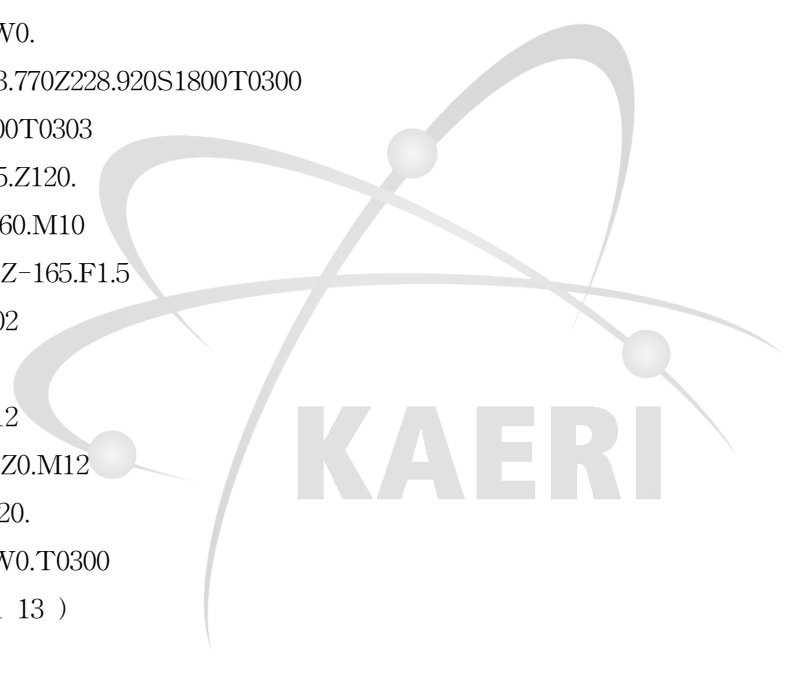
(4) Enlarge outer tube

1/4

CODE NO.	08 - L090 - 2 - E - OT		
NAME of PARTS	Enlarge outer tube		
MATERIAL	Al - 1050		
&HE:%	Z-40.F0.12		
:0902(08-03-090-2)	Z30.F5.		
N00	Z-38.		
(STOPPER BAR 190)	Z-60.F0.12		
G28U0.W0.	Z30.F5.		
G50X300.000Z100.000T0200	Z-58.		
G00X155.Z50.	Z-80.F0.12		
X45.Z10.	Z30.F5.		
Z0.5	Z-78.		
/M69	Z-100.F0.12		
G04U3.	Z30.F5.		
/M68	Z-98.		
G04U1.	Z-120.F0.08		
G00Z10.	Z30.F5.		
X155.Z50.	Z-118.		
G28U0.W0.	Z-140.F0.08		
N01	Z30.F5.		
(26MM SOLID DRILL)	Z-138.		
G28U0.W0.	Z-150.F0.08		
G50X305.500Z049.000S1500T1200	Z22.F5.		
G97S800T1212	G00X155.M12		
G00X155.Z22.	G28U0.W0.T1200		
X0.Z5.M10	N02		
G01Z-20.F0.12	(24.3 MM DRILL)		
Z30.F5.	G28U0.W0.		
Z-18.	G50X305.500Z039.000S1500T1000		
PROGRAM		CHECKED	
		APPROVED	

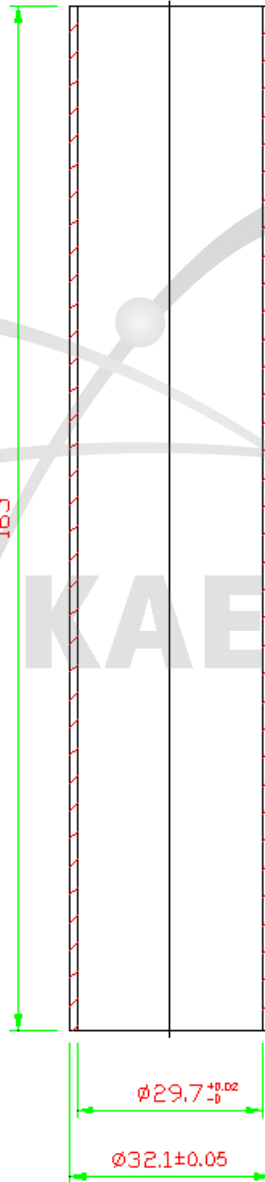
CODE NO.	08 - L090 - 2 - E - OT
G97S1000T1010	G50X331.480Z047.150S2200T0400
G00X155.Z25.	G97S1300T0404
X0.Z5.M10	G00X165.Z22.
G01Z-145.F5.	X27.9Z4.M10
Z-160.F0.08	G01X27.83Z-118.F0.12
Z18.F5.	G00U-0.5Z22.
Z-158.	X180.
Z-163.F0.08	M01
Z18.F5.	G00X27.73
Z-161.	Z4.
Z-166.F0.08	G01X27.83Z-116.F1.3
Z18.F5.	X27.8Z-167.F0.12
Z-164.	G00U-0.5Z4.M12
Z-168.F0.08	X165.Z22.
Z18.F5.	G28U0.W0.T0400
Z-166.	N04
Z-170.F0.08	(C20S SCLCR09 CCGT 04 FL 175)
Z18.F5.	G28U0.W0.
Z-168.	G50X331.480Z047.150S2200T0400
Z-172.F0.08	G97S1300T0404
Z18.F5.	G00X165.Z22.
Z-170.	X29.55Z4.M10
Z-174.F0.08	G01X29.48Z-118.F0.12
Z18.F5.	G00U-0.5Z22.
G00X155.M12	X180.
G28U0.W0.T1000	M01
N03	G00X29.38
(C20S SCLCR09 CCGT 04 FL 175)	Z4.
G28U0.W0.	G01X29.48Z-116.F1.3

CODE NO.	08 - L090 - 2 - E - OT
X29.45Z-167.F0.12	X135.Z115.
G00U-0.5Z4.M12	G28U0.W0.T1100
X165.Z22.	M01
G28U0.W0.T0400	N06
N05	(SDJCR M11 DCMT 11T304 CT3000)
(PCLNR M12 CCGT 04 FL K10)	G28U0.W0.
G28U0.W0.	G50X268.730Z217.750S2500T0500
G50X269.000Z217.780S3000T1100	G97S900T0505
G97S1300T1111	G00X135.Z115.
G00X135.Z115.	X28.15Z1.6M10
X44.Z3.M10	G01X32.15Z-0.4F0.10
G01Z0.1F0.05	S300
X24.	G01X32.145Z-16.
G00X38.Z3.	S600
G01X37.9Z-168.F0.12	X32.14Z-32.
X41.9Z-170.	S900
G00X44.Z3.	X32.12Z-64.F0.12
X36.	S1200
G01X35.9Z-168.	X32.10Z-96.
X41.9Z-171.	S1500
G00X44.Z3.	X32.08Z-168.F0.15
X34.	G00X44.M12
G01X33.9Z-168.	Z10.
X41.9Z-172.	X135.Z115.
G00X44.Z3.	G28U0.W0.T0500
X32.25	N07
G01X32.20Z-168.	(S20S STF0R11 TCMT 04 KP500)
X42.4Z-173.	G28U0.W0.
G00X44.Z3.M12	G50X331.240Z047.150S2000T0600

CODE NO.	08 - L090 - 2 - E - OT
<p>Z-168. G00X44.M12 Z10. X135.Z115. G28U0.W0.T0500 M01 N10 (GVR2525-4 GV504 P20) G28U0.W0. G50X253.770Z228.920S1800T0300 G97S1300T0303 G00X125.Z120. X55.Z-160.M10 G01X34.Z-165.F1.5 X28.F0.02 S1300 X13.F0.12 G00X55.Z0.M12 X125.Z120. G28U0.W0.T0300 M30(31 13) %</p>  A large, light gray watermark of the KAERI logo is centered on the page. It features a stylized atomic symbol with three elliptical orbits and three spheres representing protons and neutrons. The word "KAERI" is written in a bold, sans-serif font across the center of the logo.	

DRAWING of CNC MANUFACTURING

CODE NO.	08 - L090 - 2 - E - OT
NAME of PARTS	Enlarge outer tube
MATERIAL	Al - 1050






DRAWN		CHECKED		APPROVED	
-------	--	---------	--	----------	--

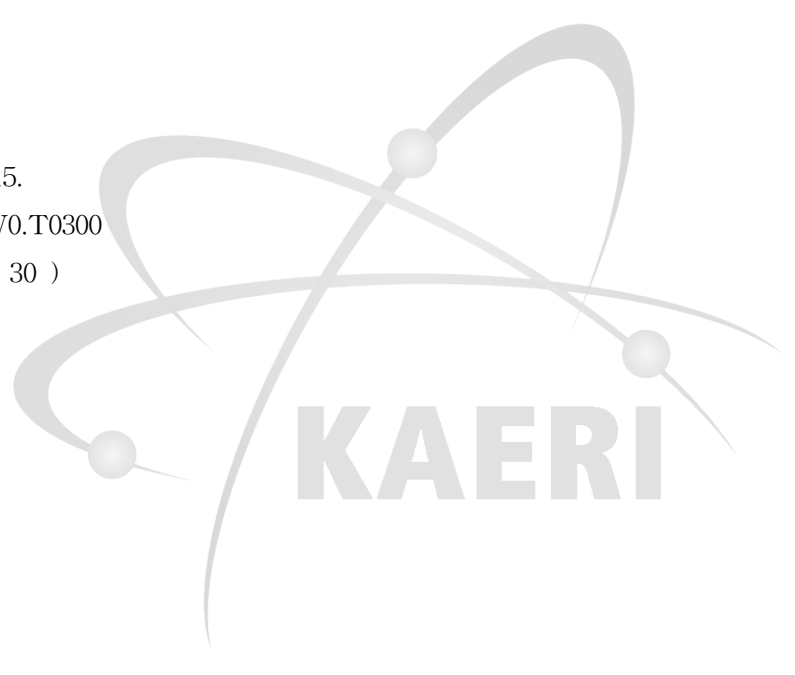
(3) Zr & Al 소형캡슐 제작

(가) Small capsule bottle

1/3

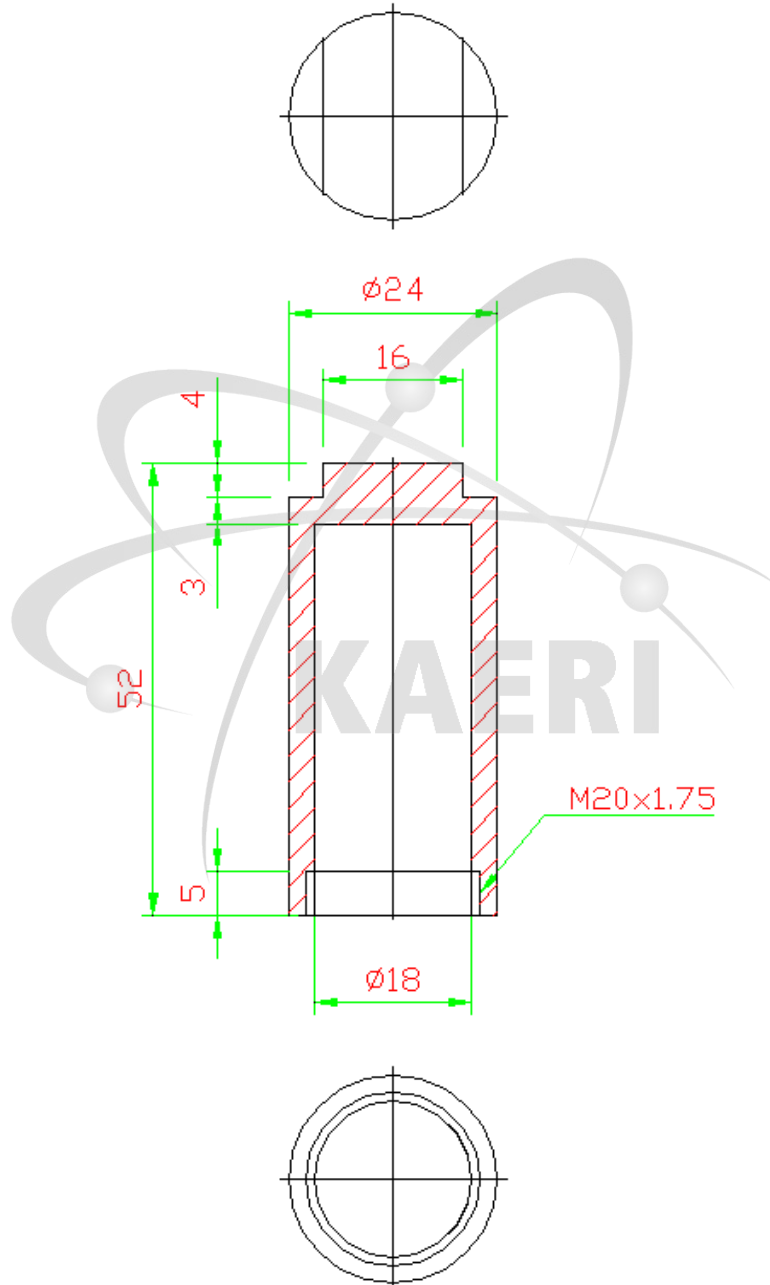
CODE NO.	08 - L113 - 1 - SC - B		
NAME of PARTS	Small capsule bottle		
MATERIAL	Zr & Al		
%	X16.8Z3.M10		
:1131(08-04-113-1)	G01Z-43.F0.08		
N00	G00U-0.5Z20.		
(JIG CHUCKING 080)	X17.5Z3.		
N01	G01Z-44.8		
(16MM HSS DRILL 123)	G00U-0.5Z20.		
G28U0.W0.	X26.4Z3.		
G50X300.000Z095.000S2000T0200	G01X18.4Z-1.		
G97S800T0202	Z-6.		
G00X150.Z50.	X18.Z-6.2		
X0.Z3.M10	Z-44.8		
G01Z-25.F0.12	G00U-0.5Z20.		
Z20.F1.8	G00Z50.M12		
Z-23.	X160.Z70.		
Z-45.F0.12	G28U0.W0.T0800		
Z10.F1.8	N03		
G00Z50.M12	(C12R SCLCR06 CCMT KP300 080)		
X150.	G28U0.W0.		
G28U0.W0.T0200	G50X317.180Z137.030S3000T0600		
N02	G97S2200T0606		
(S12M SCLCR 06 CCGT K10 080)	G00X160.Z70.		
G28U0.W0.	X26.5Z2.2M10		
G50X317.390Z137.730S3000T0800	G01X18.55Z-1.8F0.08		
G97S2200T0808	Z-5.5		
G00X160.Z70.	X17.95Z-5.7		
PROGRAM		CHECKED	
		APPROVED	

CODE NO.	08 - L113 - 1 - SC - B
Z-44.8	G28U0.W0.T0600
G00U-0.5Z3.M12	N06
X160.Z70.	(S16M THSNR 16 TH16NR 30 P20)
G28U0.W0.T0600	G28U0.W0.
N04	G50X318.550Z137.700S1000T1000
(S16M THSNR 16 TH16NR 30 P20)	G97S300T1010
G28U0.W0.	G00X150.Z100.
G50X318.550Z137.700S1000T1000	X22.Z10.M10
G97S300T1010	G01X18.5Z10.F0.1
G00X150.Z100.	G76P010060Q100R025
X22.Z10.M10	G76X20.44Z-7.P0970Q0300F1.5
G01X18.5Z10.F0.1	G01X18.5Z10.
G76P010060Q100R025	G00X150.Z100.M12
G76X20.44Z-7.P0970Q0300F1.5	G28U0.W0.T1000
G01X18.5Z10.	N07
G00X150.Z100.M12	G28U0.W0.
G28U0.W0.T1000	G50X317.180Z137.030S3000T0600
N05	G97S2200T0606
G28U0.W0.	G00X160.Z70.
G50X317.180Z137.030S3000T0600	X26.5Z2.5M10
G97S2200T0606	G01X18.5Z-1.5F0.08
G00X160.Z70.	Z-6.
X26.5Z2.2M10	X18.05Z-6.2
G01X18.55Z-1.8F0.08	Z-44.8
Z-5.5	G00U-0.5Z3.M12
X18.Z-5.7	X160.Z70.
Z-44.8	G28U0.W0.T0600
G00U-0.5Z3.M12	N08
X160.Z70.	(16MM CARBIDE ENDMILL 80)

CODE NO.	08 - L113 - 1 - SC - B
G96S500T0303 G00X110.Z115. X40.Z10.M10 G01Z-52.F0.8 X28. /M19 G01X-1.2F0.03 G04U2. /M20 G00X44. Z4.M12 X110.Z115. G28U0.W0.T0300 M30(08 30) %	 The logo for KAERI (Korea Atomic Energy Research Institute) is centered on the page. It features a stylized atomic symbol with three elliptical orbits and three spheres representing protons and neutrons. Below the symbol, the word "KAERI" is written in a bold, sans-serif font.

DRAWING of CNC MANUFACTURING




CODE NO.	08 - L113 - 1 - SC - B
NAME of PARTS	Small capsule bottle
MATERIAL	Zr & Al



DRAWN		CHECKED		APPROVED	
-------	--	---------	--	----------	--

(4) Small capsule cap

1/3

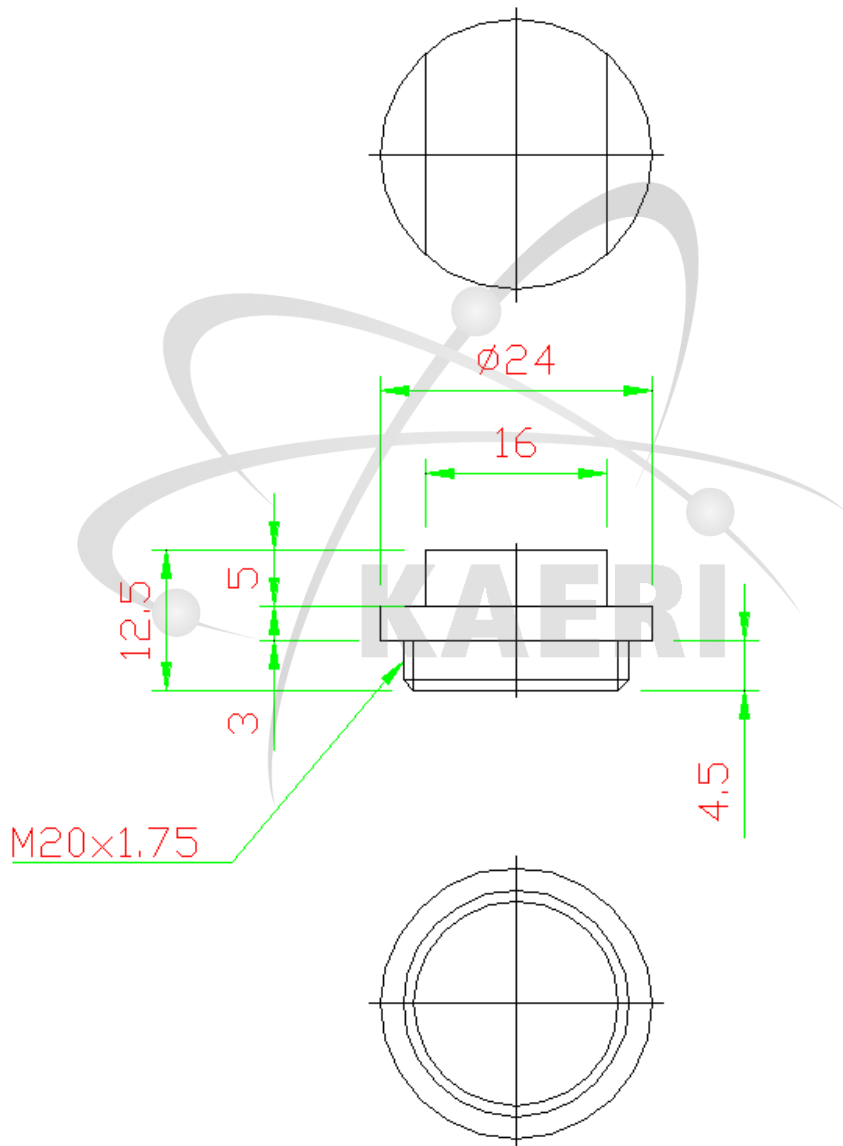
CODE NO.	08 - L113 - 2 - SC - C		
NAME of PARTS	Small capsule cap		
MATERIAL	Zr & Al		
%	G97S2200T0909		
:1132(08-04-113-2)	G00X120.Z120.		
N00	X-1.2Z3.M10		
(JIG CHUCKING 040)	G01Z0.F0.08		
N01	X17.		
(SDJCR M11 DCGT 11T302 FL K10)	X19.95Z-1.5		
G99	Z-4.5		
G28U0.W0.	X17.7		
G50X241.800Z253.510S3000T0500	X23.18		
G97S2200T0505	X23.98Z-4.9		
G00X120.Z110.	Z-15.		
X28.Z3.M10	G00X28.Z3.M12		
G01Z0.1F0.12	X120.Z120.		
X-1.2	G28U0.W0.T0900		
G00X22.Z3.	N03		
G01Z-4.4	(HCER 2525 M 160 16 ERM 2.0)		
G00X28.Z3.	G28U0.W0.		
X20.5	G50X243.200Z255.330S1000T0100		
G01Z-4.4	G97S300T0101		
G00X28.Z3M12	G00X120.Z130.		
X120.Z110.	X28.Z10.M10		
G28U0.W0.T0500	G01X20.Z10.F1.5		
N02	G76P010060Q100R025		
(SDJCR M11 DCMT 11T304 CT3000)	G76X18.06Z-4.5P0970Q0300F1.5		
G28U0.W0.	G01X20.Z10.		
G50X241.900Z254.750S3000T0900	G00X150.Z150.M12		
PROGRAM		CHECKED	
		APPROVED	

CODE NO.	08 - L113 - 2 - SC - C
G28U0.W0.T0100	G76P010060Q100R025
N04	G76X18.06Z-4.5P0970Q0300F1.5
(SDJCR M11 DCMT 11T304 CT3000)	G01X20.Z10.
G28U0.W0.	G00X150.Z150.M12
G50X241.900Z254.750S3000T0900	G28U0.W0.T0100
G97S2200T0909	N06
G00X120.Z120.	(SDJCR M11 DCMT 11T304 CT3000)
X-1.2Z3.M10	G28U0.W0.
G01Z0.F0.08	G50X241.900Z254.750S3000T0900
X17.	G97S2200T0909
X19.95Z-1.5	G00X120.Z120.
Z-4.5	X-1.2Z3.M10
X17.7	G01Z0.F0.08
X23.18	X17.
X23.98Z-4.9	X19.95Z-1.5
Z-13.3	Z-4.5
X22.98	X17.7
Z-15.	X23.18
G00X28.Z3.M12	X23.98Z-4.9
X120.Z120.	Z-13.3
G28U0.W0.T0900	X22.98
N05	Z-15.
(THCER 2525 M 160 16 ERM 2.0)	G00X28.Z3.M12
G28U0.W0.	X120.Z120.
G50X243.200Z255.330S1000T0100	G28U0.W0.T0900
G97S300T0101	N07
G00X120.Z130.	(THCER 2525 M 160 16 ERM 2.0)
X28.Z10.M10	G28U0.W0.
G01X20.Z10.F1.5	G50X243.200Z255.330S1000T0100

CODE NO.	08 - L113 - 2 - SC - C
G97S300T0101	
G00X120.Z130.	
X28.Z10.M10	
G01X20.Z10.F1.5	
G76P010060Q100R025	
G76X18.06Z-4.5P0970Q0300F1.5	
G01X20.Z10.	
G00X150.Z150.M12	
G28U0.W0.T0100	
M01	
N08	
(GVR2525-3 GV503 P20)	
G28U0.W0.	
G50X232.800Z264.900S3000T0300	
G96S800T0303	
G00X115.Z130.	
X33.Z10.M10	
G01Z-12.5F1.8	
X26.	
/M19	
G01X-1.2F0.03	
G04U2.	
/M20	
G00X44.	
Z4.M12	
X115.Z130.	
G28U0.W0.T0300	
M30(03 13)	
%	

DRAWING of CNC MANUFACTURING

CODE NO.	08 - L113 - 2 - SC - C
NAME of PARTS	Small capsule cap
MATERIAL	Zr & Al



DRAWN		CHECKED		APPROVED	
-------	--	---------	--	----------	--

(4) Ir-192 NDT 선원 조사표적 제작

(가) Target cap

1/3

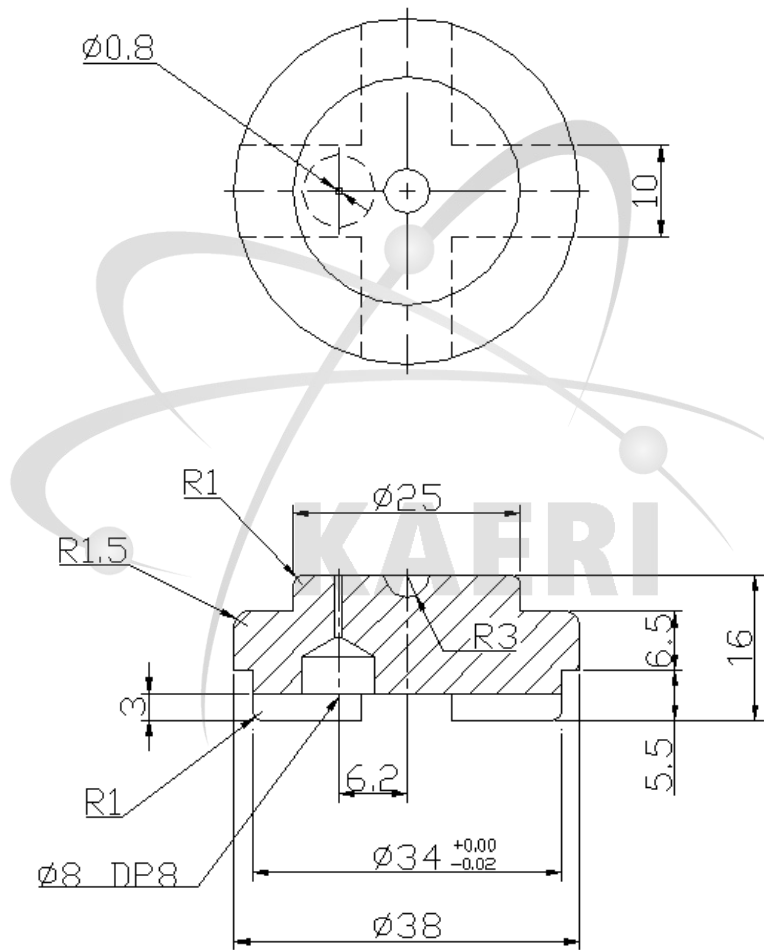
CODE NO.	08 - L115 - 1 - T - C		
NAME of PARTS	Target cap		
MATERIAL	Al - 1050		
%			X42.Z3.
:01151(08-05-115-1)			G01Z0.1F0.12M10
N00			X-1.2
(ZERO POINT 50.5 [31.0])			G00X42.Z3.
G98			X38.5
G28U0.W0.			G01Z-5.
G50X300.000Z198.000T0400			G00X42.Z3
G00X150.Z90.			X36.5
X0.Z15.			G01Z-5.
G98G01Z-15.F700			G00X42.Z3.
/M69			X34.5
G01W19.5			G01Z-5.
G04U2.			X38.5
/M68			G01Z-20.
G01W22.			X42.5Z-23.
G00X150.Z90.			G00X180.
G28U0.W0.			Z-40.
M01			G01X41.F2.
N01			G01Z-18.
(SDJCR M11 DCGT 11T302 FL K10)			X39.
G99			Z2.
G28U0.W0.			G00X0.M12
G50X241.800Z243.200S3000T0500			G00X120.Z110.
G97S2200T0505			G28U0.W0.T0500
G00X120.Z110.			M01
PROGRAM		CHECKED	
		APPROVED	

CODE NO.	08 - L115 - 1 - T - C
N02	X31.08
(T-C TTER 2525-3 TDT 3E-0.4)	G03X33.88W-1.4R1.4
G28U0.W0.	G01Z-5.5
G50X241.150Z254.800S3000T0700	X37.38
G97S2200T0707	X37.98Z-5.8
G00X120.Z130.	Z-14.
X44.Z10.	G00X44.Z3.M12
Z-12.2	X120.Z110.
G01X25.5F0.05M10	G28U0.W0.T0900
G00X44.	M01
Z-14.7	N04
G01X25.5	(T-C TTER 2525-3 TDT 3E-0.4)
G00X44.	G28U0.W0.
Z-16.2	G50X241.500Z254.450S3000T1100
G01X18.	G97S2200T1111
G00X44.M12	G00X125.Z120.
Z50.	X38.5Z3.
X120.Z130.	G01X38.05Z-8.5F0.03M10
G28U0.W0.T0700	G03X31.05W-3.5R3.5
M01	G01X25.
N03	Z-14.3
(SDJCR M11 DCMT 11T304 CT3000)	G03X21.4W-1.8R1.8
G28U0.W0.	G00X44.M12
G50X241.840Z244.630S3000T0900	X125.Z120.
G97S2200T0909	G28U0.W0.T1100
G00X120.Z110.	M01
X4.Z3.	N05
G01X0.F0.08M10	(GVR2525-3 GV503 P20)
Z0.	G28U0.W0.

CODE NO.	08 - L115 - 1 - T - C
<p>G50X230.800Z254.730S3000T0300 G97S2200T0303 G00X110.Z115. X40.Z10. G01Z-16.F0.8M10 X28. /M19 G01X-1.2F0.03 G04U2. /M20 G00X44. Z4.M12 X110.Z115. G28U0.W0.T0300 M30(03 04) %</p>  A large, light gray watermark of the KAERI logo is centered on the page. It features a stylized atomic symbol with three elliptical orbits and three spheres representing electrons. Below the symbol, the word "KAERI" is written in a bold, sans-serif font.	

DRAWING of CNC MANUFACTURING

CODE NO.	08 - L115 - 1 - T - C
NAME of PARTS	Target cap
MATERIAL	Al - 1050



DRAWN	<i>[Signature]</i>	CHECKED	<i>[Signature]</i>	APPROVED	<i>[Signature]</i>
-------	--------------------	---------	--------------------	----------	--------------------

(4) Target body

1/4

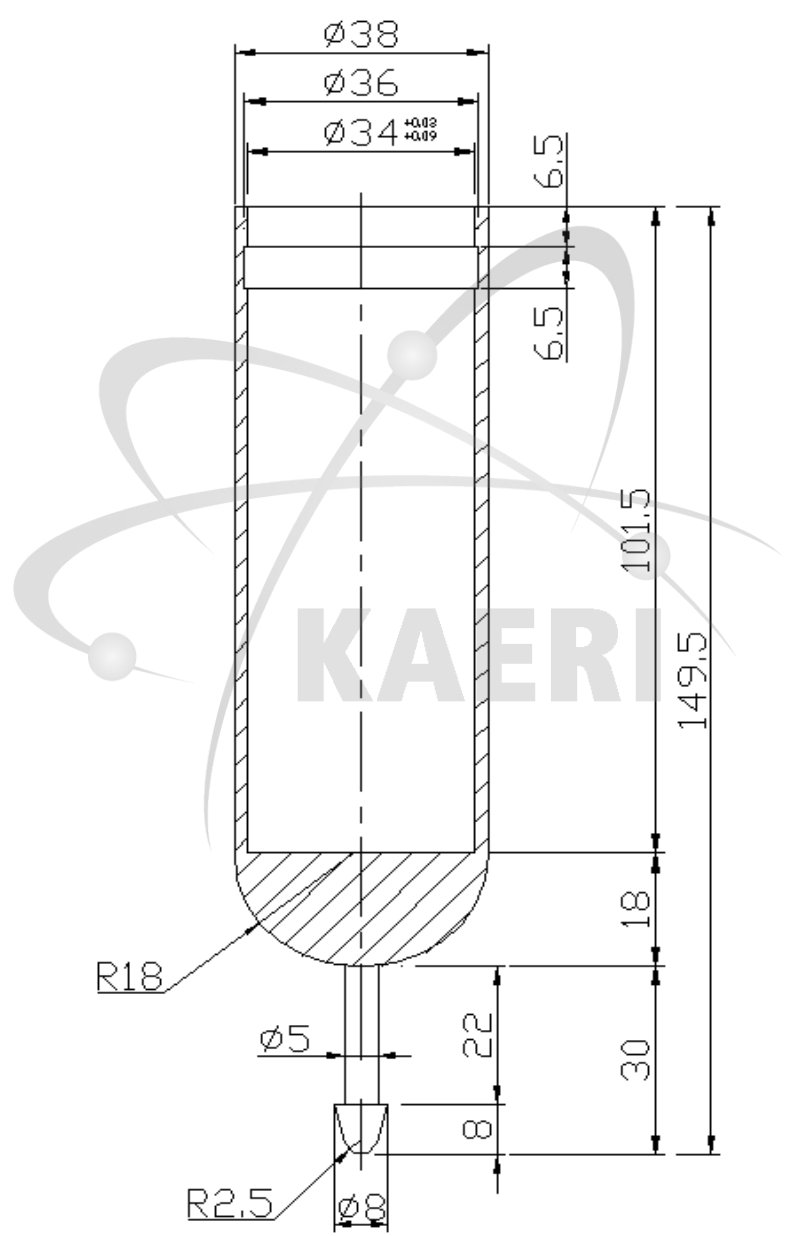
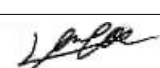
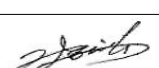

CODE NO.	08 - L115 - 2 - T - B		
NAME of PARTS	Target body		
MATERIAL	Al - 1050		
&HE:%	Z-30.F0.15		
:1152(08-05-115-2)	Z20.F8.		
N00	Z-29.		
(STOPPER BAR 170)	Z-45.F0.15		
G28U0.W0.	Z20.F8.		
G50X300.000Z120.000T0200	Z-44.		
G00X150.Z60.	Z-60.F0.15		
X0.Z10.	Z20.F8.		
Z0.5	Z-59.		
/M69	Z-70.F0.12		
G04U3.	Z20.F8.		
/M68	Z-69.		
G04U1.	Z-80.F0.12		
G00Z10.	Z20.F8.		
X150.Z60.	Z-79.		
G28U0.W0.	Z-90.F0.12		
N01	Z20.F8.		
(32MM SOLID DRILL 140)	Z-89.		
G28U0.W0.	Z-97.F0.10		
G50X305.500Z101.600S2000T1200	Z20.F6.		
G97S800T1212	Z-96.		
G00X150.Z50.	Z-101.3F0.10		
X0.Z3.M10	G00Z10.M12		
G01Z-15.F0.15	X150.Z50.		
Z20.F8.	G28U0.W0.T1200		
Z-14.	N02		
PROGRAM		CHECKED	
		APPROVED	

CODE NO.	08 - L115 - 2 - T - B
(30MM CARBIDE ENDMILL 122)	G01X34.00Z-101.3
G28U0.W0.	G00Z10.M12
G50X305.700Z118.700S1000T0800	X150.Z50.
G97S800T0808	G28U0.W0.T0400
G00X150.Z60.	N04
X0.Z3.M10	(S25R-GVCGXR GVGIR6330 118)
G01Z-90.F8.	G28U0.W0.
Z-97.F0.15	G50X341.660Z126.600S1800T1000
Z-101.5F0.08	G97S1300T1010
G04U2.	G00X150.Z70.
G00Z10.M12	X32.Z10.M10
X150.Z60.	G01Z-6.5F3.3
G28U0.W0.T0800	X35.95F0.08
N03	G00X32.
(S20S SCLCR 09 CCGT 04 130)	Z-8.
G28U0.W0.	G01X35.95
G50X331.600Z112.110S3000T0400	G00X32.
G97S2500T0404	Z-10.
G00X150.Z50.	G01X35.95
X44.Z5.M10	G00X32.8
G01Z0.05F0.12	Z-5.5
X31.85	S300
G01Z-93.F3.3	G01X34.8Z-6.5F0.03
Z-101.0F0.15	X36.05
G00U-0.5Z50.	Z-10.
X42.	X34.8
Z0.	X32.8Z-11.
G01X36.00	G00Z10.M12
G02X34.05W-1.0R1.0	X150.Z70.

CODE NO.	08 - L115 - 2 - T - B
G28U0.W0.T1000	G00X150.Z120.
N05	X37.95Z3.M10
(SDJCR M11 DCGT 11T302 FL K10)	S1300
G28U0.W0.	G01X37.94Z-20.F0.08
G50X267.880Z237.800S3000T0100	S2200
G97S2500T0101	G01X37.87Z-153.5F0.12
G00X200.Z120.	G00X43.Z10.M12
X29.Z3.9M10	X150.Z120.
G01X39.Z-1.1F0.12	G28U0.W0.T0500
G00Z2.	N07
X38.10	(S20S STF0R11 TCMT 04 KP500)
G01X38.02Z-153.5	G28U0.W0.
X39.8	G50X331.330Z112.220S3000T0600
W-5.	G97S2200T0606
X43.8W-2.	G00X150.Z55.
G00X150.	X34.10Z2.M10
W-3.	G01X34.05Z-101.4F0.12
X43.	X13.
G01X41.2	G00Z25.M12
W10.5F8.	X150.Z55.
X40.	G28U0.W0.T0600
Z5.	M01
G00X150.Z120.M12	N08
G28U0.W0.T0100	(S20S SCLCR 09 CCGT 04 130)
N06	G28U0.W0.
(SDJCR M11 DCMT 11T304 CT3000)	G50X331.600Z112.110S3000T0400
G28U0.W0.	G97S2200T0404
G50X268.690Z237.600S3000T0500	G00X150.Z55.
G97S2200T0505	X33.65Z5.M10




CODE NO.	08 - L115 - 2 - T - B
<p>G01Z-99.F1.8 X34.05Z-101.50F0.12 X13.F0.04 G00Z10.M12 X150.Z55. G28U0.W0.T0400 N09 (GVR2525-4 GV504 P20) G28U0.W0. G50X253.770Z248.980S2200T0300 G96S700T0303 G00X150.Z150. X44.Z-150.M10 /M19 G01X-1.2F0.03 G00X66.M12 W-7. /M20 G00X150.Z150. G28U0.W0.T0300 M30(08 30) %</p>	

DRAWING of CNC MANUFACTURING

CODE NO.	08 - L115 - 2 - T - B				
NAME of PARTS	Target body				
MATERIAL	Al - 1050				
					
DRAWN		CHECKED		APPROVED	

(다) Target body(tail)

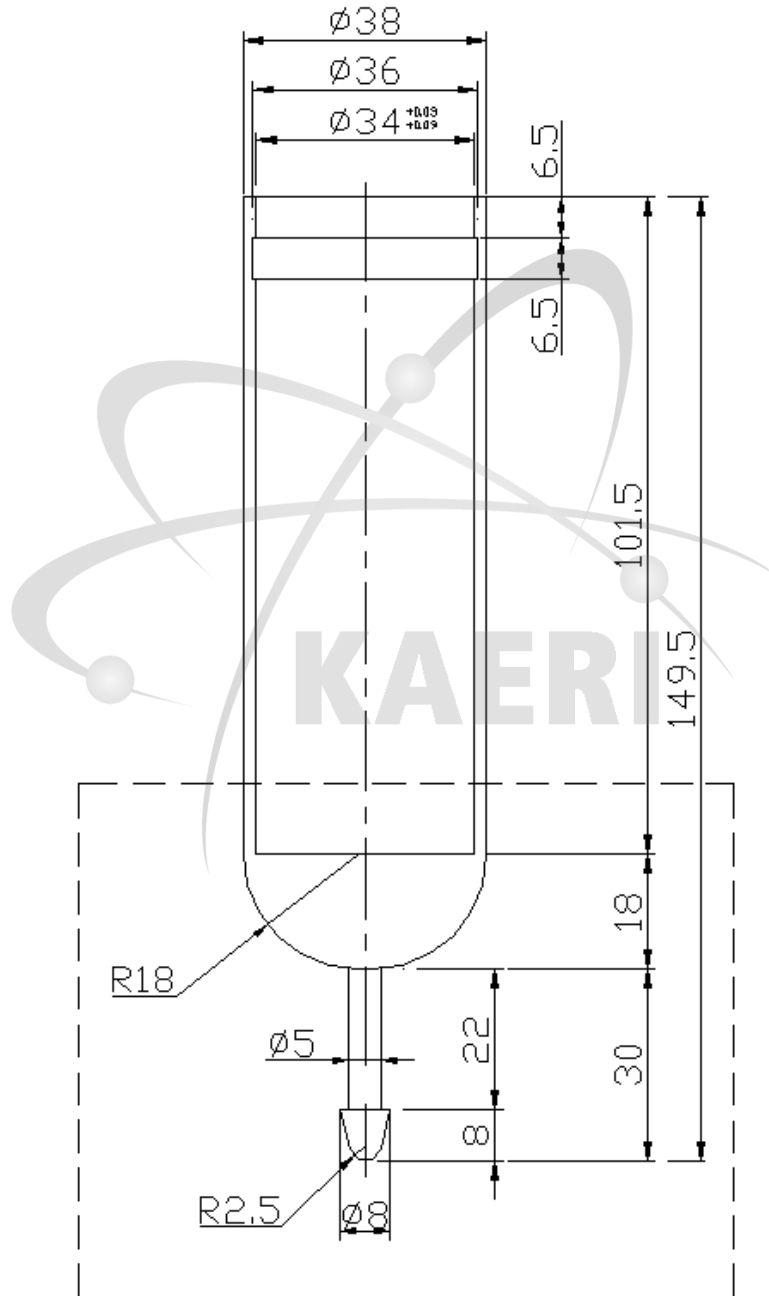
1/2

CODE NO.	08 - L115 - 3 - T - Bt		
NAME of PARTS	Target body(tail)		
MATERIAL	Al - 1050		
&HE:%	X130.Z150.		
:1153(08-05-115-3)	G28U0.W0.T0300		
N00	M01		
(JIG CHUCKING 110)	N02		
N01	(SVJBR M16 VCGT 08 K10)		
(SVJBR M16 VCGT 08 K10)	G28U0.W0.		
G28U0.W0.	G50X267.440Z297.550S3000T0300		
G50X267.440Z297.550S3000T0300	G97S2200T0303		
G97S2200T0303	G00X130.Z150.		
G00X130.Z150.	X7.Z2.3M10		
X44.Z0.M10	G01Z0.3F0.1		
G01X-1.2F0.10	X11.Z-9.		
G00X40.Z8.	G00U2.Z30.		
G71P011Q014U0.5W0.5F0.1	X6.Z2.		
N11G00X9.5	G01Z0.5		
N12G01Z-28.5	X10.Z-9.5		
N13X39.Z-36.	X6.5		
N14Z-45.	X8.5Z-29.5		
N15G70P011Q014	G03X38.5W-18.R18.		
G00X8.5Z2.	G00U2.Z30.		
G01Z-9.	X0.Z2.		
X6.5Z-10.	G01Z0.15F0.08		
X9.5Z-29.	G03X5.W-2.R2.5		
G03X38.5W-18.R18.	G01X8.1Z-8.2		
G01Z-50.	Z-10.5		
G00U2.Z30.M12	G00X50.M12		
PROGRAM		CHECKED	
		APPROVED	

CODE NO.	08 - L115 - 3 - T - Bt
X130.Z150.	G03X38.W-18.R18.
G28U0.W0.T0300	G01X38.5Z-53.
N03	G00U2.Z5.M12
(GVR2525-3 GV503 P20)	X130.Z120.
G28U0.W0.	G28U0.W0.T0500
G50X258.040Z307.660S2500T0700	M30(06 16)
G97S2200T0707	%
G00X135.Z150.	
X12.Z3.M10	
G01Z-8.F0.2	
X5.F0.03	
G04U2.	
G00X30.M12	
X135.Z150.	
G28U0.W0.T0700	
N04	
(SDJCR M11 DCMT 11T304 CT3000)	
G28U0.W0.	
G50X268.840Z297.550S3000T0500	
G97S2200T0505	
G00X130.Z120.	
X-0.5Z2.M10	
G01Z-0.15F0.1	
G03X4.55W-2.R2.5	
G01X8.4Z-8.6	
Z-10.6	
X5.	
Z-28.	
G02X9.Z-30.R2.	

DRAWING of CNC MANUFACTURING




CODE NO.	08 - L115 - 3 - T - Bt
NAME of PARTS	Target body(tail)
MATERIAL	Al - 1050



DRAWN		CHECKED	
		APPROVED	

(라) Target holder

1/3

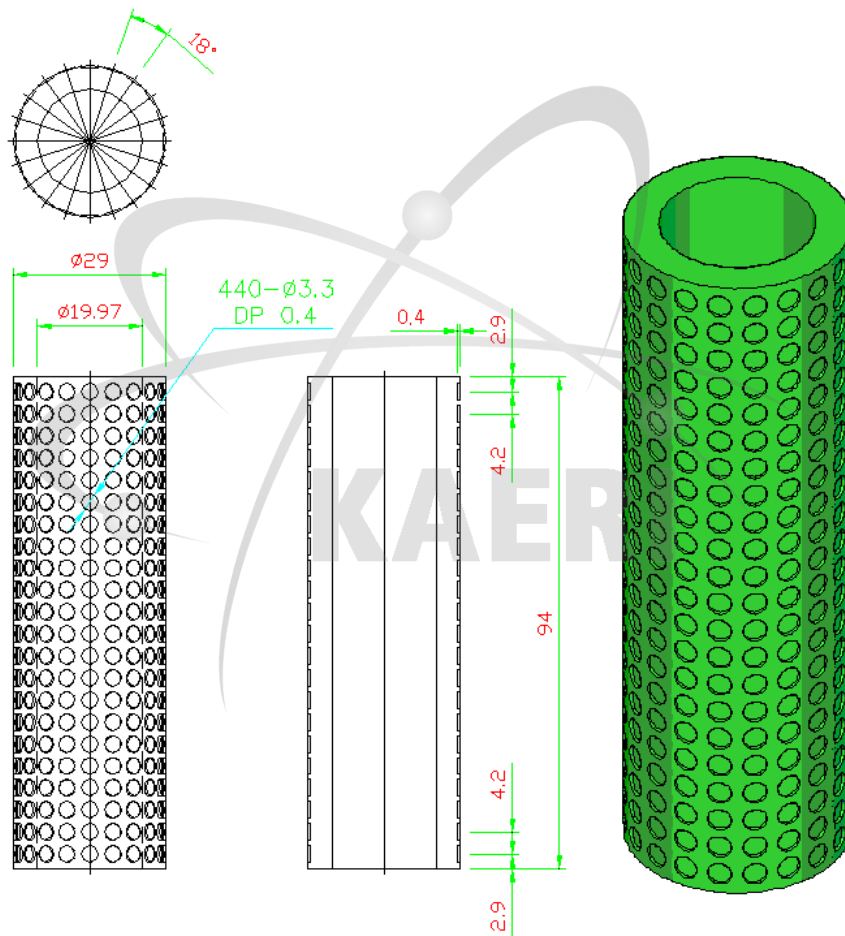
CODE NO.	08 - L115 - 4 - T - H		
NAME of PARTS	Target holder		
MATERIAL	Al - 1050		
%		Z20.F5.	
:1154(08-05-115-4)		Z-18.	
N00		Z-40.F0.12	
(ZERO POINT 121 [023])		Z20.F5.	
G98		Z-38.	
G28U0.W0.		Z-60.F0.12	
G50X300.000Z203.000T0400		Z20.F5.	
G00X150.Z104.		Z-58.	
X0.Z15.		Z-80.F0.12	
G98G01Z-15.F1800		Z20.F5.	
/M69		Z-78.	
G01W97.		Z-93.F0.12	
G04U2.		Z20.F5.	
/M68		Z-91.	
G01W22.		Z-103.F0.12	
G00X150.Z104.		G04U1.	
G28U0.W0.		G00Z5.M12	
N01		X150.Z20.	
(19MM SOLID DRILL)		G28U0.W0.T0200	
G99		N02	
G28U0.W0.		(SDJCR M11 DCGT 11T302 FL K10)	
G50X300.000Z038.000S1500T0200		G28U0.W0.	
G97S700T0202		G50X241.820Z173.400S3000T0500	
G00X150.Z20.		G97S2200T0505	
X0.Z5.M10		G00X120.Z80.	
G01Z-20.F0.12		X44.Z0.2M10	
PROGRAM		CHECKED	
		APPROVED	

CODE NO.	08 - L115 - 4 - T - H
G01X16.F0.08	Z-96.
G00X29.3Z3.	G00U-0.5Z5.M12
G01Z-95.	X160.Z30.
X30.3Z-98.	G28U0.W0.T1000
G00X44.Z3.M12	M01
X120.Z80.	N05
G28U0.W0.T0500	(S16R STF11 TCMT 110204)
N03	G28U0.W0.
(C12KS LCR06 CCMT 060204 KP300)	G50X321.360Z067.200S2200T1000
G28U0.W0.	G97S900T1010
G50X317.130Z066.600S2200T0600	G00X160.Z30.
G97S1800M10T0606	X24.03Z5.M10
G00X160.Z33.	G01Z1.4F0.12
X22.95Z5.	X20.03Z-0.6
G01Z1.F0.12	Z-96.
X19.97Z-0.5	G00U-0.5Z5.M12
X19.96Z-96.	X160.Z30.
G00U-0.5Z5.	G28U0.W0.T1000
X160.Z33.M12	N06
G28U0.W0.T0600	(SDJCR M11 DCMT 11T304 CT3000)
N04	G28U0.W0.
(S16R STF11 TCMT 110204)	G50X241.920Z174.800S2500T0900
G28U0.W0.	G97S1800T0909
G50X321.360Z067.200S2200T1000	G00X120.Z80.
G97S900T1010	X18.Z3.M10
G00X160.Z30.	G01Z0.F0.12
X24.00Z5.M10	X28.
G01Z1.4F0.12	G01X29.Z-0.5
X20.00Z-0.6	X29.01Z-94.5

CODE NO.	08 - L115 - 4 - T - H
X28.Z-95.	
Z-97.	
G00X36.Z10.M12	
X120.Z80.	
G28U0.W0.T0900	
N07	
(GVR2525-3 GV503 P20)	
G28U0.W0.	
G50X230.800Z185.000S1800T0300	
G97S1800T0303	
G00X115.Z80.	
X36.Z10.	
Z-94.M10	
/M19	
G01X16.F0.08	
G04U1.	
/M20	
G00X36.Z10.M12	
X115.Z80.	
G28U0.W0.T0300	
M30(09 00)	
%	

DRAWING of CNC MANUFACTURING

CODE NO.	08 - L115 - 4 - T - H
NAME of PARTS	Target holder
MATERIAL	Al - 1050



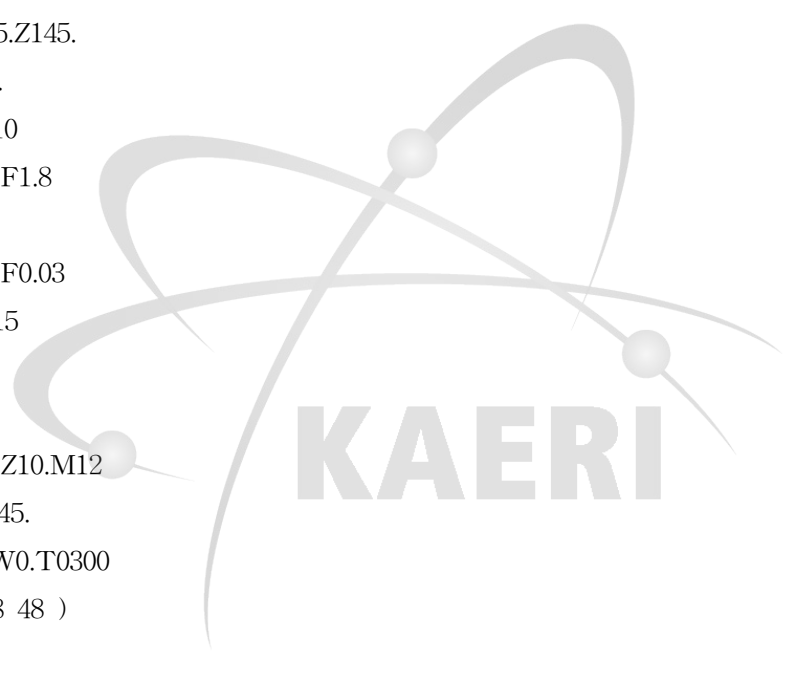
DRAWN		CHECKED		APPROVED	
-------	---	---------	---	----------	---

(마) Target holder cap

1/3

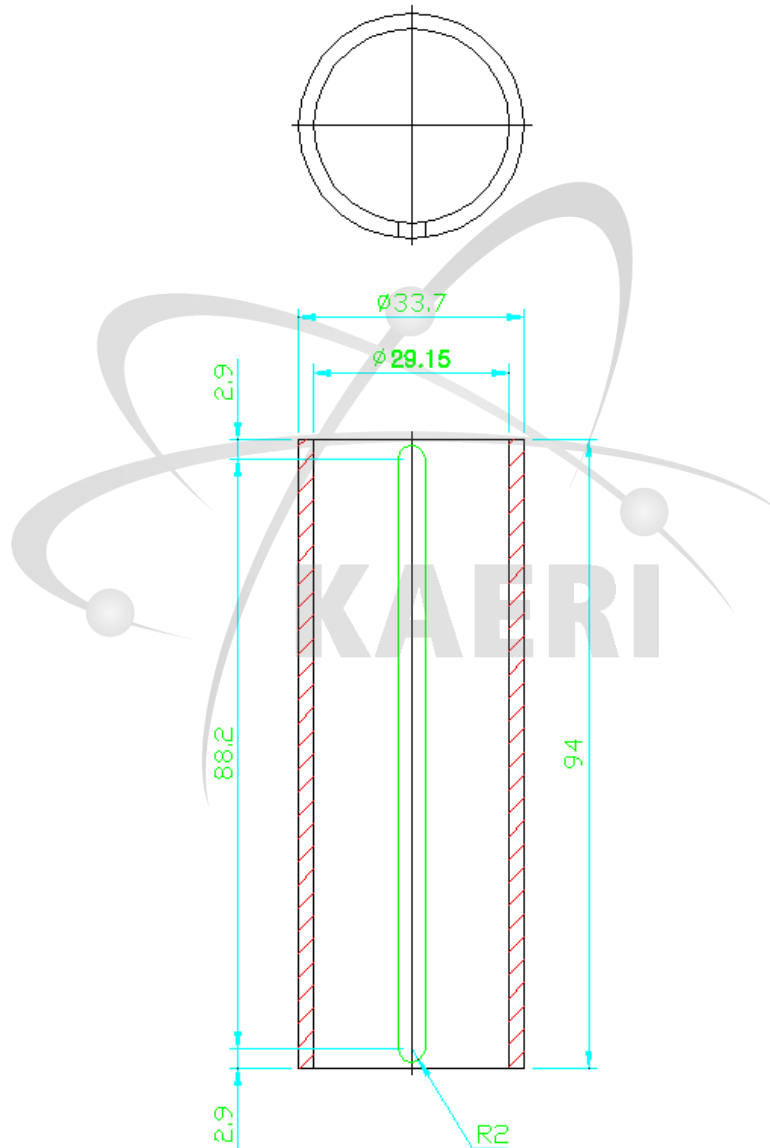
CODE NO.	08 - L115 - 5 - T - HC		
NAME of PARTS	Target holder cap		
MATERIAL	Al - 1050		
&HE:%	Z-40.F0.12		
:1155(08-05-115-5)	Z20.F8.		
N00	Z-38.		
(STOPPER BAR 120)	Z-60.F0.12		
G28U0.W0.	Z20.F8.		
G50X300.000Z170.000T0200	Z-58.		
G00X155.Z85.	Z-80.F0.12		
X0.Z10.	Z20.F8.		
Z0.5	Z-78.		
/M69	Z-103.F0.12		
G04U3.	G04U1.		
/M68	Z20.F8.		
G04U1.	G00X155.Z75.M12		
G00Z10.	G28U0.W0.T1200		
X155.Z85.	N02		
G28U0.W0.	(SDJCR M11 DCGT 11T302 FL K10)		
N01	G28U0.W0.		
(26MM SOLID DRILL)	G50X267.880Z288.000S3000T0100		
G28U0.W0.	G97S2500T0101		
G50X305.500Z151.000S1500T1200	G00X135.Z145.		
G97S800T1212	X44.Z0.2M10		
G00X155.Z75.	G01X24.F0.12		
X0.Z5.M10	G00X38.Z5.		
G01Z-20.F0.12	G01Z-98.		
Z20.F8.	X42.Z-100.		
Z-18.	G00X88.Z44.		
PROGRAM		CHECKED	
		APPROVED	

CODE NO.	08 - L115 - 5 - T - HC
X36.Z4.	X165.Z90.
G01Z-98.	G28U0.W0.T0400
X38.	M01
X42.Z-100.	N04
G00X88.Z44.	(S20S STF11 TCMT 04 KP500)
X34.Z4.	G28U0.W0.
G01Z-98.	G50X331.840Z162.050S2500T0600
X38.	G97S1800T0606
X42.Z-100.	G00X165.Z75.
Z-103.	X33.1Z5.M10
G00X88.Z44.M12	G01Z1.6F0.08
G00X135.Z145.	X29.15Z-0.4
G28U0.W0.T0100	X29.10Z-96.
N03	G00U-0.5Z5.M12
(S20S SCLCR 09 CCGT 04 130)	G00X165.Z75.
G28U0.W0.	G28U0.W0.T0600
G50X331.600Z161.700S3000T0400	N05
G97S2500T0404	(SDJCR M11 DCMT 11T304 CT3000)
G00X165.Z90.	G28U0.W0.
X30.5Z5.M10	G50X268.760Z287.600S2500T0500
G01Z1.5F0.12	G97S2200M10T0505
X26.5Z-0.5	G00X135.Z145.
X26.45Z-96.	X26.Z3.
G00U-0.5Z50.	G01Z0.F0.12
X33.Z5.	X32.3
G01Z1.5	G01X33.7Z-0.7
X29.05Z-0.5	X33.66Z-94.6
X29.00Z-96.	X32.66Z-95.1
G00U-0.5Z5.M12	Z-96.

CODE NO.	08 - L115 - 5 - T - HC
<p>G00X44.Z10. X135.Z145.M12 G28U0.W0.T0500 N06 (GVR2525-4 GV504 P20) G28U0.W0. G50X254.000Z298.900S1800T0300 G96S900T0303 G00X125.Z145. X44.Z10. Z-94.M10 G01X36.F1.8 /M19 G01X28.F0.03 X18.F0.15 G04U3. /M20 G00X40.Z10.M12 X125.Z145. G28U0.W0.T0300 M30(08 48) %</p> 	

DRAWING of CNC MANUFACTURING

CODE NO.	08 - L115 - 5 - T - HC
NAME of PARTS	Target holder cap
MATERIAL	Al - 1050






DRAWN		CHECKED		APPROVED	
-------	--	---------	--	----------	--

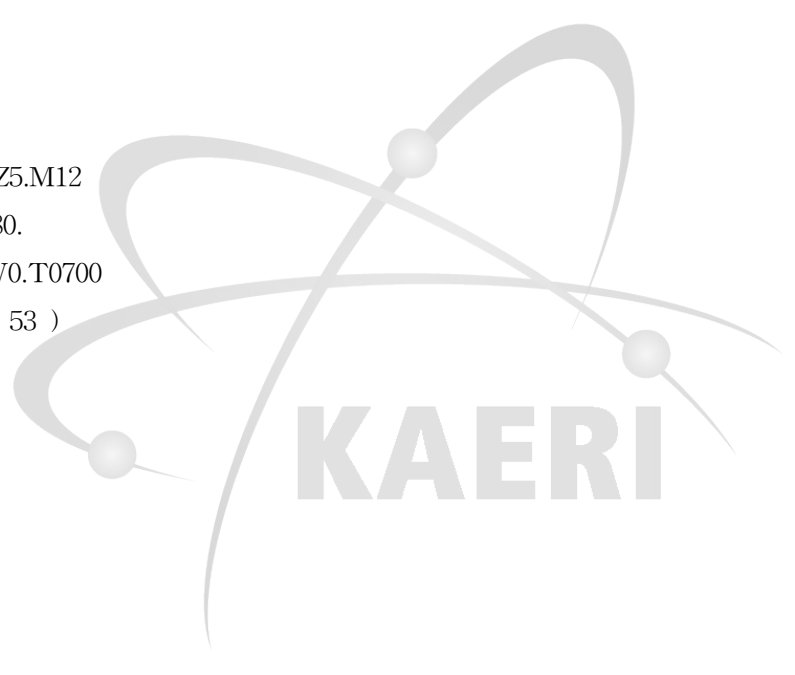
(5) Laser alignment 제작

(가) Alignment cap

1/3

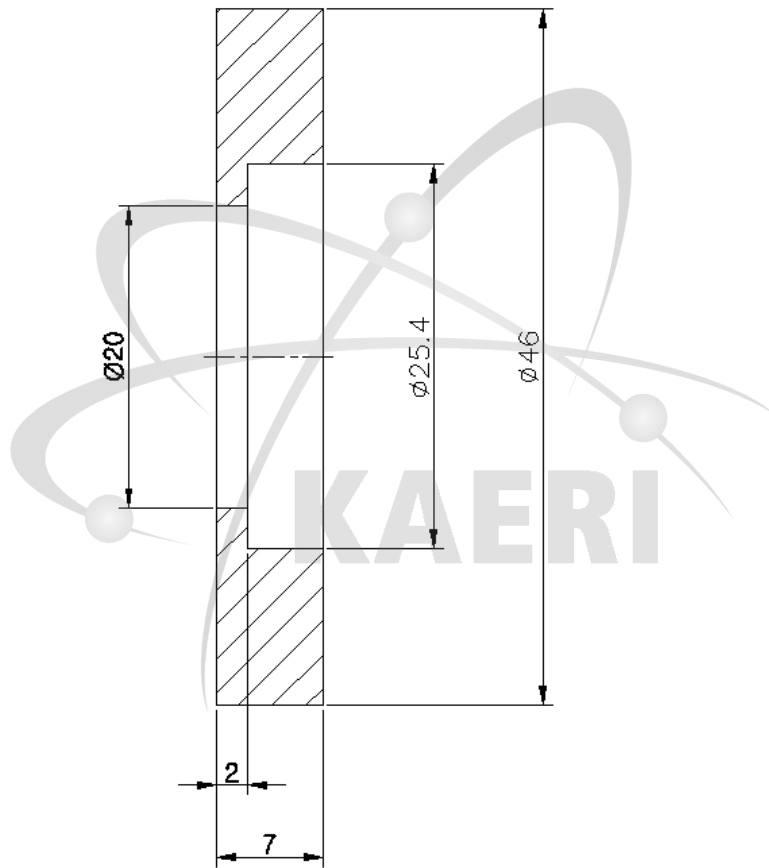
CODE NO.	08 - L279 - 1 - LA - C		
NAME of PARTS	Alignment cap		
MATERIAL	Al - 6061		
&HE:%	G00Z80.M12		
:2791(08-08-279-1)	X155.		
N00	G28U0.W0.T1200		
(STOPPER BAR 50)	M01		
G28U0.W0.	N02		
G50X250.000Z242.000T1000	(SDJCR M11 DCMT 11T304 CT3000)		
G00X150.Z60.	G28U0.W0.		
X0.Z10.	G50X267.550Z357.900S3000T0300		
Z0.5	G97S1800T0303		
/M69	G00X130.Z120.		
G04U3.	X55.Z0.2M10		
/M68	G01X16.F0.1		
G04U1.	G00X46.5Z3.		
G00Z10.	G01Z-11.5		
X150.Z60.	G00X55.Z5.M12		
G28U0.W0.	X130.Z180.		
N01	G28U0.W0.T0300		
(18MM SOLID DRILL 128)	M01		
G28U0.W0.	N03		
G50X306.000Z232.000S2000T1200	(S16R SCLCR CCGT 09T304 070)		
G97S800T1212	G28U0.W0.		
G00X155.Z80.	G50X328.500Z291.900S3000T0200		
X0.Z5.M10	G97S1800T0202		
G01Z-13.F0.10	G00X160.Z145.		
Z10.F3.3	X22.Z3.M10		
PROGRAM		CHECKED	
		APPROVED	

CODE NO.	08 - L279 - 1 - LA - C
G01Z-4.9F0.08	G97S1800T0505
G00U-0.5Z5.	G00X120.Z180.
X25.Z3.	X22.Z3.M10
G01Z-5.	G01Z0.F0.08
X19.6	X45.
Z-8.5	X46.Z-0.5
G00U-0.5Z5.M12	Z-8.
X160.Z145.	X45.
G28U0.W0.T0200	Z-11.5
N04	G00X55.Z3.M12
(C16R STF CR TCMT 110204 070)	X120.Z180.
G28U0.W0.	G28U0.W0.T0500
G50X327.750Z290.630S3000T0800	M01
G97S1800T0808	N06
G00X160.Z145.	(TTER 2525-4 TDT 4E-0.4)
X29.4Z1.5M10	G28U0.W0.
G01X25.4Z-0.5F0.08	G50X268.000Z368.580S2500T0900
Z-5.03	G97S1800T0909
X21.	G00X135.Z150.
X20.Z-5.5	X55.Z3.M10
Z-8.	G01Z-7.5F0.2
G00U-0.5Z3.M12	X21.F0.03
X160.Z145.	G04U2.
G28U0.W0.T0800	G00X55.M12
M01	X135.Z150.
N05	G28U0.W0.T0900
(SVJBR M16 VCGT 08 K10)	M01
G28U0.W0.	N07
G50X268.840Z357.730S3000T0500	(GVR2525-3 GV503 P20)

CODE NO.	08 - L279 - 1 - LA - C
G28U0.W0. G50X257.770Z367.890S1800T0700 G96S500T0707 G00X130.Z180. X55.Z5.M10 G01Z-7.F0.8 /M19 G01X18.F0.03 X4.F0.12 G04U2. /M20 G00X55.Z5.M12 X130.Z180. G28U0.W0.T0700 M30(03 53) %	 The logo for KAERI (Korea Atomic Energy Research Institute) is centered on the page. It features a stylized atomic symbol with three elliptical orbits and three spheres representing protons and neutrons. Below the symbol, the word "KAERI" is written in a bold, sans-serif font.

DRAWING of CNC MANUFACTURING

CODE NO.	08 - L279 - 1 - LA - C
NAME of PARTS	Alignment cap
MATERIAL	Al - 6061






NOTES
1. 가공완료 후 ANODIZING

DRAWN		CHECKED		APPROVED	
-------	--	---------	--	----------	--

(4) Alignment guide

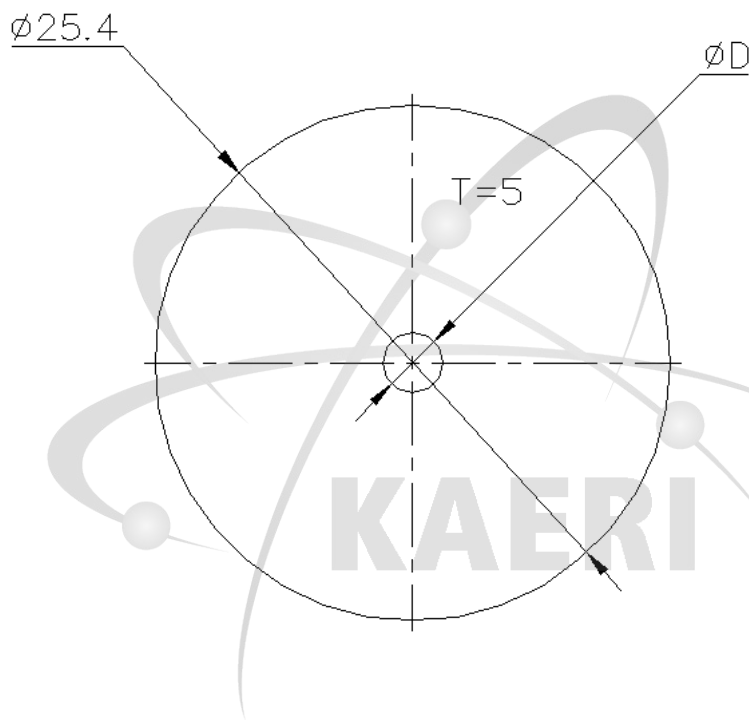
1/2

CODE NO.	08 - L279 - 2 - LA - G		
NAME of PARTS	Alignment guide		
MATERIAL	Al - 6061		
&HE:%	G00X33.Z5.M12		
:2792(08-08-279-2)	X130.Z180.		
N00	G28U0.W0.T0300		
(STOPPER BAR 50)	M01		
G28U0.W0.	N02		
G50X255.000Z242.000T1000	(CENTER DRILL 2.0 MM)		
G00X150.Z120.	G28U0.W0.		
X0.Z10.	G50X305.750Z314.620S2200T0400		
Z0.5	G97S1300T0404		
/M69	G00X150.Z160.		
G04U3.	X30.Z30.M10		
/M68	G01X0.Z3.F3.3		
G04U1.	Z-1.2F0.10		
G00Z10.	Z3.F3.3		
X150.Z120.	G00X150.Z160.M12		
G28U0.W0.	G28U0.W0.T0400		
N01	M01		
(SDJCR M11 DCMT 11T304 CT3000)	N03		
G28U0.W0.	(HSS DRILL 1.0 MM)		
G50X267.550Z357.900S3000T0300	G28U0.W0.		
G97S1800T0303	G50X305.750Z228.360S2200T1200		
G00X130.Z180.	G97S1300T1212		
X33.Z0.2M10	G00X150.Z120.		
G01X-0.8F0.1	X30.Z30.M10		
G00X25.9Z3.	G01X0.Z3.F3.3		
G01Z-7.5	Z0.5F0.13		
PROGRAM		CHECKED	
		APPROVED	

CODE NO.	08 - L279 - 2 - LA - G
Z-5.F0.02	G50X268.000Z368.580S2500T0900
Z3.F3.3	G97S1800T0909
G00X150.Z120.M12	G00X135.Z150.
G28U0.W0.T1200	X33.Z3.M10
M01	G01Z-3.2F0.2
N04	X7.F0.03
(SVJBR M16 VCGT 08 K10)	G04U2.
G28U0.W0.	G00X33.M12
G50X268.790Z357.730S3000T0500	X135.Z150.
G97S1800T0505	G28U0.W0.T0900
G00X120.Z180.	M01
X-0.8Z3.M10	N06
G01Z0.F0.08	(GVR2525-3 GV503 P20)
X24.6	G28U0.W0.
X25.4Z-0.4	G50X257.770Z367.870S1800T0700
Z-4.	G96S500T0707
X24.4	G00X130.Z180.
Z-7.5	X33.Z5.M10
G00X33.	G01Z-3.F0.8
Z3.	/M19
X25.4	G01X-0.8F0.03
G01Z-5.	G04U2.
G00X33.Z3.M12	/M20
X120.Z180.	G00X33.Z5.M12
G28U0.W0.T0500	X130.Z180.
M01	G28U0.W0.T0700
N05	M30(03 03)
(TTER 2525-4 TDT 4E-0.4)	%
G28U0.W0.	

DRAWING of CNC MANUFACTURING

CODE NO.	08 - L279 - 2 - LA - G
NAME of PARTS	Alignment guide
MATERIAL	Al - 6061



부품 2 규격(φD)			
품번	규격(φD)	재질	수량
2-A	φ1	Al-6061	10
2-B	φ2	Al-6061	10
2-C	φ3	Al-6061	10




NOTES
1. 가공완료 후 ANODIZING

DRAWN		CHECKED	
		APPROVED	


(6) ITER blanket qualification mock-up 제작

(가) Tensile specimen(SS)

1/3

CODE NO.	08 - L283 - 1 - SP - T - SS		
NAME of PARTS	Tensile specimen(SS)		
MATERIAL	SS		
%	M01		
:2831(08-10-283-1)	N02		
N00	(THCER 2525 M16Q 16 ERM 2.0)		
(DRILL CHUCK 041 + 30.5)	G28U0.W0.		
N01	G50X242.500Z220.000S1000T0300		
(SDJCR M11 DCMT 11T304 CT300)	G97S300T0303		
G28U0.W0.	G00X120.Z115.		
G50X242.000Z219.000S3000T0900	X18.Z5.M10		
G97S2200T0909	G01X12.2Z5.F0.175		
G00X120.Z105.	G76P010060Q100R025		
X18.Z5.M10	G76X9.95Z-17.P1130Q0300F1.75		
G01X14.Z0.7F0.12	G01X18.Z5.		
X-1.2	G00X120.Z115.M12		
G00X14.Z5.	G28U0.W0.T0300		
Z0.2	M01		
G01X-1.2	N03		
G00X4.85Z2.6	(CENTER DRILL 3 MM)		
G01X11.85Z-0.9	G28U0.W0.		
G00X14.Z5.	G50X300.000Z171.550S1800T0200		
X4.85Z2.2	G97S700T0202		
G01X11.85Z-1.3	G00X200.Z20.		
Z-17.5	X20.Z3.M10		
G00X18.Z5.M12	X0.		
G00X120.Z105.	G01Z-5.5F0.12		
G28U0.W0.T0900	G04U2.		
PROGRAM		CHECKED	
		APPROVED	

CODE NO.	08 - L283 - 1 - SP - T - SS
G00Z20.M12	G76P010060Q100R025
X200.	G76X9.95Z-17.P1130Q0300F1.75
G28U0.W0.T0200	G01X18.Z5.
M01	G00X120.Z115.M12
N04	G28U0.W0.T0300
(SDJCR M11 DCMT 11T304 CT300)	M01
G28U0.W0.	N06
G50X241.440Z223.000S3000T0900	(THCER 2525 M16Q 16 ERM 2.0)
G97S2200T0909	G28U0.W0.
G00X120.Z105.	G50X243.700Z222.690S1000T0300
X18.Z3.M10	G97S300T0303
G01X14.Z0.F0.12	G00X120.Z115.
X-1.2	X18.Z5.M10
G00X14.Z5.	G01X12.2Z5.F0.175
X4.85Z1.8	G76P010060Q100R025
G01X11.85Z-1.7F0.12	G76X9.95Z-17.P1130Q0300F1.75
Z-17.5	G01X18.Z5.
G00X18.Z5.M12	G00X120.Z115.M12
X120.Z105.	G28U0.W0.T0300
G28U0.W0.T0900	M01
M01	N07
N05	(SDJCR M11 DCMT 11T304 CT300)
(THCER 2525 M16Q 16 ERM 2.0)	G28U0.W0.
G28U0.W0.	G50X241.440Z223.000S3000T0900
G50X243.700Z222.690S1000T0300	G97S2200T0909
G97S300T0303	G00X120.Z105.
G00X120.Z115.	X18.Z3.M10
X18.Z5.M10	G01X14.Z0.F0.12
G01X12.2Z5.F0.175	X-1.2

CODE NO.	08 - L283 - 1 - SP - T - SS
G00X14.Z5. X4.85Z1.8 G01X11.85Z-1.7F0.12 Z-17.5 G00X18.Z5.M12 X120.Z105. G28U0.W0.T0900 M30(06 00) %	 The logo for KAERI (Korea Atomic Energy Research Institute) is centered on the page. It features a stylized atomic symbol with three elliptical orbits and three spheres representing electrons. Below the symbol, the word "KAERI" is written in a bold, sans-serif font.

DRAWING of CNC MANUFACTURING

CODE NO.	08 - L283 - 1 - SP - T - SS				
NAME of PARTS	Tensile specimen(SS)				
MATERIAL	SS				
<p style="text-align: center;"> M12x1.75 $R1/2$ 25 $\phi 6.35$ SMOOTH BLEND NO UNDERCUT = 0.2% 0.2 20 40 20 80 </p>					
DRAWN		CHECKED		APPROVED	

(4) Tensile specimen(Cu/SS)

1/3

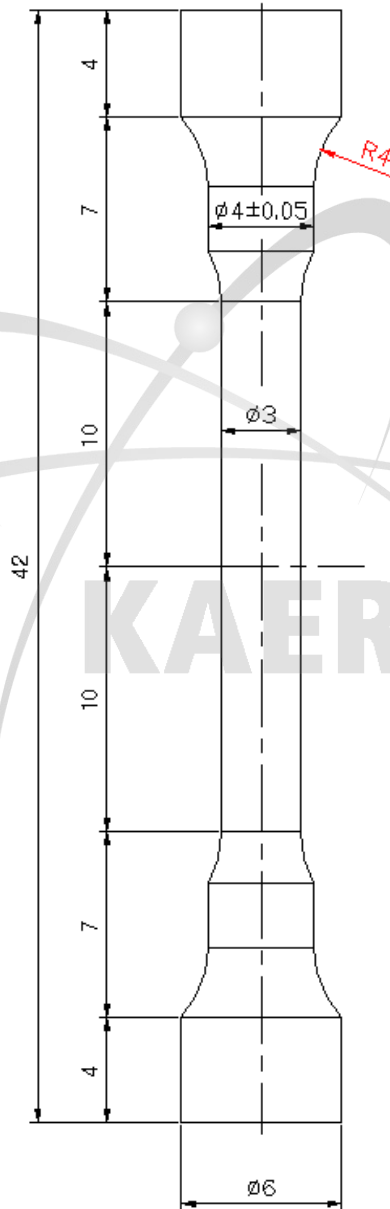
CODE NO.	08 - L283 - 2 - SP - T - Cu/SS		
NAME of PARTS	Tensile specimen(Cu/SS)		
MATERIAL	Cu/SS		
%	G28U0.W0.		
:2833(08-10-283-3)	G50X239.660Z243.000S1800T1100		
N00	G97S700T1111		
(DRILL CHUCK 060 + 040)	G00X180.Z100.		
N01	X66.Z42.		
(SVVBN M16 VCGT 04 KT 300)	X13.Z38.6M10		
G28U0.W0.	G01X6.F0.08		
G50X238.960Z243.000S1800T1100	G02X4.W-2.64R4.		
G97S700T1111	G01Z33.19		
G00X180.Z100.	G02X3.W-1.94R4.		
X66.Z42.	G01X3.03Z11.6		
X13.Z38.6M10	G02X4.03W-1.94R4.		
G01X6.F0.08	G01Z7.24		
G02X4.W-2.64R4.	G02X6.03W-2.64R4.		
G01Z33.19	G01X6.53Z2.		
G02X3.W-1.94R4.	G00X66.Z42.		
G01X3.03Z11.6	X180.Z100.M12		
G02X4.03W-1.94R4.	G28U0.W0.T1100		
G01Z7.24	N03		
G02X6.03W-2.64R4.	(SVVBN M16 VCGT 04 KT 300)		
G01X6.53Z2.	G28U0.W0.		
G00X66.Z42.	G50X240.360Z243.000S1800T1100		
X180.Z100.M12	G97S700T1111		
G28U0.W0.T1100	G00X180.Z100.		
N02	X66.Z42.		
(SVVBN M16 VCGT 04 KT 300)	X13.Z38.6M10		
PROGRAM		CHECKED	
		APPROVED	

CODE NO.	08 - L283 - 2 - SP - T - Cu/SS
G01X6.F0.08	G00X66.Z42.
G02X4.W-2.64R4.	X180.Z100.M12
G01Z33.19	G28U0.W0.T1100
G02X3.W-1.94R4.	N05
G01X3.03Z11.6	(SVVBN M16 VCGT 04 KT 300)
G02X4.03W-1.94R4.	G28U0.W0.
G01Z7.24	G50X241.270Z243.000S1800T1100
G02X6.03W-2.64R4.	G97S700T1111
G01X6.53Z2.	G00X180.Z100.
G00X66.Z42.	X66.Z42.
X180.Z100.M12	X13.Z38.6M10
G28U0.W0.T1100	G01X6.F0.08
N04	G02X4.W-2.64R4.
(SVVBN M16 VCGT 04 KT 300)	G01Z33.19
G28U0.W0.	G02X3.W-1.94R4.
G50X240.860Z243.000S1800T1100	G01X3.05Z11.6
G97S700T1111	G02X4.05W-1.94R4.
G00X180.Z100.	G01Z7.24
X66.Z42.	G02X6.05W-2.64R4.
X13.Z38.6M10	G01X6.55Z2.
G01X6.F0.08	G00X66.Z42.
G02X4.W-2.64R4.	X180.Z100.M12
G01Z33.19	G28U0.W0.T1100
G02X3.W-1.94R4.	M01
G01X3.03Z11.6	N06
G02X4.03W-1.94R4.	(SVVBN M16 VCGT 04 KT 300)
G01Z7.24	G28U0.W0.
G02X6.03W-2.64R4.	G50X241.400Z243.000S1800T1100
G01X6.53Z2.	G97S700T1111

CODE NO.	08 - L283 - 2 - SP - T - Cu/SS
G00X180.Z100.	
X66.Z42.	
X13.Z38.6M10	
G01X6.F0.08	
G02X4.W-2.64R4.	
G01Z33.19	
G02X3.W-1.94R4.	
G01X3.06Z11.6	
G02X4.06W-1.94R4.	
G01Z7.24	
G02X6.05W-2.64R4.	
G01X6.55Z2.	
G00X66.Z42.	
X180.Z100.M12	
G28U0.W0.T1100	
M30(09 30)	
%	

DRAWING of CNC MANUFACTURING

CODE NO.	08 - L283 - 2 - SP - T - Cu/SS
NAME of PARTS	Tensile specimen(Cu/SS)
MATERIAL	Cu/SS






DRAWN		CHECKED		APPROVED	
-------	--	---------	--	----------	--

(7) 압축 벤토나이트 티타늄 몰드 제작

(가) Mold body

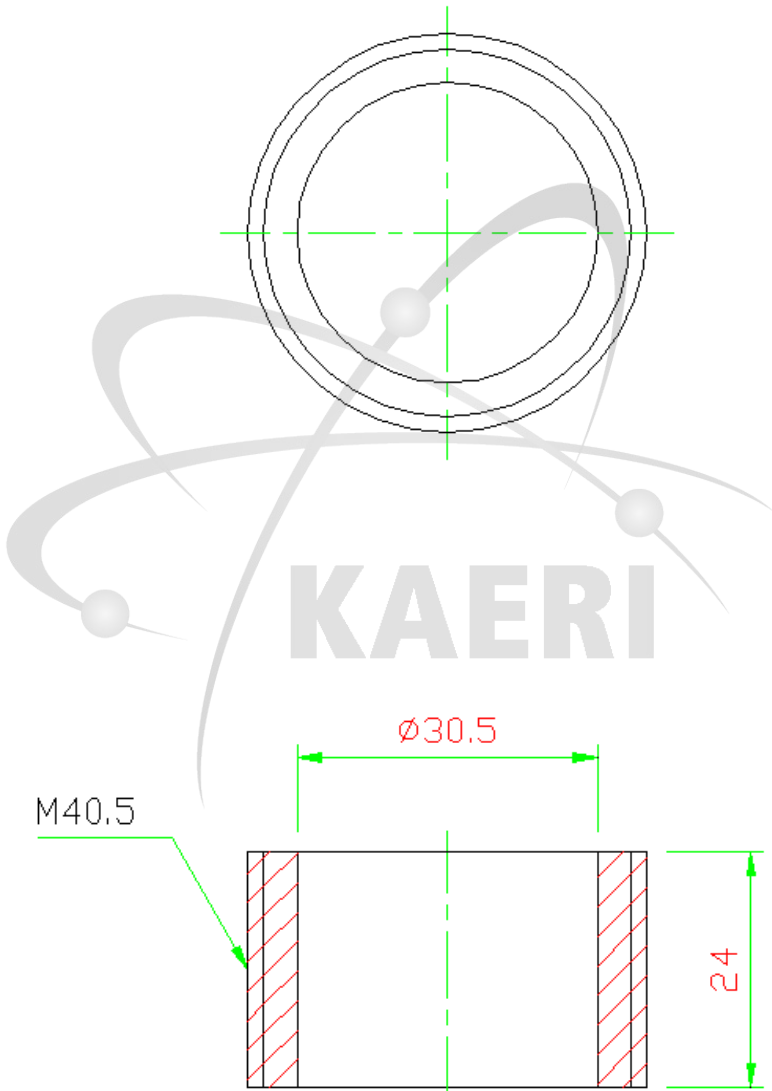
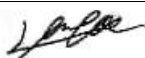


1/3




CODE NO.	08 - L384 - 1 - M - Bo		
NAME of PARTS	Mold body		
MATERIAL	Ti		
&HE:%	Z-5.		
:3841(08-11-0384-1)	Z-12.F0.05		
N00	Z20.F6.		
(STOPPER BAR)	Z-11.		
G28U0.W0.	Z-18.F0.05		
G50X305.200Z240.000T0200	Z20.F6.		
G00X150.Z120.	Z-17.		
X18.Z10.	Z-24.F0.05		
Z0.5	Z20.F6.		
/M69	Z-23.		
G04U2.	Z-33.F0.05		
/M68	Z20.F6.		
G04U2.	G00X30.Z30.M12		
G00Z10.	X150.Z150.		
X150.Z120.	G28U0.W0.T1200		
G28U0.W0.	N02		
N01	(SDJCR M11 DCMT 11T304 CT3000)		
(26MM SOLID DRILL)	G28U0.W0.		
G28U0.W0.	G50X268.950Z357.660S2500T0500		
G50X305.300Z247.000S1500T1200	G97S700T0505		
G97S300M10T1212	G00X135.Z180.		
G00X150.Z150.	X44.Z0.2M10		
X0.Z4.	G01X22.F0.12		
G01Z-6.F0.05	G00Z3.		
Z20.F6.	G01Z0.		
PROGRAM		CHECKED	
		APPROVED	

CODE NO.	08 - L384 - 1 - M - Bo
X37.	X44.Z0.2M10
X40.Z-1.5	G01X22.F0.12
Z-25.	G00Z3.
X37.	G01Z0.
Z-28.	X37.
X38.	X40.Z-1.5
X40.5Z-29.	Z-25.
G00X44.Z3.M12	X37.
X135.Z180.	Z-28.
G28U0.W0.T0500	X38.
N03	X40.5Z-29.
(TH2525RE THR42M P20 1.5)	G00X44.Z3.M12
G28U0.W0.	X135.Z180.
G50X269.000Z359.500S1000T0100	G28U0.W0.T0500
G97S200M10T0101	N05
G00X150.Z150.	(TH2525RE THR42M P20 1.5)
X44.Z10.M10	G28U0.W0.
G01X40.F0.15	G50X269.000Z359.500S1000T0100
G76P010060Q050R016	G97S200M10T0101
G76X38.06Z-25.5P0970Q0300F1.5	G00X150.Z150.
G01X40.Z10.	X44.Z10.M10
G00X150.Z150.M12	G01X40.F0.15
G28U0.W0.T0100	G76P010060Q050R016
N04	G76X38.06Z-22.5P0970Q0300F1.5
(SDJCR M11 DCMT 11T304 CT3000)	G01X40.Z10.
G28U0.W0.	G00X150.Z150.M12
G50X268.950Z357.660S2500T0500	G28U0.W0.T0100
G97S700T0505	M01
G00X135.Z180.	N06

CODE NO.	08 - L384 - 1 - M - Bo
(S20S SCLCR 09 CCMT 09T308)	G97S600T0909
G28U0.W0.	G00X135.Z150.
G50X331.500Z301.000S1500T0600	X44.Z3.M10
G97S500M10T0606	G01Z-24.2F1.8
G00X150.Z150.	X36.F0.06
X28.Z3.	G00X44.M12
G01Z-25.5F0.08	X135.Z150.
G00U-0.5Z3.	G28U0.W0.T0900
X30.	N09
G01Z-25.5	(GVR2525-4 GV504 P20)
G00U-0.5Z3.	G28U0.W0.
X150.Z150.M12	G50X252.000Z369.000S1800T0700
G28U0.W0.T0600	G97S500T0707
N07	G00X125.Z170.
(S16R SDUCR 07 DCMT 070204)	X44.Z20.M10
G28U0.W0.	G01Z-24.F1.8
G50X327.700Z310.700S1500T0800	/M19
G97S500M10T0808	G01X28.F0.05
G00X150.Z150.	X18.F0.13
X36.5Z2.2M10	G04U2.
G01X30.5Z-0.8F0.08	/M20
Z-25.5	G00X55.M12
G00U-1.Z10.	Z20.
X150.Z150.M12	X125.Z170.
G28U0.W0.T0800	G28U0.W0.T0700
N08	M30(13 13)
(TTER 2525-4 TDT 4E-0.4)	%
G28U0.W0.	
G50X268.000Z368.500S2500T0900	

DRAWING of CNC MANUFACTURING

CODE NO.	08 - L384 - 1 - M - Bo				
NAME of PARTS	Mold body				
MATERIAL	Ti				
					
DRAWN		CHECKED		APPROVED	

CODE NO.	08 - L384 - 2 - M - Ba		
NAME of PARTS	Mold base		
MATERIAL	Ti		
&HE:%	Z-10.F0.05		
:3842(08-11-0384-2)	Z5.F6.		
N00	G00X150.Z110.M12		
(STOPPER BAR)	G28U0.W0.T1200		
G28U0.W0.	N03		
G50X305.200Z240.000T0200	(PCLNR M12 CCGT 04 FL K10)		
G00X150.Z120.	G28U0.W0.		
X55.Z10.	G50X268.600Z357.700S3000T1100		
Z0.5	G97S800T1111		
/M69	G00X135.Z180.		
G04U2.	X55.Z0.2M10		
/M68	G01X28.F0.12		
G04U2.	G00X40.Z1.5		
G00Z10.	G01X46.Z-1.5		
X150.Z120.	Z-24.		
G28U0.W0.	X48.Z-25.		
N01	Z-32.		
(32MM SOLID DRILL)	X50.Z-33.		
G28U0.W0.	G00X55.Z30.M12		
G50X305.200Z220.000S1500T1200	X135.Z180.		
G97S300M10T1212	G28U0.W0.T1100		
G00X150.Z110.	N04		
X0.Z5.	(SDJCR M11 DCMT 11T304 CT3000)		
G01Z-7.F0.05	G28U0.W0.		
Z20.F6.	G50X268.900Z357.660S2500T0500		
Z-6.	G97S700T0505		
PROGRAM		CHECKED	
		APPROVED	

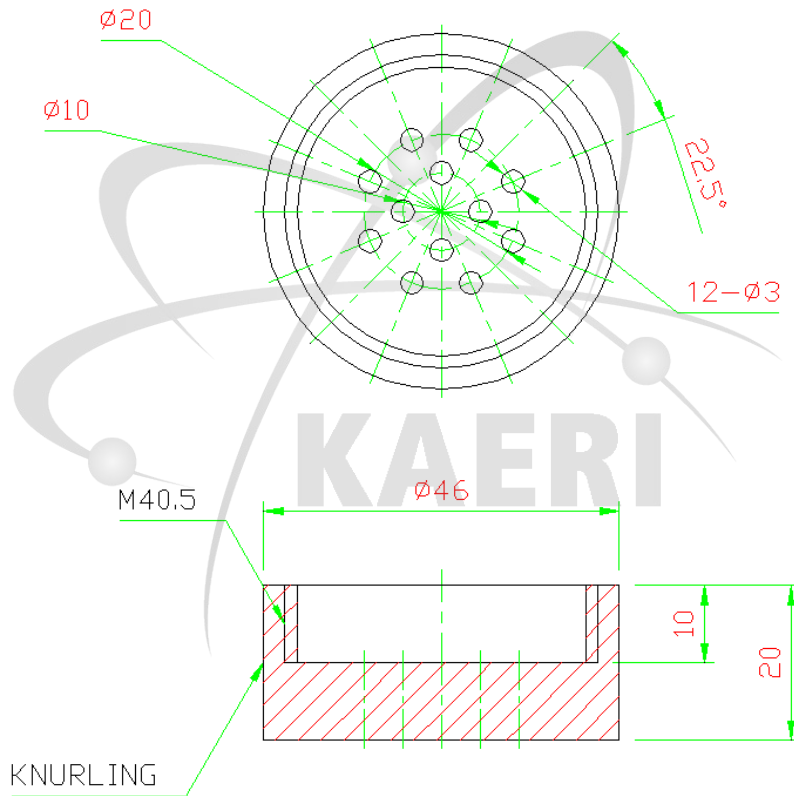
CODE NO.	08 - L384 - 2 - M - Ba
G00X135.Z180.	X135.Z180.
X28.Z3.M10	G28U0.W0.T0300
G01Z0.F0.12	N06
X42.8	(S20S SCLCR 09 CCMT 09T308)
X45.8Z-1.5	G28U0.W0.
Z-21.5	G50X331.500Z301.000S1500T0600
X42.8	G97S500M10T0606
Z-24.	G00X150.Z150.
X45.8	X20.Z2.
X49.8Z-26.	G01Z-9.9F0.08
G01X55.	G00U-1.Z2.
G00Z3.M12	X23.
X135.Z180.	G01Z-9.9F0.08
G28U0.W0.T0500	G00U-1.Z2.
M01	X26.
N05	G01Z-9.9F0.08
(KNURING)	G00U-1.Z2.
G28U0.W0.	X29.
G50X241.800Z375.000S2500T0300	G01Z-9.9F0.08
G97S600T0303	G00U-1.Z2.
G00X135.Z180.	X32.
X85.Z0.M10	G01Z-9.9F0.08
G01X50.F0.5	G00U-1.Z2.
G01X45.6F0.33S30	X35.
G04U5.	G01Z-9.9F0.08
G01Z-16.F0.18S100	G00U-1.Z2.
G04U2.	X38.
G00X85.M12	G01Z-9.9F0.08
Z30.	G00U-1.Z1.5

CODE NO.	08 - L384 - 2 - M - Ba
X32.5	Z-10.
G01X38.5Z-1.5	X4.
Z-9.9	G00Z3.
X8.	X150.Z150.M12
G00Z10.	G28U0.W0.T0800
X150.Z150.M12	N08
G28U0.W0.T0600	(S20PTHCNR16 TH16NR30 P20)
N07	G28U0.W0.
(S16R SDUCR 07 DCMT 070204)	G50X331.550Z302.550S300T1000
G28U0.W0.	G97S200M10T1010
G50X327.800Z310.800S1500T0800	G00X150.Z150.
G97S500M10T0808	X36.5Z10.M10
G00X150.Z150.	G01X38.5F0.15
X36.Z3.M10	G76P010060Q050R016
G01Z-6.F0.08	G76X40.44Z-9.5P0970Q300F1.5
X38.5	G01X38.5Z10.
X39.5Z-6.5	G00X150.Z150.M12
G01Z-9.9	G28U0.W0.T1000
X37.5	N09
Z-6.	(S16R SDUCR 07 DCMT 070204)
X38.5	G28U0.W0.
X40.5Z-7.	G50X327.800Z310.700S1500T0800
Z-9.9	G97S500M10T0808
X37.5	G00X150.Z150.
G00Z3.	X46.5Z3.M10
X46.5	G01X38.5Z-1.F0.08
G01X38.5Z-1.	Z-6.
Z-6.	X40.5Z-7.
X40.5Z-7.	Z-10.

CODE NO.	08 - L384 - 2 - M - Ba
X36.	G28U0.W0.T0900
G00Z3.	N12
X150.Z150.M12	(GVR2525-4 GV504 P20)
G28U0.W0.T0800	G28U0.W0.
N10	G50X252.000Z369.100S1800T0700
(S20PTHCNR16 TH16NR30 P20)	G97S500T0707
G28U0.W0.	G00X125.Z170.
G50X331.550Z302.550S300T1000	X55.Z20.M10
G97S200M10T1010	G01X50.Z-20.1F1.8
G00X150.Z150.	/M19
X36.5Z10.M10	G01X22.F0.18
G01X38.5F0.15	G01X0.F0.02
G76P010060Q050R016	G04U2.
G76X40.44Z-9.5P0970Q300F1.5	/M20
G01X38.5Z10.	G00X55.M12
G00X150.Z150.M12	Z20.
G28U0.W0.T1000	X125.Z170.
M01	G28U0.W0.T0700
N11	M30(18 18)
(TTER 2525-4 TDT 4E-0.4)	%
G28U0.W0.	
G50X268.000Z368.500S2500T0900	
G97S600T0909	
G00X135.Z150.	
X50.Z3.M10	
G01Z-20.2F1.8	
X16.F0.04	
G00X55.M12	
X135.Z150.	

DRAWING of CNC MANUFACTURING

CODE NO.	08 - L384 - 2 - M - Ba
NAME of PARTS	Mold base
MATERIAL	Ti





DRAWN		CHECKED		APPROVED	
-------	--	---------	--	----------	--

(8) REF-V 가이드 필드용 rod 제작

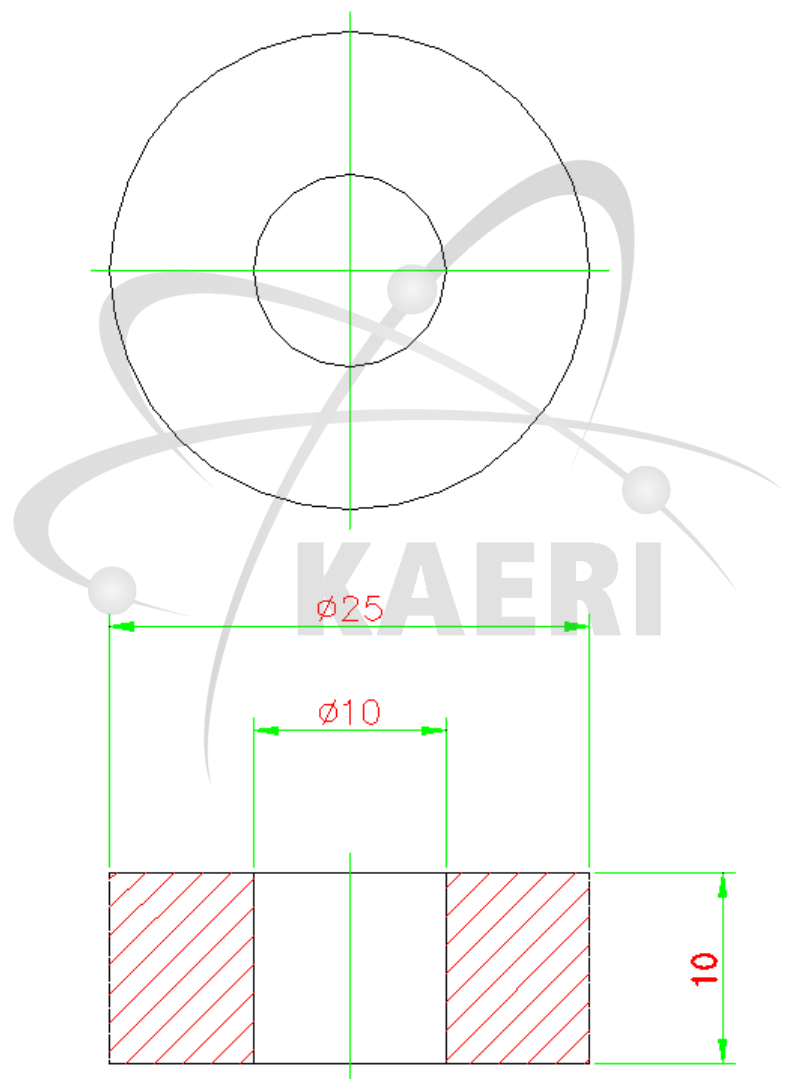
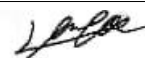


(가) Guide color

1/2

CODE NO.	08 - L388 - 1 - RG - C		
NAME of PARTS	Guide color		
MATERIAL	SS400		
%		X0.Z5.	
:3881(08-12-388-1)		G01Z1.F0.8	
N00		Z-5.F0.08	
(ZERO POINT 31.0 [26.5])		G00Z5.	
G98		X150.Z105.M12	
G28U0.W0.		G28U0.W0.T0200	
G50X299.000Z207.000T0400		M01	
G00X150.Z90.		N03	
X0.Z15.		(DRILL 10 MM)	
G98G01Z-10.F1100		G28U0.W0.	
/M69		G50X300.000Z201.500S1300T0800	
G01W14.		G97S700T0808	
G04U3.		G00X150.Z105.	
/M68		X0.Z5.M10	
G01W24.		G01Z1.F0.8	
G00X150.Z90.		G01Z-16.F0.08	
G28U0.W0.		G00Z5.	
M01		X150.Z105.M12	
N01		G28U0.W0.T0800	
(CENTER DRILL 5 MM)		M01	
G99		N04	
G28U0.W0.		(SDJCR M11 DCMT 11T304 CT300)	
G50X300.000Z206.000S1800T0200		G28U0.W0.	
G97S900M10T0202		G50X241.800Z264.500S3000T0900	
G00X150.Z105.		G97S1800M10T0909	
PROGRAM		CHECKED	
		APPROVED	




CODE NO.	08 - L388 - 1 - RG - C
G00X120.Z130.	N06
X29.Z3.	(T-C TTER 2525-3 TDT 3E-0.4)
Z0.1	G28U0.W0.
G01X5.F0.08	G50X243.000Z274.200S3000T0700
G00Z3.	G97S1300M10T0707
G01Z0.	G00X120.Z130.
X23.	X29.Z30.
X24.Z-0.5	G01Z-10.F3.3
Z-13.5	/M19
G00X29.Z3.	X5.F0.03
X120.Z130.M12	G04U2.
G28U0.W0.T0900	/M20
M01	G00X29.
N05	Z30.
(T-C TTER 2525-3 TDT 3E-0.4)	X120.Z130.M12
G28U0.W0.	G28U0.W0.T0700
G50X241.600Z274.730S3000T0500	M30(02 31)
G97S1300M10T0505	%
G00X120.Z135.	
X29.Z-10.2	
G01X11.F0.08	
G00X27.	
Z-8.2	
G01X23.Z-10.2F0.08	
G00X29.	
Z10.	
X120.Z135.M12	
G28U0.W0.T0500	
M01	

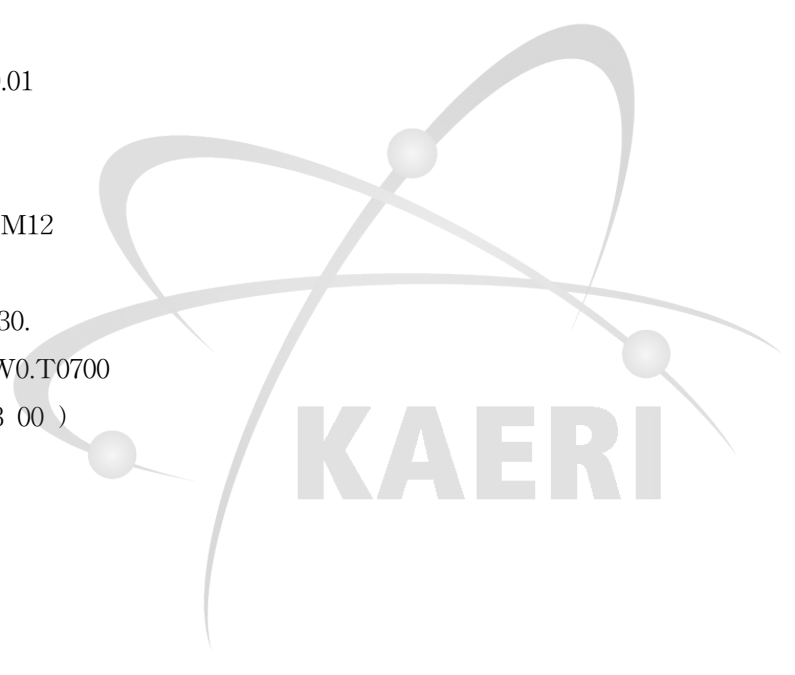
DRAWING of CNC MANUFACTURING

CODE NO.	08 - L388 - 1 - RG - C				
NAME of PARTS	Guide color				
MATERIAL	SS400				
					
DRAWN		CHECKED		APPROVED	

(4) Guide support

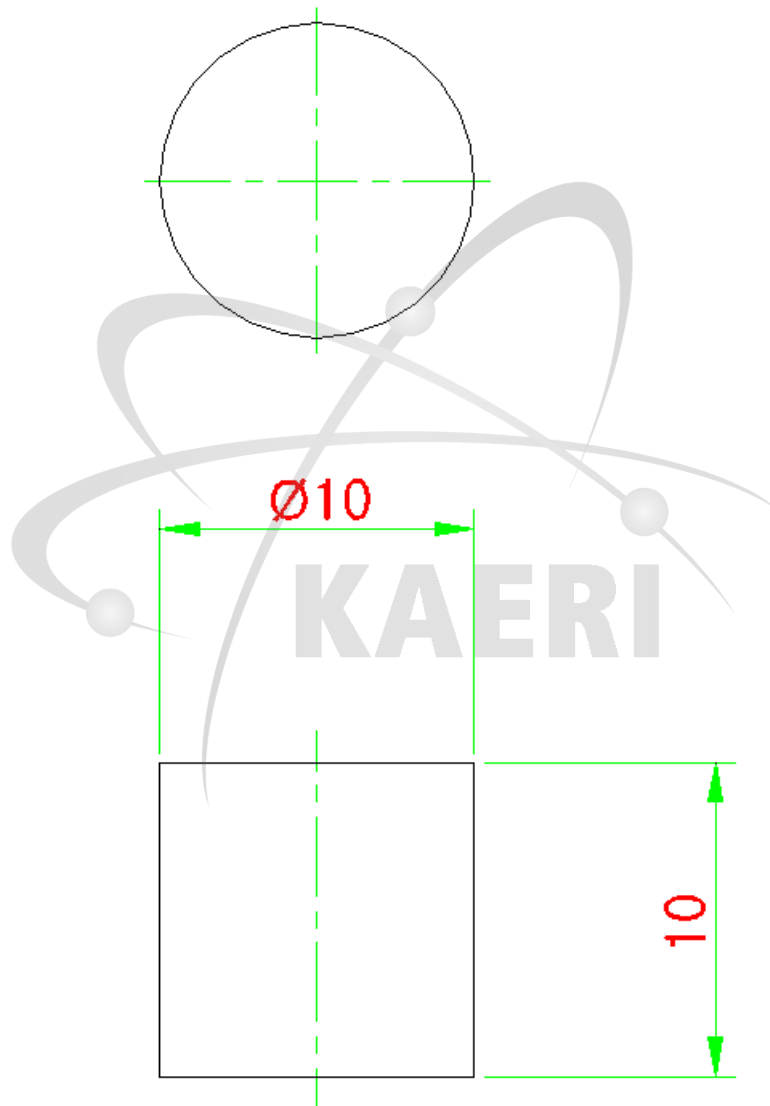
1/2

CODE NO.	08 - L388 - 2 - RG - S		
NAME of PARTS	Guide support		
MATERIAL	SS400		
%			G01X-1.2F0.10
:3882(08-13-388-2)			G00X12.5Z3.
N00			Z-2.
(ZERO POINT 30.5 [16.5])			G01X8.5Z0.
G98			X-1.2
G28U0.W0.			G00X14.Z3.M12
G50X298.500Z204.000T0400			X120.Z130.
G00X150.Z90.			G28U0.W0.T0900
X0.Z15.			M01
G01Z-8.F700			N02
/M69			(T-C TTER 2525-3 TDT 3E-0.4)
G01W14.			G28U0.W0.
G04U3.			G50X241.000Z274.600S1500T0500
/M68			G97S1800T0505
G01W22.			G00X120.Z130.
G00X150.Z90.			X13.Z-10.2M10
G28U0.W0.			G01X4.F0.03
M01			G00X12.5
N01			Z-7.9
(PDJNR DNMG 150604 TT3500)			G01X8.5Z-9.9
G99			G00X14.M12
G28U0.W0.			Z18.
G50X241.800Z264.500S1500T0900			X120.Z130.
G97S1800T0909			G28U0.W0.T0500
G00X150.Z150.			M01
X14.Z0.4M10			N03
PROGRAM		CHECKED	
		APPROVED	

CODE NO.	08 - L388 - 2 - RG - S
<p>(T-C TTER 2525-3 TDT 3E-0.4)</p> <p>G28U0.W0.</p> <p>G50X242.500Z274.180S1500T0700</p> <p>G97S1800T0707</p> <p>G00X120.Z130.</p> <p>X20.Z20.M10</p> <p>G01Z-10.F3.3</p> <p>X11.</p> <p>/M19</p> <p>X-1.2F0.01</p> <p>/M20</p> <p>G04U2.</p> <p>G00X20.M12</p> <p>Z20.</p> <p>X120.Z130.</p> <p>G28U0.W0.T0700</p> <p>M30(03 00)</p> <p>%</p>  A large, light gray watermark of the KAERI logo is centered on the page. It features a stylized atomic symbol with three elliptical orbits and three spheres representing protons and neutrons. The word "KAERI" is written in a bold, sans-serif font across the bottom of the logo.	

DRAWING of CNC MANUFACTURING

CODE NO.	08 - L388 - 2 - RG - S
NAME of PARTS	Guide support
MATERIAL	SS400






DRAWN		CHECKED		APPROVED	
-------	--	---------	--	----------	--

(9) Al-1050 용접시편 제작

(가) Inner welding specimen

1/5

CODE NO.	08 - L443 - 1 - WSP - I				
NAME of PARTS	Inner welding specimen				
MATERIAL	Al - 1050				
&HE:%	Z-18.				
:4431(08-13-443-1)	Z-40.F0.12				
N00	Z30.F5.				
(STOPPER BAR 190)	Z-38.				
G28U0.W0.	Z-60.F0.12				
G50X305.500Z100.000T0200	Z30.F5.				
G00X155.Z50.	Z-58.				
X30.Z10.	Z-80.F0.12				
Z0.5	Z30.F5.				
/M69	Z-78.				
G04U3.	Z-100.F0.12				
/M68	Z30.F5.				
G04U1.	Z-98.				
G00Z10.	Z-120.F0.08				
X155.Z50.	Z30.F5.				
G28U0.W0.	Z-118.				
N01	Z-130.F0.08				
(22MM SOLID DRILL)	Z32.F5.				
G28U0.W0.	Z-128.				
G50X305.500Z064.860S1500T1200	Z-140.F0.08				
G97S1300T1212	Z30.F5.				
G00X155.Z32.	G00X155.M12				
X0.Z5.M10	G28U0.W0.T1200				
G01Z-20.F0.12	N02				
Z30.F5.	(24.3 MM DRILL)				
PROGRAM		CHECKED		APPROVED	

CODE NO.	08 - L443 - 1 - WSP - I
G28U0.W0.	G01Z-158.F5.
G50X305.500Z037.320S1500T1000	Z-162.F0.15
G97S1000T1010	G00Z18.
G00X155.Z18.	M01
X0.Z5.M10	G01Z-161.F5.
G01Z-30.F0.15	Z-164.F0.15
Z18.F5.	G00Z18.
Z-28.	G01Z-163.F5.
Z-60.F0.15	Z-166.F0.15
Z18.F5.	G00Z18.
Z-58.	G01Z-165.F5.
Z-90.F0.15	Z-168.F0.15
Z18.F5.	G00Z18.
Z-88.	M01
Z-120.F0.15	G01Z-167.F5.
Z18.F5.	Z-170.F0.15
Z-118.	G00Z18.
Z-150.F0.15	G01Z-169.F5.
Z18.F5.	Z-172.F0.15
Z-148.	G00Z18.
Z-153.F0.15	G01Z-171.F5.
Z18.F5.	Z-174.F0.15
M01	G00Z18.M12
Z-152.	X155.
Z-156.F0.15	G28U0.W0.T1000
G00Z18.	N03
G01Z-155.F5.	(PCLNR M12 CCGT 04 FL K10)
Z-159.F0.15	G28U0.W0.
G00Z18.	G50X269.000Z217.700S3000T1100

CODE NO.	08 - L443 - 1 - WSP - I
G97S1800T1111	M01
G00X135.Z109.	G00X24.75
X44.Z3.M10	Z4.
G01Z0.F0.12	G01X25.05Z-138.F1.8
X24.	X25.03Z-164.F0.12
G00X35.10Z3.	G00U-0.5Z4.M12
G01X35.05Z-164.F0.12	X165.Z23.
X39.05Z-166.	G28U0.W0.T0600
G00X44.Z3.	N05
X35.0	(PCLNR M12 CCGT 04 FL K10)
G01X34.9Z-164.	G28U0.W0.
X40.9Z-167.	G50X269.000Z217.700S3000T1100
G00X44.Z3.	G97S1800T1111
X31.1	G00X135.Z109.
G01X31.05Z-163.5	X44.Z3.M10
X41.05Z-168.5	G01Z0.F0.12
G00X44.Z3.M12	X22.
X135.Z109.	G00X28.55Z4.
G28U0.W0.T1100	G01X28.50Z-163.5
N04	X38.50Z-168.5
(S20S SCLCR09 CCGT 04 FL 175)	G00X44.Z3.M12
G28U0.W0.	X135.Z109.
G50X331.350Z046.320S2200T0600	G28U0.W0.T1100
G97S1300T0606	N06
G00X165.Z23.	(S20S SCLCR09 CCGT 04 FL 175)
X25.1Z4.M10	G28U0.W0.
G01X25.05Z-138.F0.12	G50X331.350Z046.320S2200T0600
G00U-0.5Z23.	G97S1300T0606
X180.	G00X165.Z23.

CODE NO.	08 - L443 - 1 - WSP - I
X25.68Z4.M10	G00X135.Z109.
G01X25.63Z-128.F0.12	X23.950Z2.1M10
G00U-0.5Z23.	G01X27.950Z0.1F0.10
X180.	Z-18.
M01	S600
G00X25.33	G01Z-36.
Z4.	S700
G01X25.63Z-128.F1.8	X27.935Z-54.1F0.12
X25.61Z-164.F0.12	X27.735Z-54.2
G00U-0.5Z4.M12	S900
X165.Z23.	X27.720Z-108.0
G28U0.W0.T0600	X27.920Z-108.1
N07	S1200
(C20S SCLCR09 CCGT 04 FL 175)	X27.905Z-163.
G28U0.W0.	G00X44.M12
G50X331.710Z047.410S2200T0400	Z10.
G97S600T0404	X135.Z109.
G00X165.Z24.	G28U0.W0.T0500
X30.18Z2.1M10	M01
G01X26.18Z0.1F0.12	N09
X26.08Z-164.	(C20S SCLCR09 CCGT 04 FL 175)
G00U-0.5Z4.M12	G28U0.W0.
X165.Z24.	G50X331.610Z047.410S2200T0400
G28U0.W0.T0400	G97S400T0404
N08	G00X165.Z23.
(SDJCR M11 DCMT 11T304 CT3000)	X30.18Z2.1M10
G28U0.W0.	G01X26.18Z0.1F0.12
G50X268.730Z217.630S2500T0500	X26.07Z-164.
G97S500T0505	G00U-0.5Z4.M12

CODE NO.	08 - L443 - 1 - WSP - I
X165.Z23.	(GVR2525-4 GV504 P20)
G28U0.W0.T0400	G28U0.W0.
N10	G50X254.000Z228.720S1800T0700
(SDJCR M11 DCMT 11T304 CT3000)	G97S1300T0707
G28U0.W0.	G00X125.Z120.
G50X268.830Z217.630S2500T0500	X55.Z-150.M10
G97S300T0505	G01X32.Z-162.F1.5
G00X135.Z109.	X24.F0.02
X23.950Z2.M10	S1300
G01X27.950Z0.F0.10	X13.F0.12
Z-18.	G00X55.Z0.M12
S450	X125.Z120.
G01Z-36.	G28U0.W0.T0700
S600	M30(29 45)
X27.935Z-54.1F0.12	%
X27.735Z-54.2	
S900	
X27.720Z-108.0	
X27.920Z-108.1	
S1200	
X27.905Z-162.3	
X27.505	
Z-163.	
G00X44.M12	
Z10.	
X135.Z109.	
G28U0.W0.T0500	
M01	
N11	

DRAWING of CNC MANUFACTURING

CODE NO.	08 - L443 - 1 - WSP - I				
NAME of PARTS	Inner welding specimen				
MATERIAL	Al - 1050				
DRAWN		CHECKED		APPROVED	

(4) Outer welding specimen

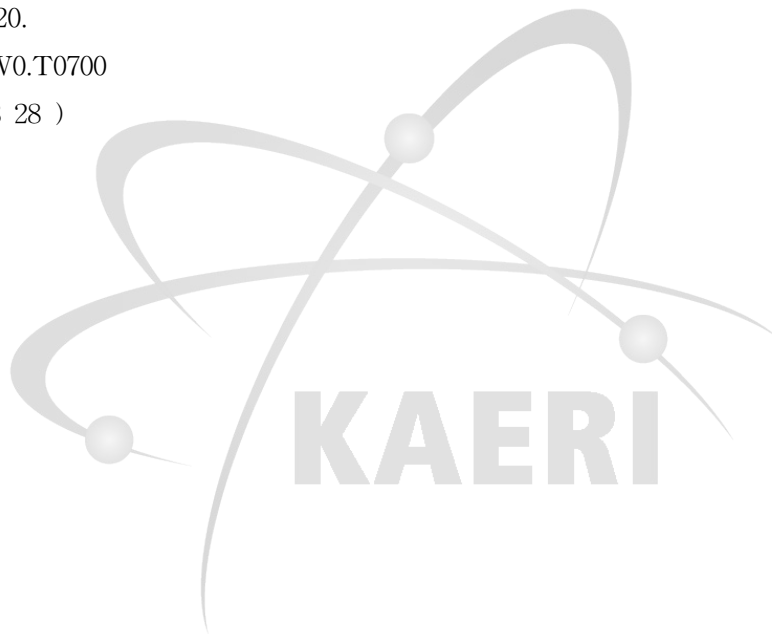
1/4

CODE NO.	08 - L443 - 2 - WSP - O		
NAME of PARTS	Outer welding specimen		
MATERIAL	Al - 1050		
&HE:%	Z-40.F0.12		
:4433(08-13-443-3)	Z30.F5.		
N00	Z-38.		
(STOPPER BAR 190)	Z-60.F0.12		
G28U0.W0.	Z30.F5.		
G50X305.500Z100.000T0200	Z-58.		
G00X155.Z50.	Z-80.F0.12		
X30.Z10.	Z30.F5.		
Z0.5	Z-78.		
/M69	Z-100.F0.12		
G04U3.	Z30.F5.		
/M68	Z-98.		
G04U1.	Z-120.F0.12		
G00Z10.	Z30.F5.		
X155.Z50.	Z-118.		
G28U0.W0.	Z-130.F0.08		
N01	Z30.F5.		
(26MM SOLID DRILL)	Z-128.		
G28U0.W0.	Z-140.F0.08		
G50X305.500Z049.490S1500T1200	Z30.F5.		
G97S1300T1212	Z-138.		
G00X155.Z25.	Z-150.F0.08		
X0.Z5.M10	Z30.F5.		
G01Z-20.F0.12	G00X155.M12		
Z30.F5.	G28U0.W0.T1200		
Z-18.	N02		
PROGRAM		CHECKED	
		APPROVED	

CODE NO.	08 - L443 - 2 - WSP - O
(24.3 MM DRILL)	N03
G28U0.W0.	(PCLNR M12 CCGT 04 FL K10)
G50X305.500Z037.320S1500T1000	G28U0.W0.
G97S1300T1010	G50X269.000Z217.700S3000T1100
G00X155.Z18.	G97S1800T1111
X0.Z5.M10	G00X135.Z109.
G01Z-145.F5.	X44.Z3.M10
Z-160.F0.12	G01Z0.1F0.12
Z18.F5.	X26.
Z-158.	G00X44.Z3.
Z-163.F0.12	X36.0
Z18.F5.	G01X35.9Z-164.
Z-161.	X41.9Z-167.
Z-166.F0.12	G00X44.Z3.
Z18.F5.	X32.6
Z-164.	G01X32.5Z-164.
Z-168.F0.12	X40.5Z-168.
Z18.F5.	G00X44.Z3.M12
Z-166.	X135.Z109.
Z-170.F0.08	G28U0.W0.T1100
Z18.F5.	N04
Z-168.	(S20S SCLCR09 CCGT 04 FL 175)
Z-172.F0.08	G28U0.W0.
Z18.F5.	G50X331.350Z046.320S2200T0600
Z-170.	G97S1300T0606
Z-174.F0.08	G00X165.Z23.
Z18.F5.	X26.75Z4.M10
G00X155.M12	G01X26.70Z-138.F0.12
G28U0.W0.T1000	G00U-0.5Z23.

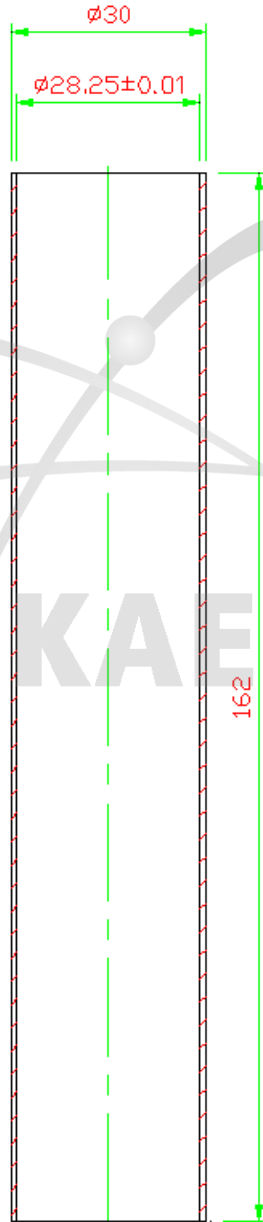
CODE NO.	08 - L443 - 2 - WSP - O
X180.	G00X165.Z23.
M01	X27.75Z4.M10
G00X26.40	G01X27.70Z-138.F0.12
Z4.	G00U-0.5Z23.
G01X26.70Z-138.F1.8	X180.
X26.68Z-164.F0.12	M01
G00U-0.5Z4.M12	G00X27.40
X165.Z23.	Z4.
G28U0.W0.T0600	G01X27.70Z-138.F1.8
N05	X27.68Z-164.F0.12
(PCLNR M12 CCGT 04 FL K10)	G00U-0.5Z4.M12
G28U0.W0.	X165.Z23.
G50X269.000Z217.700S3000T1100	G28U0.W0.T0600
G97S1800T1111	N07
G00X135.Z109.	(C20S SCLCR09 CCGT 04 FL 175)
X44.Z3.M10	G28U0.W0.
G01Z0.F0.12	G50X331.710Z047.410S2200T0400
X22.	G97S600T0404
G00X30.6Z4.	G00X165.Z24.
G01X30.53Z-163.5	X32.25Z2.2M10
X40.53Z-168.5	G01X28.25Z0.2F0.12
G00X44.Z3.M12	X28.15Z-164.
X135.Z109.	G00U-0.5Z4.M12
G28U0.W0.T1100	X165.Z24.
N06	G28U0.W0.T0400
(S20S SCLCR09 CCGT 04 FL 175)	N08
G28U0.W0.	(SDJCR M11 DCMT 11T304 CT3000)
G50X331.350Z046.320S2200T0600	G28U0.W0.
G97S1300T0606	G50X268.710Z217.630S2500T0500

CODE NO.	08 - L443 - 2 - WSP - O
G97S1300T0707	
G00X125.Z120.	
X55.Z-150.M10	
G01X32.Z-162.F1.5	
X24.F0.02	
S1300	
X13.F0.12	
G00X55.Z0.M12	
X125.Z120.	
G28U0.W0.T0700	
M30(28 28)	
%	



DRAWING of CNC MANUFACTURING

CODE NO.	08 - L443 - 2 - WSP - O
NAME of PARTS	Outer welding specimen
MATERIAL	Al - 1050





DRAWN		CHECKED		APPROVED	
-------	--	---------	--	----------	--

(10) 산화물 시료 저장용기 제작

(가) Sample vessel - 170

1/4

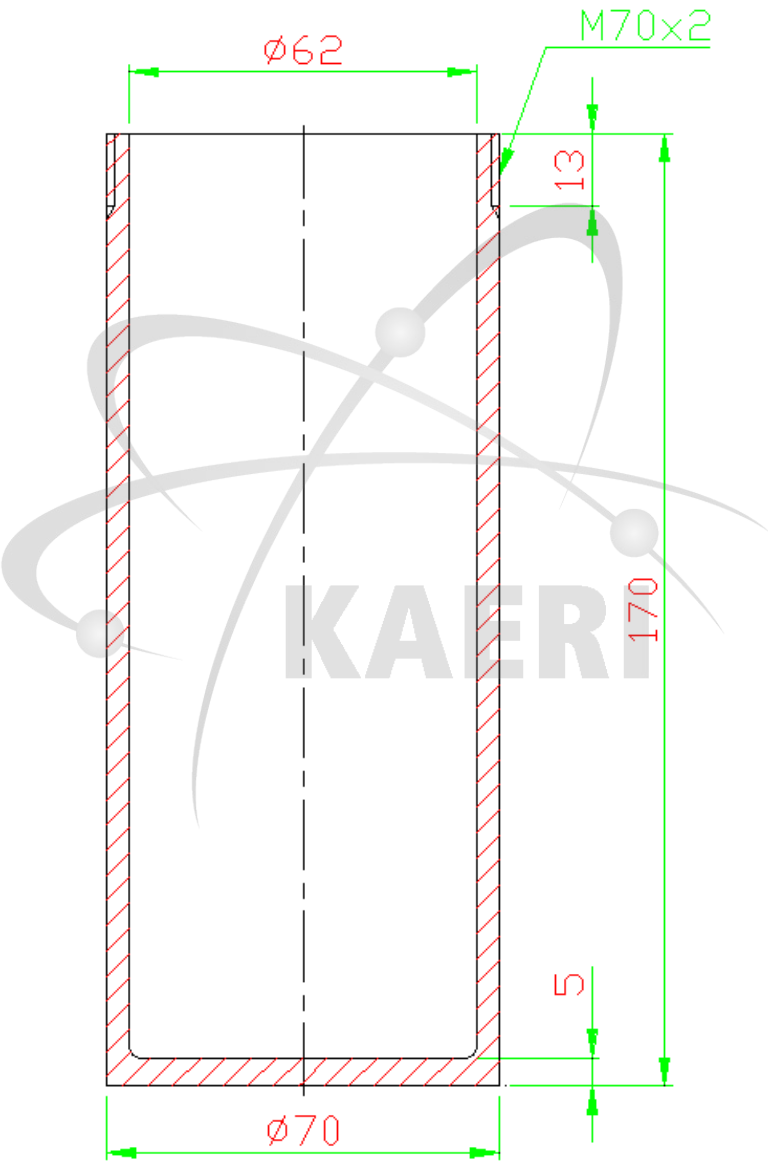



CODE NO.	08 - L445 - 1 - SV - 170		
NAME of PARTS	Sample vessel - 170		
MATERIAL	STS304		
&HE:%	Z0.1		
:4451(08-15-0445-1)	G01X54.		
N00	G00X66.8Z2.		
(JIG CHUCKING 177)	G01Z-2.		
N01	X69.3Z-3.25		
(24.3 MM DRILL)	Z-13.5		
G28U0.W0.	X71.3Z-14.5		
G50X305.500Z092.800S1500T1000	G00X73.Z3.M12		
G97S500T1010	X135.Z135.		
G00X155.Z18.	G28U0.W0.T0300		
X0.Z5.M10	N03		
G01Z-163.F6.6	(SDJCR M11 DCMT 11T304 CT3000)		
Z-170.F0.10	G28U0.W0.		
G00Z18.M12	G50X268.850Z273.160S2500T0500		
X155.	G97S700T0505		
G28U0.W0.T1000	G00X135.Z135.		
N02	X72.Z0.M10		
(PDJNR 2525 M15 DNMG 150604)	G01X58.F0.12		
G28U0.W0.	G00X62.5Z1.3		
G50X267.700Z273.200S2500T0300	G01X66.5Z-0.7		
G97S500T0303	Z-2.		
G00X135.Z135.	X69.Z-3.25		
X73.Z0.5M10	Z-13.5		
G01X54.F0.12	X71.Z-14.5		
G00X73.Z3.	G00X77.Z10.M12		
PROGRAM		CHECKED	
		APPROVED	

CODE NO.	08 - L445 - 1 - SV - 170
X135.Z135.	X49.4
G28U0.W0.T0500	Z-152.
N04	X43.4
(TH2525RE THR42M P20 2.0)	Z-154.
G28U0.W0.	X37.4
G50X269.400Z274.000S1000T0100	Z-156.
G97S400T0101	X34.4
G00X135.Z180.	Z-160.0
X72.Z7.M10	G00Z-147.
G01X69.F0.2	X60.
G76P010060Q050R025	G01X61.
G76X66.4Z-13.5P1300Q0300F2.0	Z-150.
G01X72.Z7.	X55.4
G00X135.Z180.M12	Z-152.
G28U0.W0.T0100	X49.4
N05	Z-154.
(S32U SCLCR12 CCGT 04 FLK10)	X43.4
G28U0.W0.	Z-156.
G50X349.880Z096.150S1500T0800	X37.4
G97S500T0808	Z-158.
G00X166.Z48.	X31.4
X65.4Z1.5M10	Z-160.5
G01X61.Z-0.5F0.12	G00Z48.
Z-148.	X60.
G00U-2.Z48.	M01
M01	Z-149.
X55.4	G01X61.
Z-147.	Z-152.
G01Z-150.	X55.4

CODE NO.	08 - L445 - 1 - SV - 170
Z-154.	X31.4
X49.4	G00Z-155.
Z-156.	X60.
X43.4	G01X61.
Z-158.	Z-158.
X37.4	X56.4
Z-161.0	Z-162.5
X31.4	X31.4
G00Z-151.	G00Z-157.
X60.	X60.
G01X61.	G01X61.
Z-154.	Z-163.0
X55.4	X31.4
Z-156.	G00Z48.M12
X49.4	X166.
Z-158.	G28U0.W0.T0800
X43.4	M01
Z-161.5	N06
X31.4	(S32U SCLCR12 CCGT 04 FLK10)
G00Z48.	G28U0.W0.
X60.	G50X349.880Z096.150S1500T0800
M01	G97S700T0808
Z-153.	G00X166.Z48.
G01X61.	X60.Z3.M10
Z-156.	G01Z-162.0F5.5
X55.4	X61.F0.12
Z-158.	Z-163.5
X49.4	X24.
Z-162.0	G00Z-162.5



CODE NO.	08 - L445 - 1 - SV - 170
M01	
N10	
(S20S SCLCR 09 CCGT 09T304)	
G28U0.W0.	
G50X331.500Z097.080S1500T0400	
G97S800T0404	
G00X166.Z48.	
X28.Z5.M10	
G01Z-169.0F6.6	
X24.Z-169.8F0.08	
Z-169.9	
X2.	
G01Z-169.0F6.6	
X59.	
S1800	
Z-170.0F0.08	
X2.	
G00Z5.M12	
X165.Z48.	
G28U0.W0.T0400	
M30(27 27)	
%	

DRAWING of CNC MANUFACTURING

CODE NO.	08 - L445 - 1 - SV - 170				
NAME of PARTS	Sample vessel - 170				
MATERIAL	STS304				
					
DRAWN		CHECKED		APPROVED	

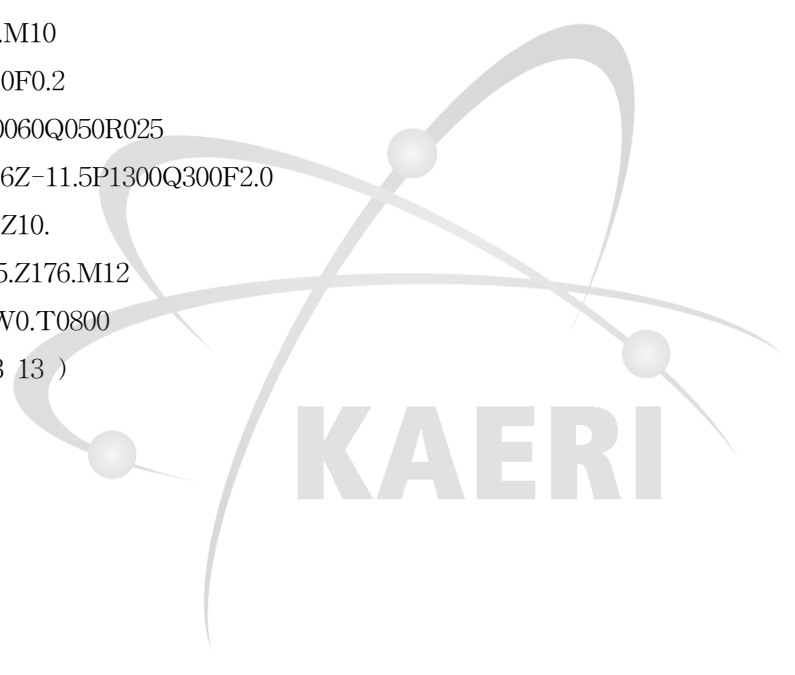
(4) Sample vessel cap-A

1/4

CODE NO.	08 - L445 - 2 - SV - Ca		
NAME of PARTS	Sample vessel cap-A		
MATERIAL	STS304		
&HE:%	G01X22.		
:4454(08-15-0445-4)	G00X84.Z3.		
N00	Z-0.7		
(JIG CHUCKING 010)	G01X81.		
N01	X78.Z0.8		
(26 MM HHS DRILL)	X68.		
G28U0.W0.	G00X88.Z30.M12		
G50X305.500Z250.450S1500T1000	X135.Z200.		
G97S300M10T1010	G28U0.W0.T1100		
G00X150.Z110.	N03		
X0.Z5.	(SDJCR M11 DCMT 11T304 CT3000)		
G01Z-7.F0.08	G28U0.W0.		
Z20.F6.6	G50X268.850Z399.230S2500T0500		
Z-6.	G97S700T0505		
Z-12.F0.08	G00X135.Z200.		
Z5.F6.6	X84.Z2.M10		
G00X150.Z110.M12	G01Z-1.F0.12		
G28U0.W0.T1000	X80.7		
N02	X77.7Z0.		
(PCLNR 2525 M12 CCGT 120404)	X66.		
G28U0.W0.	G00Z10.M12		
G50X269.500Z399.300S2500T1100	X135.Z200.		
G97S500T1111	G28U0.W0.T0500		
G00X135.Z200.	N04		
X84.Z3.M10	(S20S SCLCR 09 CCGT 09T304)		
G01Z0.2F0.12	G28U0.W0.		
PROGRAM		CHECKED	
		APPROVED	

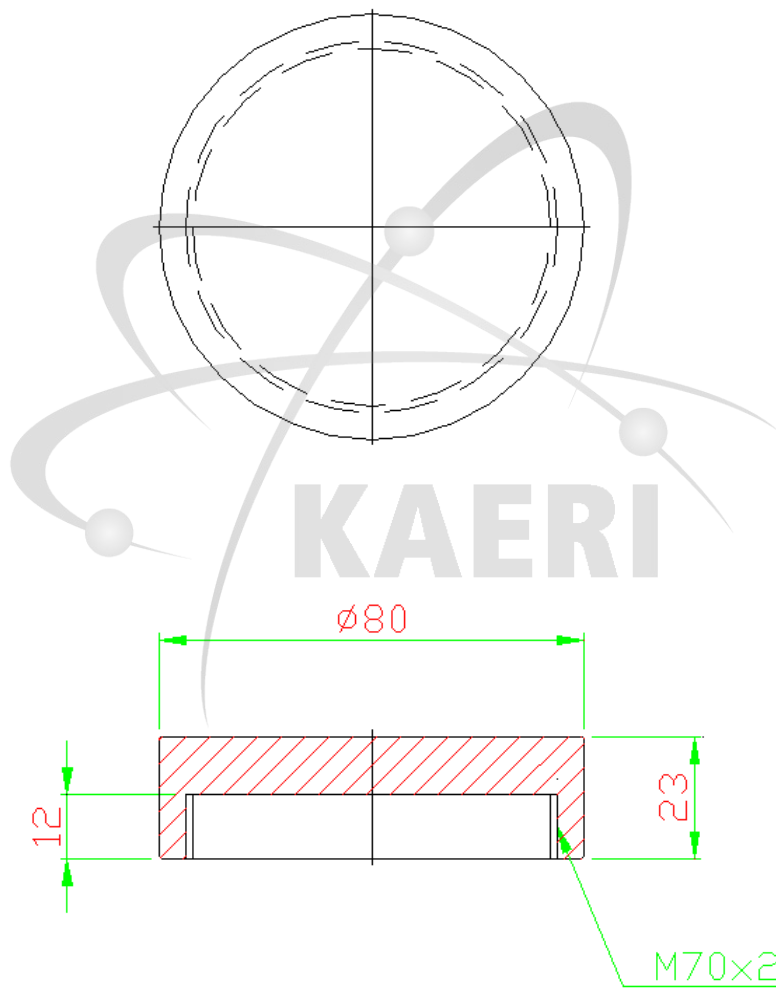
CODE NO.	08 - L445 - 2 - SV - Ca
G50X332.380Z321.700S1500T0200	G01Z-11.9
G97S400T0202	X6.
G00X166.Z160.	G00U-1.Z80.
X26.Z2.M10	X56.
G01Z-9.5F0.12	Z2.
G00U-1.Z80.	G01Z-11.9
X31.	G00U-1.Z80.
Z2.	X61.
G01Z-10.0	Z2.
X21.	G01Z-11.9
G00U-1.Z80.	G00U-1.Z80.
X36.	X66.
Z2.	Z2.
G01Z-10.5	G01Z-11.9
X16.	G00U-1.Z80.M12
G00U-1.Z80.	X166.Z160.
X41.	G28U0.W0.T0200
Z2.	N05
G01Z-11.	(S20S SCLCR 09 CCGT 09T304)
X11.	G28U0.W0.
G00U-1.Z80.	G50X331.110Z357.700S1500T0400
X46.	G97S1000T0404
M01	G00X165.Z166.
G00Z2.	X73.0Z1.6M10
G01Z-11.5	G01X67.0Z-1.4F0.12
X6.	Z-11.95
G00U-1.Z80.	X2.
X51.	G00Z1.6
Z2.	X73.

CODE NO.	08 - L445 - 2 - SV - Ca
G01X67.0Z-1.4	X166.Z164.M12
Z-12.0	G28U0.W0.T0600
X2.	M01
G00Z30.M12	N07
X166.Z123.	(S20PTHCNR16 TH16NR30 P20)
G28U0.W0.T0400	G28U0.W0.
N06	G50X330.740Z352.150S300T0800
(S20S SDUCR 11 DCGT 11T304)	G97S300T0808
G28U0.W0.	G00X150.Z150.
G50X331.900Z328.350S1500T0600	X63.Z10.M10
G97S700T0606	G01X67.0F0.2
G00X166.Z164.	G76P010060Q050R025
X65.0Z3.M10	G76X69.6Z-11.5P1300Q300F2.0
G01Z-11.8F6.6	G01X63.Z10.
X68.F0.12	G00X150.Z150.M12
Z-11.9	G28U0.W0.T0800
G00X65.	N08
Z-8.9	(S20S SDUCR 11 DCGT 11T304)
G01X69.2	G28U0.W0.
Z-11.9	G50X332.010Z328.350S1500T0600
G00X65.	G97S1300T0606
Z1.4	G00X166.Z164.
X73.1	X73.1Z1.4M10
G01X67.1Z-1.6	G01X67.1Z-1.6F0.12
Z-8.3	Z-8.3
X69.4	X69.1
Z-11.9	Z-11.9
X65.2	X65.1
G00Z30.	G00Z30.

CODE NO.	08 - L445 - 2 - SV - Ca
<p>X166.Z164.M12 G28U0.W0.T0600 N09 (S20P THCNR16 TH16NR30 P20) G28U0.W0. G50X330.740Z352.150S300T0800 G97S300M10T0808 G00X165.Z176. X63.Z10.M10 G01X67.0F0.2 G76P010060Q050R025 G76X69.6Z-11.5P1300Q300F2.0 G01X63.Z10. G00X165.Z176.M12 G28U0.W0.T0800 M30(13 13) %</p>  A large, light gray watermark of the KAERI logo is centered on the page. It features a stylized atomic symbol with three elliptical orbits and three spheres representing electrons. The word "KAERI" is written in a bold, sans-serif font across the bottom of the logo.	

DRAWING of CNC MANUFACTURING

CODE NO.	08 - L445 - 2 - SV - Ca
NAME of PARTS	Sample vessel cap-A
MATERIAL	STS304



DRAWN		CHECKED		APPROVED	
-------	--	---------	--	----------	--

(다) Sample vessel cap-B

1/3

CODE NO.	08 - L445 - 3 - SV - Cb		
NAME of PARTS	Sample vessel cap-B		
MATERIAL	STS304		
&HE:%	G01X81.		
:4455(08-15-0445-5)	X78.Z0.5		
N00	X74.		
(JIG CHUCKING 010)	G00Z30.M12		
N01	X135.Z199.		
(26 MM HHS DRILL)	G28U0.W0.T1100		
G28U0.W0.	N03		
G50X305.500Z249.150S1500T1000	(SDJCR M11 DCMT 11T304 CT3000)		
G97S300T1010	G28U0.W0.		
G00X153.Z125.	G50X268.850Z397.930S2500T0500		
X0.Z5.M10	G97S1000T0505		
G01Z-8.F0.08	G00X134.Z199.		
G00Z125.M12	X84.Z2.M10		
X153.	G01Z-1.F0.12		
G28U0.W0.T1000	X80.6		
N02	X78.6Z0.		
(PCLNR 2525 M12 CCGT 120404)	X66.		
G28U0.W0.	G00Z10.M12		
G50X269.500Z398.000S2500T1100	X134.Z199.		
G97S500T1111	G28U0.W0.T0500		
G00X135.Z199.	N04		
X84.Z3.M10	(S20S SCLCR 09 CCGT 09T304)		
G01Z0.2F0.12	G28U0.W0.		
X22.	G50X332.380Z320.330S1500T0200		
G00X84.Z3.	G97S400T0202		
Z-1.	G00X175.Z160.		
PROGRAM		CHECKED	
		APPROVED	

CODE NO.	08 - L445 - 3 - SV - Cb
X26.Z3.M10	X55.
G01Z-5.F0.10	G01Z-7.9
G00U-1.Z3.	G00U-1.Z3.
X30.	X60.
G01Z-5.5	G01Z-7.9
X26.	G00U-1.Z3.
G00U-1.Z3.	X65.
X34.	G01Z-7.9
G01Z-6.0	G00U-1.Z3.
X22.	X70.
G00U-1.Z3.	G01Z-7.9
X38.	G00U-1.Z160.M12
G01Z-6.5	X166.Z110.
X18.	G28U0.W0.T0200
G00U-1.Z3.	N05
X42.	(S20S SCLCR 09 CCGT 09T304)
G01Z-7.0	G28U0.W0.
X14.	G50X330.880Z356.420S1500T0400
G00U-1.Z3.	G97S1000T0404
X46.	G00X175.Z149.
G01Z-7.5	X74.5Z1.3M10
X10.	G01X70.5Z-0.7F0.12
G00U-1.Z80.	Z-7.95
M01	X2.
G00X50.	G00Z1.5
Z3.	X74.5
G01Z-7.9	G01X70.5Z-0.5
X6.	Z-8.0
G00U-1.Z3.	X2.

CODE NO.	08 - L445 - 3 - SV - Cb
----------	-------------------------

G00Z30.

X166.Z123.M12

G28U0.W0.T0400

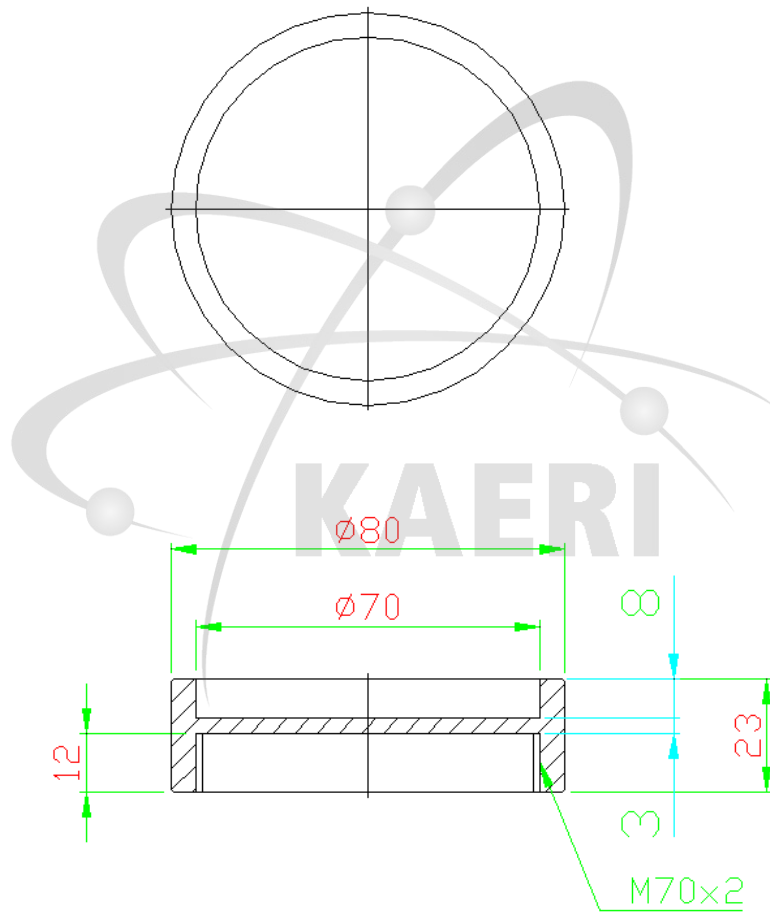
M30(10 10)

%



DRAWING of CNC MANUFACTURING

CODE NO.	08 - L445 - 3 - SV - Cb
NAME of PARTS	Sample vessel cap-B
MATERIAL	STS304






DRAWN		CHECKED		APPROVED	
-------	--	---------	--	----------	--

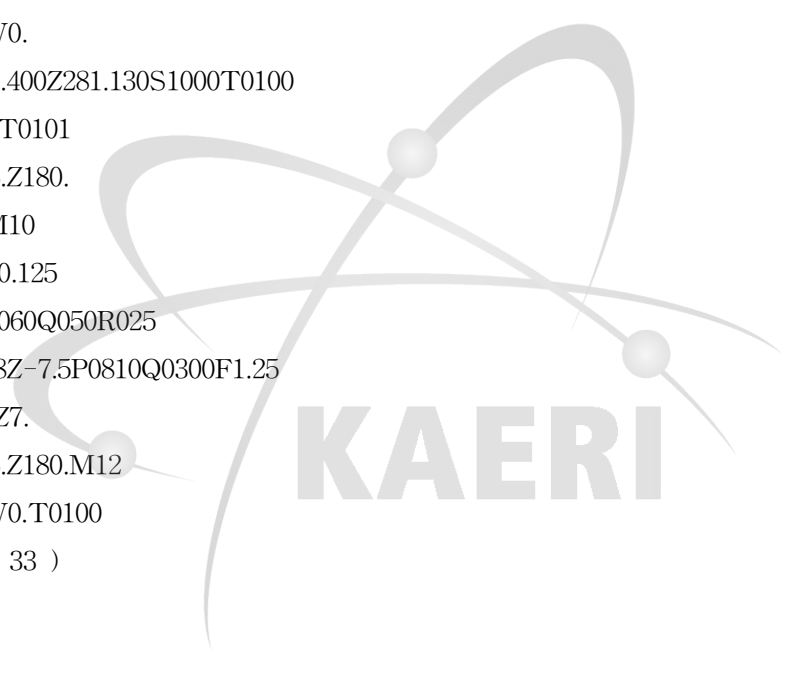
(11) In-Situ 고압 시료용기 제작

(가) Sample bottle

1/3

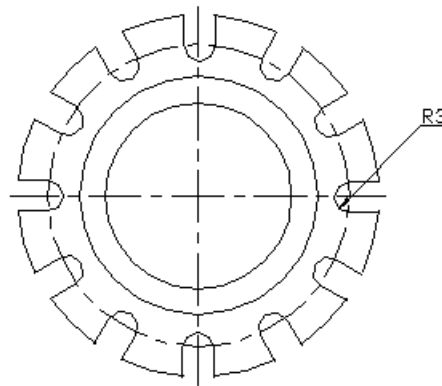
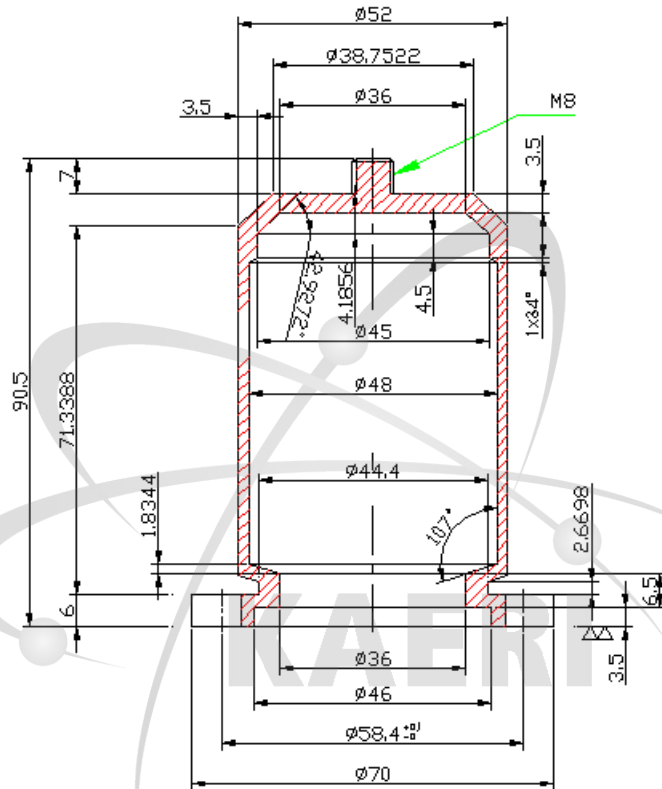
CODE NO.	08 - L529 - 1 - SB - O		
NAME of PARTS	Sample bottle		
MATERIAL	STS304		
&HE:%	M01		
:5291(08-16-0529-1)	X60.Z3.		
N00	G01Z-85.3		
(JIG CHUCKING 126)	G00X180.Z100.		
N01	M01		
(PCLNR 2525 M12 CCGT 120404)	X56.Z3.		
G28U0.W0.	G01Z-85.3		
G50X267.770Z280.390S2500T0700	G00X180.Z100.		
G97S400T0707	M01		
G00X135.Z142.	X52.4Z3.		
X76.Z3.M10	G01Z-85.3		
G01Z-85.3F0.12	X78.5		
G00X180.Z100.	Z-100.		
M01	G00X88.Z3.M12		
X72.Z3.	X135.Z142.		
G01Z-85.3	G28U0.W0.T0700		
G00X180.Z100.	M01		
M01	N02		
X68.Z3.	(PCLNR 2525 M12 CCGT 120404)		
G01Z-85.3	G28U0.W0.		
G00X180.Z100.	G50X268.880Z280.640S2500T1100		
M01	G97S500T1111		
X64.Z3.	G00X135.Z142.		
G01Z-85.3	X48.Z3.M10		
G00X180.Z100.	G01Z-11.1F0.12		
PROGRAM		CHECKED	
		APPROVED	

CODE NO.	08 - L529 - 1 - SB - O
G01Z-7.8	G01X51.5Z-13.56
G00X16.Z3.	G03X52.0W-0.75R1.
X8.4	G01X51.97Z-85.5
G01Z-7.8	X75.5
G00X12.Z3.	G03X78.0W-0.8R1.
Z0.7	G01Z-99.
G01X-1.2	G00X88.Z5.M12
G00X12.Z3.	X135.Z142.
Z0.2	G28U0.W0.T0500
G01X-1.2	M01
G00X48.Z3.M12	N04
X135.Z142.	(SDJCR M11 DCMT 11T304 CT3000)
G28U0.W0.T1100	G28U0.W0.
M01	G50X268.680Z280.610S2500T0500
N03	G97S900T0505
(SDJCR M11 DCMT 11T304 CT3000)	G00X135.Z142.
G28U0.W0.	X12.Z0.M10
G50X268.560Z280.510S2500T0500	G01X-1.2F0.12
G97S600T0505	G00X4.9Z0.8
G00X135.Z142.	G01X7.9Z-1.2
X12.Z0.1M10	Z-6.5
G01X-1.2F0.12	X5.9Z-7.5
G00X3.9Z0.8	Z-8.
G01X7.9Z-1.2	X37.25
Z-6.5	G03X38.25Z-8.2R1.5
X6.9Z-7.5	G01X51.5Z-13.56
Z-8.	G03X52.0W-0.75R1.
X37.25	G01X51.97Z-85.5
G03X38.25Z-8.2R1.5	X75.5

CODE NO.	08 - L529 - 1 - SB - O
<p>G03X78.0W-0.8R1. G01Z-99. G00X88.Z5.M12 X135.Z142. G28U0.W0.T0500 M01 N05 (TH2525RE THR42M P20 2.0) G28U0.W0. G50X269.400Z281.130S1000T0100 G97S300T0101 G00X135.Z180. X12.Z7.M10 G01X8.F0.125 G76P010060Q050R025 G76X6.38Z-7.5P0810Q0300F1.25 G01X12.Z7. G00X135.Z180.M12 G28U0.W0.T0100 M30(33 33) %</p> 	

DRAWING of CNC MANUFACTURING




CODE NO.	08 - L529 - 1 - SB - O
NAME of PARTS	Sample bottle
MATERIAL	STS304



DRAWN		CHECKED		APPROVED	
-------	--	---------	--	----------	--

(4) Sample bottle cap

1/3

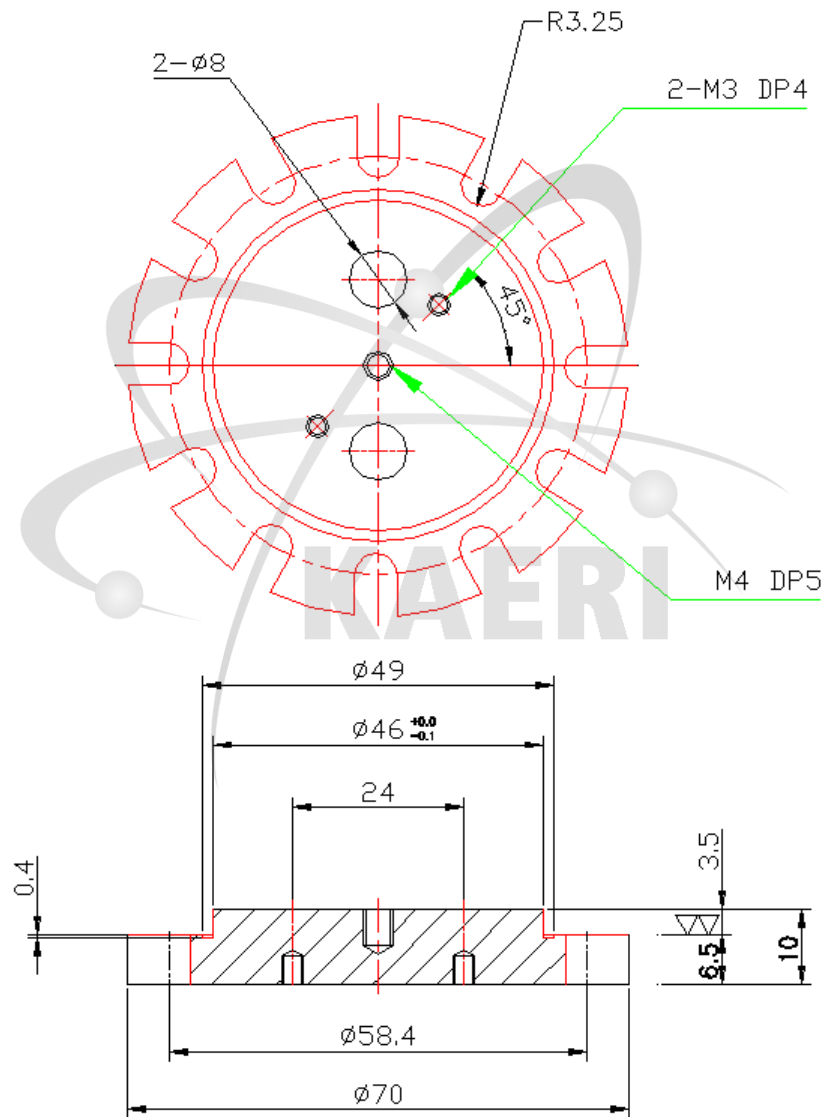
CODE NO.	08 - L529 - 2 - SB - C		
NAME of PARTS	Sample bottle cap		
MATERIAL	STS304		
&HE:%	G01Z-14.8		
:5293(08-16-0529-3)	G00X180.Z100.		
N00	X52.Z3.		
(JIG CHUCKING 046)	G01Z-14.8		
N01	G00X180.Z100.		
(PCLNR 2525 M12 CCGT 120404)	X48.Z3.		
G28U0.W0.	G01Z-14.8		
G50X267.770Z357.700S2500T0700	G00X88.Z100.		
G97S400T0707	X46.5Z3.		
G00X133.Z180.	G01Z-14.8		
X76.Z3.M10	G00X76.Z3.M12		
G01Z-14.8F0.12	X133.Z180.		
G00X180.Z100.	G28U0.W0.T0700		
X72.Z3.	M01		
G01Z-14.8	N02		
G00X180.Z100.	(PCLNR 2525 M12 CCGT 120404)		
X68.Z3.	G28U0.W0.		
G01Z-14.8	G50X267.770Z357.700S2500T0700		
G00X180.Z100.	G97S400T0707		
X64.Z3.	G00X133.Z180.		
G01Z-14.8	X42.Z3.M10		
G00X180.Z100.	G01Z-11.3F0.12		
X60.Z3.	G00X88.Z100.		
G01Z-14.8	X38.Z3.		
G00X180.Z100.	G01Z-11.3		
X56.Z3.			
PROGRAM		CHECKED	
		APPROVED	

CODE NO.	08 - L529 - 2 - SB - C
G00X88.Z100.	G97S500T1111
X34.Z3.	G00X135.Z142.
G01Z-11.3	X16.Z3.M10
G00X88.Z100.	G01Z0.7F3.3
X30.Z3.	X-1.2F0.10
G01Z-11.3	G00X16.Z3.
G00X88.Z100.	Z0.1F3.3
X26.Z3.	G01X-1.2F0.10
G01Z-11.3	G00X12.1Z3.
G00X88.Z100.	G01Z-11.45
X22.Z3.	X46.1
G01Z-11.3	G01Z-14.95
G00X88.Z100.	X78.1
X18.Z3.	Z-28.
G01Z-11.3	X80.1Z-29.
G00X88.Z100.	Z-33.
X14.Z3.	G00X88.Z3.M12
G01Z-11.3	X135.Z142.
G00X88.Z100.	G28U0.W0.T1100
X12.5Z3.	M01
G01Z-11.3	N04
G00X88.Z3.M12	(SDJCR M11 DCMT 11T304 CT3000)
X133.Z180.	G28U0.W0.
G28U0.W0.T0700	G50X268.600Z357.650S2500T0500
M01	G97S700T0505
N03	G00X135.Z142.
(PCLNR 2525 M12 CCGT 120404)	X12.Z3.M10
G28U0.W0.	G01X-1.2F3.3
G50X268.880Z357.800S2500T1100	Z0.F0.10

CODE NO.	08 - L529 - 2 - SB - C
X9.7	G03X78.W-0.75R1.
G03X12.W-0.75R1.	Z-28.
Z-11.5	G00X88.Z3.M12
X43.7	X135.Z142.
G03X45.95W-0.75R1.	G28U0.W0.T0500
G01Z-15.	M01
X75.7	N05
G03X78.W-0.75R1.	(SDJCR M11 DCMT 11T304 CT3000)
Z-28.	G28U0.W0.
G00X88.Z3.M12	G50X269.770Z353.850S2500T0300
X135.Z142.	G97S300T0303
G28U0.W0.T0500	G00X135.Z142.
M01	X46.Z5.M10
N05	G01Z-11.F3.3
(SDJCR M11 DCMT 11T304 CT3000)	Z-14.F0.08
G28U0.W0.	Z-15.5F0.03
G50X268.700Z357.700S2500T0500	G04U3.
G97S700T0505	Z-11.F3.3
G00X135.Z142.	G00X88.Z5.M12
X12.Z3.M10	X135.Z142.
G01X-1.2F3.3	G28U0.W0.T0300
Z0.F0.10	M30(22 22)
X9.7	%
G03X12.W-0.75R1.	
Z-11.5	
X43.7	
G03X45.95W-0.75R1.	
G01Z-15.	
X75.7	

DRAWING of CNC MANUFACTURING

CODE NO.	08 - L529 - 2 - SB - C
NAME of PARTS	Sample bottle cap
MATERIAL	STS304



DRAWN		CHECKED		APPROVED	
-------	--	---------	--	----------	--

CODE NO.	08 - M164 - 1 - PT
0.0000, 0.0000, 2.5000, 20)	G00 Z20 ;
HOLES 07(23.7500, 8.7500, 180.0000,	X0 Y0 ;
0.0000, 0.0000, 2.5000, 20)	M05 ;
HOLES 08(23.7500, 6.2500, 180.0000,	M30 ;
0.0000, 0.0000, 2.5000, 20)	
HOLES 09(23.7500, 3.7500, 180.0000,	G54G00X0Y0
0.0000, 0.0000, 2.5000, 20)	T03<엔드밀 ø2mm>
HOLES 10(23.7500, 1.2500, 180.0000,	Z20.0 ;
0.0000, 0.0000, 2.5000, 20)	M03 F50 ;
HOLES 11(23.7500, -1.2500, 180.0000,	G00 Y-25.75 X1.25 ;
0.0000, 0.0000, 2.5000, 20)	Z1.0 ;
HOLES 12(23.7500, -3.7500, 180.0000,	G01 Z-5.0 ;
0.0000, 0.0000, 2.5000, 20)	Y-19.75 ;
HOLES 13(23.7500, -6.2500, 180.0000,	G00 Z20.0 ;
0.0000, 0.0000, 2.5000, 20)	X0 Y0 ;
HOLES 14(23.7500, -8.7500, 180.0000,	M05 ;
0.0000, 0.0000, 2.5000, 20)	M30 ;
HOLES 15(23.7500, -11.2500, 180.0000,	G54G00X0Y0 ;
0.0000, 0.0000, 2.5000, 20)	
HOLES 16(23.7500, -13.7500, 180.0000,	T04<엔드밀 ø10mm>
0.0000, 0.0000, 2.5000, 20)	Z20.0 ;
HOLES 17(23.7500, -16.2500, 180.0000,	M03 F100 ;
0.0000, 0.0000, 2.5000, 20)	G00 X33.65 Y40.0 ;
HOLES 18(23.7500, -18.7500, 180.0000,	G01 Y26.15 ;
0.0000, 0.0000, 2.5000, 20)	G02 X26.15 Y-33.65 CR=7.5 ;
HOLES 19(23.7500, -21.2500, 180.0000,	G01 X-26.15 ;
0.0000, 0.0000, 2.5000, 20)	G02 X-33.65 Y-26.15 CR=7.5 ;
HOLES 20(23.7500, -23.7500, 180.0000,	G01 X26.15 ;
0.0000, 0.0000, 2.5000, 20)	G02 X-26.15 Y33.65 CR=7.5 ;

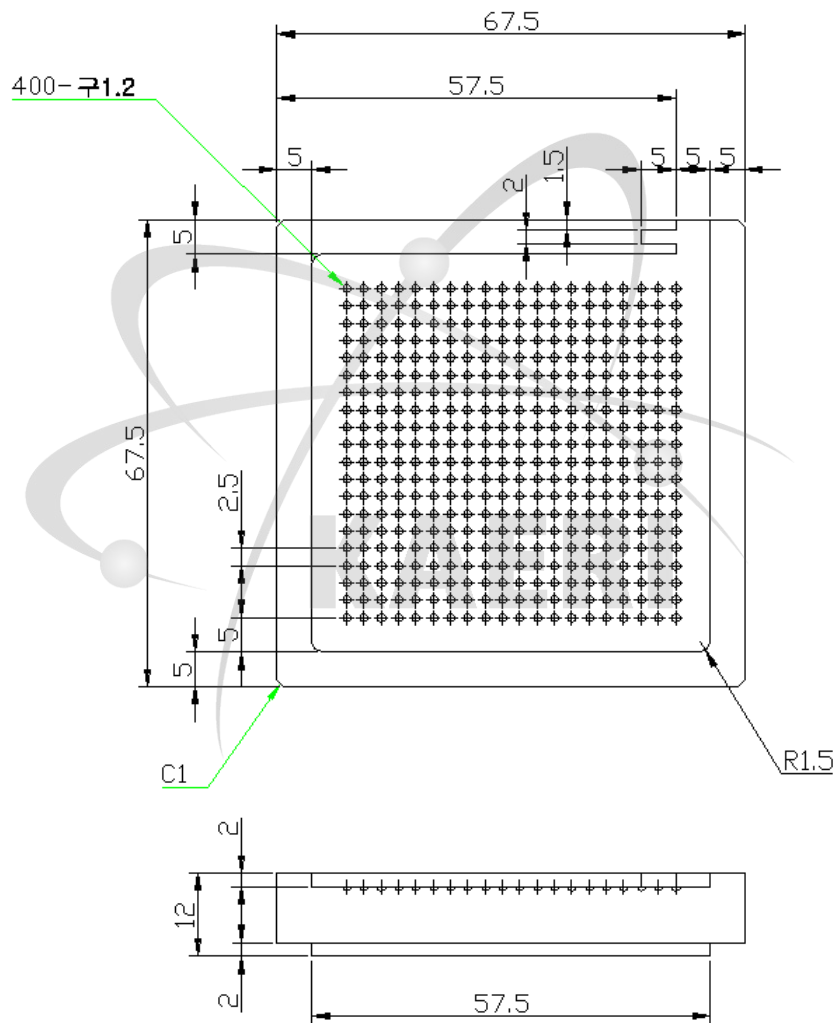
CODE NO.	08 - M164 - 1 - PT
----------	--------------------

G01 X26.15 ;
G02 X33.65 Y-26.15 CR=7.5 ;
G00 Z20.0 ;
X0 Y0 ;
M05 ;
M30 ;



DRAWING of CNC MANUFACTURING

CODE NO.	08 - M164 - 1 - PT
NAME of PARTS	Tray
MATERIAL	Al - 6061



DRAWN		CHECKED		APPROVED	
-------	--	---------	--	----------	--

제 3 절 KS 와 JIS 금속재료 비교표^[1]

KS 번호	규격명	KS 기호	기호 설명	JIS 번호	JIS 기호
KS D 2301	타프피치 형동	B-Tcu C-Tcu	B-Billet, C-Cake T-Tough Pitch	JIS H 2123	B-Tcu C-Tcu
KS D 2302	연 지금	Pb	Pb-Lead	JIS H 2105	-
KS D 2304	알루미늄 지금	Al	Al-Aluminium	JIS H 2102	-
KS D 2305	주석 지금	Sn	Sn-Tin	JIS H 2108	-
KS D 2306	금속 크롬	Cr	Cr-Chromium	JIS G 2313	Mcr
KS D 2307	니켈 지금	Ni	Ni-Nickel	JIS H 2104	N
KS D 2308	은 지금	Ag	Ag-Silver	JIS H 2141	-
KS D 2310	인동 지금	Pcu	P-Phosphor Cu-Copper	JIS H 2501	Pcu
KS D 2312	금속 망간	MMnE	M-Metal Mn-Manganese E-Electric	JIS H 2311	MMnE
KS D 2313	금속 규소	MSi	M-Metal, Si-Silicon	JIS G 2312	MSn
KS D 2316	웨어 티탄	FTiL	F-Ferro, Ti-Titanium L-Low	JIS G 2309	FTiH FTiL
KS D 2320	주물용 황동 지금	BsIC	Bs-Brass, I-Ingot C-Casting	JIS G 2202	YBs CIn
KS D 2321	주물용 청동 지금	BrlC	B-Bronze, I-Ingot C-Casting	JIS G 2203	BCIn
KS D 2322	주물용 인청동 지금	PBrIC	P-Phosphor B-Bronze, I-Ingot C-Casting	JIS G 2204	PBCIn
KS D 2323	주물용 고력 황동 합금 지금	HBsC	H-High Strength Bs-Brass C-Casting, I-Ingot	JIS H 2205	HBsCIn
KS D 2324	주물용 연입 청동 합금 지금	PbBrIC	Pb-Lead, Br-Bronze C-Casting, I-Ingot	JIS H 2206	AlBr CIn
KS D 2325	주물용 알루미늄 청동 합금 지금	AlBrCl	Al-Aluminium Br-Bronze C-Casting	JIS H 2206	AlBr CIn

KS D 2326	주물용 마그네슘 합금 지금	CMgI	C-Casting Mg-Magnesium I-Ingot	JIS H 2221	MCIn
KS D 2327	마그네슘 니켈 지금	xMgNi	Mg-Magnesium Ni-Nickel	JIS H 2502	xMgNi
KS D 2328	마그네슘 동 지금	xMgCu	Mg-Magnesium Cu-Copper	JIS H 2305	xMgNi
KS D 2330	주물용 알루미늄 합금 지금	AlC	Al-Aluminium C-Casting	JIS H 2211	CxV
KS D 2331	다이캐스팅용 알루미늄 합금 지금	AIDC	A-Aluminium I-Ingot, D-Die C-Casting	JIS H 2212	DxV
KS D 2332	다이캐스팅용 알루미늄 재생 합금 지금	AIDCS	A-Aluminium I-Ingot, D-Die C-Casting S-Secondary	JIS H 2118	DxS
KS D 2333	다이캐스트용 마그네슘 합금 지금	MgDCJ	Mg-Magnesium DC-Die Casting I-Ingot	JIS H 2222	MDCIn
KS D 2334	주물용 알루미늄 재생합금 지금	CxxS	C-Casting S-Secondary	JIS H 2117	CxxS
KS D 2304	활자 합금지금	T	T-Type	JIS H 2231	K
KS D 2351	아연 지금	Zn	Zn-Zinc	JIS H 2107	-
KS D 2353	스폰지 티탄	Tis	Ti-Titanium S-SPONGE		
KS D 3214	고온 압력용기 부품용 스테인리스 강 단강품	STSF	STS-Stainless Steel F-Forging	JIS H 3214	SUSF
KS D 3501	열간 압연 강판 및 강대	SHP	S-Steel, H-Hat P-Plate	JIS H 3131	SPHC SPHD SPHE
KS D 3503	일반구조용 압연 강재	SS	S-Steel, S-Structure	JIS H 3101	SS
KS D 3504	철근 콘크리트용 봉강	SR SD	S-Steel, R-Round C-Concrete	JIS H 3112	SR SD
KS D 3506	아연도 강판	SBHG	S-Steel, B-일반 H-Hot, G-Galvanized	JIS H 3302	SPG
KS D 3507	배관용 탄소 강판	SPP	S-Steel, W-Wire P-Piping	JIS H 3452	SGP

KS D 3508	아아크 용접봉 심선재	SWRW	S-Steel, W-Wire R-Rod, W-Welding	JIS G 3503	SWRY
KS D 3509	피아노 선재	PWR	P-Piano, W-Wire R-Rod	JIS G 3502	SWRS
KS D 3510	경강선	HSW	H-Hard, S-Steel W-Wire	JIS G 3521	SW
KS D 3511	재생 강재	SBR	S-Steel, B-일반 R-Rerolled	JIS G 3111	SRB
KS D 3512	냉간압연 강판 및 강대	SCP	S-Steel, C-Cold P-Plate	JIS G 3141	SPCC SPCD SPCE
KS D 3515	용접구조용 압연 강재	SWS	S-Steel, W-Welded S-Structure	JIS G 3106	SM
KS D 3516	주석도금 강판	ET HD	E-Electric, T-Tin H-Hot, D-Dipped	JIS G 3303	SPTE SPTH
KS D 3517	기계구조용 탄소강 강판	STM	S-Steel, T-Tube M-Machine	JIS G 3445	STKM
KS D 3519	자동차 구조용 열간압연 강판 및 강대	SAPH	S-Steel, A-Automobile P-Plate, H-Hot	JIS G 3113	SAPH
KS D 3520	착색 아연도 강판	SBPG	S-Steel, B-일반 P-Precoated G-Galvanized	JIS G 3312	SCG
KS D 3521	압력 용기용 강판	SPPV	S-Steel, P-Plate P-Pressure, V-Vessel	JIS G 3115	SPV
KS D 3522	고속도 공구강 강재	SKH	S-Steel, K-공구 H-High Speed	JIS G 4403	SKH
KS D 3523	중공강 강재	SKC	S-Steel, K-공구 C-Chisel	JIS G 4410	SKC
KS D 3525	고탄소 크롬 베어링 강재	STB	ST-Stainless B-Bearing	JIS G 4805	SUJ

KS D 3526	마봉강용 일반 강재	SGD	S-Steel, G-General D-Drawn	JIS G 3108	SGD
KS D 3527	철근 콘크리트용 재생 봉강	SBCR	S-Steel, B-Bar C-Concrete R-Reinforcement	JIS G 3117	SRR SDR
KS D 3529	용접 구조용 내후성 열간 압연 강재	SMA	S-Steel, M-Marine A-Atmospheric	JIS G 3114	SMA
KS D 3530	일반 구조용 경량형강	SBCR	S-Steel, B-일반 C-Coldforming	JIS G 3350	SSC
KS D 3532	내식 내열 조합금판	NCF	Consion-Resisting and Heat Resisting Supper Alloy Sheets and plates	JIS G 4901 JIS G 4902	NCF
KS D 3533	고압가스용 철판 및 강대	SG	Steel Gas	JIS G 3116	SG
KS D 3534	스프링용 스테인리스 강대	STSC	Stainless Steel Cold	JIS G 4313	SUS
KS D 3535	스프링용 스테인리스 강선	STSC	Stainless Steel Cold	JIS G 4314	SUS
KS D 3536	구조용 스테인리스강 강관	STST	Stainless Steel Tube	JIS G 3446	SUS
KS D 3537	수도용 아연도 강관	SPPW	S-Steel, P-Pipe P-Piping, W-Water	JIS G 3442	SGPW
KS D 3538	보일러 및 압력용기용 망간 몰리브덴 강 및 망간 몰리브덴 니켈 합금강	SBV	S-Steel, B-Boiler V-Vessel	JIS G 3119	SBV
KS D 3539	압력 용기용 조절형망간 몰리브덴강 및 망간 몰리브덴 니켈 합금강 강판	SQV	S-Steel, Q-Quenching V-Vessel	JIS G 3120	SQV
KS D 3540	중. 상온 압력 용기용 탄소 강판	SGV	S-Steel, G-General V-Vessel	JIS G 3118	SGV
KS D 3541	저온 압력 용기용 소강 강판	SLAI	S-Steel, L-Low Al-Aluminium	JIS G 3126	SLA
KS D 3542	고내후성 압연 강재	SPA-H-C	S-Steel, P-Plate A-Atmospheric H-Hot, C-Cold	JIS G 3125	SPA-H-C

KS D 3543	보일러 및 압력 용기용 크롬 몰리브덴강 강판	SCMV	S-Steel, C-Chromium M-Molybdenum V-Vessels	JIS G 4109	SCMV
KS D 3544	용융 알루미늄 도금 강판 및 강대	SA	S-Steel A-Aluminium	JIS G 3314	SA
KS D 3550	피복아-크 용접봉 심선	SWW	S-Steel, W-Wire W-Welding	JIS G 3523	SWY
KS D 3552	철선	MSW	M-Mild, S-Steel W-Wire	JIS G 3532	SWH
KS D 3554	연강 선재	MSWR	M-Mild, S-Steel W-Wire, R-Rod	JIS G 3505	SWRM
KS D 3555	강관용 열간 압연 탄소강 대강	HRS	H-Hot, R-Rolled S-Steel, V-Rivet	JIS G 3132	SPHT
KS D 3556	피아노선	PW	P-Piano, W-Wire	JIS G 3522	SWP
KS D 3557	리벳용 압연 강재	SV	S-Steel, V-Rivet	JIS G 3104	SV
KS D 3559	경강 선재	HSWR	H-Hard, S-Steel W-Wire, R-Rod	JIS G 3506	SWRH
KS D 3560	보일러용 압연 강재	SB	S-Steel, B-Boiler	JIS G 3103	SB
KS D 3561	마봉강(탄소강)	SB-B-D	S-Steel, B-일반 B-Bar, D-Drawn	JIS G 3123	SS-B-D
KS D 3562	압력 배관용 탄소강 강관	SPPS	S-Steel, P-Pipe P-Pressure, S-Service	JIS G 3454	STPG
KS D 3563	보일러 및 열교환기용 탄소 강관	STBH	S-Steel, T-Tube B-Boiler, H-Heat	JIS G 3461	STB
KS D 3564	고압 배관용 탄소강관	SPPH	S-Steel, P-Pipe P-Pressure, H-High	JIS G 3455	STS

KS D 3565	수복용 도복강 강관	STPW-A STPW-C	S-Steel, T-Tube P-Pipe, W-Water A-Asphalt, C-Coaltar	JIS G 3443	-
KS D 3566	일반 구조용 탄소 강관	SPS	S-Steel, P-Pipe S-Structure	JIS G 3444	STK
KS D 3567	래삭강	FCS	F-Free, C-Cutting S-Steel	JIS G 4804	SUM
KS D 3568	일반 구조용 각형 강관	SPSR	S-Steel, P-Pipe S-Structural R-Rectangular	JIS G 3446	STKR
KS D 3569	저온 배관용 강관	SPLT	S-Steel, P-Pipe L-Low T-Temperature	JIS G 3460	STPL
KS D 3570	고온 배관용 강관	SPHT	S-Steel, P-Pipe H-High T-Temperature	JIS G 3456	STPT
KS D 3571	저온 열교환기용 강관	STLT	S-Steel, T-Tube L-Low T-Temperature	JIS G 3464	STBC
KS D 3572	보일러 열교환기용 합금 강관	STHA	S-Steel, T-Tube H-High, A-Alloy	JIS G 3462	STBA
KS D 3573	배관용 합금강 강관	SPA	S-Steel Pipe A-Alloy	JIS G 3458	STPA
KS D 3574	구조용 합금강 강관	STA	S-Steel, T-Tube A-Alloy	JIS G 3441	STKS
KS D 3575	고압가스 용기용 이음매 없는 강관	STHG	S-Steel, T-Tube H-High, G-Gas	JIS G 3429	STH
KS D 3576	배관용 오오스테나이트 스테인리스 강관	STSxT	S-Steel, T-Tube S-Stainless	JIS G 3459	SUSTP
KS D 3577	보일러 열교환기용 스테인리스 강관	STSxTB	ST-Stainless ST-Steel, T-Tube	JIS G 3463	SUSxTB

KS D 3579	스프링용 탄소강 오일 템퍼선	SWO	S-Spring, W-Wire O-Oil	JIS G 3560	SWO
KS D 3580	밸브 스프링용 탄소강 오일 템퍼선	SWO-V	S-Spring, W-Wire O-Oil, V-Valve	JIS G 3561	SWO-V
KS D 3581	밸브 스프링용 크롬바나듐 오일 템퍼선	SWOCV-V	S-Spring, W-Wire O-Oil, C-Chromium V-Vanadium V-Valve	JIS G 3565	SWOCV-V
KS D 3582	밸브 스프링용 실리콘 크롬강 오일 템퍼선	SWOSC-V	S-Spring, W-Wire O-Oil, Silicon C-Chromium V-Valve	JIS G 3566	SWOSC-V
KS D 3583	배관용 아크 용접 탄소 강관	SPW	S-Steel, P-Pipe W-Welding	JIS G 3457	STPY
KS D 3585	스테인리스강의 위생관	STS-TBS	STS-Stainless TB-Tube, S-Sanitary	JIS G 3447	SNS-TBS
KS D 3602	강제 갑판	SDP	S-Steel, D-Declar P-Plate	JIS G 3352	SDP
KS D 3694	열간 압연 스테인리스 강의 등변 ㄱ형강	STS-HA	STS-Stainless H-Hot, A-Angle	JIS G 4317	SUS-HA
KS D 3696	용접용 스테인리스 강선재	STSY	STS-Stainless Y-용접	JIS G 4316	SUSY
KS D 3697	냉간 압조용 스테인리스 강선	STSW	Cold Rolled Stainless Steel Sheet and Wire	JIS G 4315	SUS
KS D 3698	냉간 압연 스테인리스 강판	STSCP	Cold Rolled Stainless Steel Sheet and Plate	JIS G 4305	SUS
KS D 3699	열간압연 스테인리스 강대	STSH-S	ST-Stainless, S-Steel H-Hot, S-Strip	JIS G 4306	SUSxHS
KS D 3700	냉간압연 스테인리스 강대	STSCS	ST-Stainless, S-Steel C-Cold, S-Strip	JIS G 4307	SUSxCS
KS D 3701	스프링 강	SPS	SP-Spring, S-Steel	JIS G 4801	SUP

KS D 3702	스테인리스 강선재	STSx-WR	ST-Stainless, S-Steel W-Wire, R-Rod	JIS G 4308	SUSxCS
KS D 3703	스테인리스 강선	STSx-WSW H	ST-Stainless, S-Steel W-Wire, S-Shoft H-Hard	JIS G 4309	SUSxCS
KS D 3705	열간 압연 스테인리스 강판	STSx-HP	ST-Stainless, S-Steel H-Hot, P-Plate	JIS G 4306	SUSxCS
KS D 3706	스테인리스 강봉	STSxB	ST-Stainless, S-Steel B-Bar	JIS G 4303	SUSxCS
KS D 3707	크롬 강재	SCr	S-Steel C-Chromium	JIS G 4104	SCr
KS D 3708	니켈 크롬강 강재	SNC	S-Steel, N-Nickel C-Chromium	JIS G 4102	SNC
KS D 3709	니켈 크롬 몰리브덴	SNCM	S-Steel, N-Nickel C-Chromium M-Molybdenum	JIS G 4103	SNCM
KS D 3710	탄소강 단강품	SF	S-Steel, F-Forging	JIS G 3201	SF
KS D 3711	크롬 몰리브덴 강재	SCM	S-Steel, C-Chromium M-Molybdenum	JIS G 4105	SCM
KS D 3712	웨어 망간	FMn	F-Ferro Mn-Manganese	JIS G 2301	FMn
KS D 3713	웨어 실리콘	FSi	F-Ferro, Si-Silicon	JIS G 2302	FSi
KS D 3714	웨어 크롬	FCr	F-Ferro Cr-Chromium	JIS G 2303	FCr
KS D 3715	웨어 텅스텐	FW	F-Ferro, W-Wolfarm (Tungstern)	JIS G 2306	FW
KS D 3716	웨어 몰리브덴	FMO	F-Ferro M-Molybdenum	JIS G 2307	FMO
KS D 3717	실리콘 망간	SiMn	Si-Silicon Cr-Chromium	JIS G 2304	SiMn
KS D 3721	실리콘 크롬	SiCr	S-Steel, N-Nickel B-Bolt	JIS G 2315	SiCr

KS D 3723	특수 볼트용 합금봉강	SNB	S-Steel, N-Nickel B-Bolt	JIS G 4108	SNB
KS D 3724	기계 구조용 망강 강재 및 망간 크롬강 강재	SMn SMnC	S-Steel Mn-Manganese C-Chromium	JIS G 4106	SMn SMnC
KS D 3731	내열강봉	STR	Stainless Steel for Heat Resisting Steel	JIS G 4311	SUH
KS D 3732	내열강관	STR	Stainless Steel for Heat Resisting Steel	JIS G 4312	SUH
KS D 3751	탄소 공구강	STC	S-Steel, T-Tool C-Carbon	JIS G 4401	SK
KS D 3752	기계구조용 탄소강재	SM	S-Steel, M-Machine	JIS G 4051	SxC
KS D 3753	합금 공구 강재	STS	S-Steel, T-Tool S-Special	JIS G 4404	SKS SKD SKT
KS D 3754	경화능 보증 구조용강 강재	SMnC	S-Steel Mn-Manganese C-Chromium	JIS G 4052	SMnC
KS D 3755	고온 합금강 볼트재	SNB	S-Steel, N-Nickel B-Bolt	JIS G 4017	SNB
KS D 3756	알루미늄 크롬 몰리브덴강 강재	SACM	S-Steel A-Aluminium C-Chromium M-Molybdenum	JIS G 4202	SACM
KS D 3757	열교환기용 이음매 없는 니켈 크롬 철 합금관	NCFTB	N-Nickel C-Chromium F-Ferrum, T-Tube B-Boiler	JIS G 4904	NCFTB
KS D 3758	배관용 이음매 없는 니켈 크롬 철 합금 관	NCF-TP	N-Nickel C-Chromium F-Ferrum, T-Tube B-Boiler	JIS G 4903	NCF-TP
KS D 3802	냉간 압연 규소 강대	SExC	S-Steel, E-Electric C-Cold	JIS C 2552	Sx
KS D 4101	탄소 주강품	SC	S-Steel, C-Casting	JIS C 5101	SC
KS D 3801	열간 압연 규소 강관	SExH	S-Steel, E-Electric H-Hot	JIS C 2551	SxF

KS D 4110	고온 압력용기 부품용 합금 단강품	SFHV	S-Steel, F-Forging H-High Temperature V-Vessel	JIS C 3213	SFHV
KS D 4111	저온 고압용 주강품	SCPL	S-Steel, C-Casting P-Pressure L-Low Temperature	JIS C 5152	SCPL
KS D 4112	고온 고압용 원심력주강관	SCPHC-F	S-Steel, C-Casting P-Pressure H-High Temperature CF-Centrifugal	JIS C 5202	SCPHC-F
KS D 4113	압력용기용 조절형 진공처리 탄소강 및 저합금강 단강품	SFVV	S-Steel, C-Casting V-Vessel V-Vacuum	JIS C 3212	SFVV
KS D 4114	크롬 몰리브덴강 단강품	SFCM	S-Steel, F-Forging C-Chromium M-Molybdenum	JIS C 3221	SFCM
KS D 4116	탄소강 단강품용 강편	SFB	S-Steel, F-Forging B-Bloom	JIS C 3251	SFB
KS D 4117	니켈 크롬 몰리브덴강 단강품	SFNCM	S-Steel, F-Forging C-Chromium M-Molybdenum N-Nickel	JIS C 3222	SFNCM
KS D 4301	회 주철품	GC	G-Gray, C-Casting	JIS C 5501	FC
KS D 4302	구상흑연 주철품	DC	D-Ductile, C-Casting	JIS C 5502	FCD
KS D 4303	흑심가단 주철품	BMC	B-Black M-Malleable C-Casting	JIS C 5702	FCMB
KS D 4304	페라이트 가단 주철품	PMC	P-Pearlite M-Malleable C-Casting	JIS C 5704	FCMP
KS D 4305	백심가단 주철품	WMC	W-White M-Malleable C-Casting	JIS C 5703	FCMW
KS D 4315	고온 고압용 주강품	SCPH	S-Steel, C-Casting P-Pressure, H-High	JIS C 5151	SCPH

KS D 5501	이음매 없는 타프피치 동관	TCup	T-Tough Pitch Cu-Copper Pipe	JIS H 3603	TCuT
KS D 5502	타프피치 동봉	TCuBE TCuBD	T-Tough Pitch Cu-Copper B-Bar, E-Extruded D-Drawing	JIS H 3405	TCuBE TCuBD
KS D 5503	깨삭 황동 봉	MBsBE MBsBD	M-Machinable Bs-Brass, B-Bar E-Extruded D-Drawing	JIS H 3422	BsMBD BsBME
KS D 5504	타프피치 동판	TCuS	T-Tough Pitch Cu-Copper, S-Sheet	JIS H 3103	TCuP
KS D 5505	황동 판	BsS	Bs-Brass, S-Sheet	JIS H 3201	BsP
KS D 5506	인청동 판 및 조	PBS PBT	P-Phospor, B-Bronze S-Sheet, T-Tape	JIS H 3731	PBP PBR
KS D 5507	단조용 황동 봉	FBsBE FBsBD	F-Forging, Bs-Brass B-Bar, E-Extruded D-Drawing	JIS H 3423	BsBFE BsBFD
KS D 5508	스프링용 인청동 판 및 조	PBSS PBTS	P-Phosphor B-Bronze, S-Sheet S-Spring, T-Tape	JIS H 3732	PBSP SRPB
KS D 5509	악기 리드용 황동 판	BsMR	Bs-Brass, M-Musical R-Reed	JIS H 3207	BsPV
KS D 5510	이음매 없는 황동 관	BsSTx BsSTxS	B-Brass, S-Seamless T-Tube, S-Special	JIS H 3631	BsT
KS D 5511	인쇄용 동판	CuSP	Cu-Copper, S-Sheet P-Printing	JIS H 3102	CuPP
KS D 5512	연판	Pbs	Pb-Lead, S-Sheet	JIS H 4301	PbP
KS D 5513	황동조	BsT	Bs-Brass, T-Tape	JIS H 3321	BsR

KS D 5514	합연 황동 조	PbBsT	Pb-Lead, Bs-Brass T-Tape	JIS H 3322	PbSsR
KS D 5515	아연판	ZnP	Zn-Zinc, P-Plate	JIS H 4321	-
KS D 5516	인청동 봉	PBR	P-Phosphor B-Bronze, R-Rod	JIS H 3741	PBB,R
KS D 5517	타프피치 동조	CuT	Cu-Copper, T-Tape	JIS H 3304	TCuR
KS D 5518	인청동 선	PBW	P-Phosphor B-Bronze, W-Wire	JIS H 3751	PEW
KS D 5520	고강도 황동 봉	EBsRE HBsRD	H-High, Bs-Brass Rod, E-Extruded D-Drawing	JIS H 3425	HBsBD HBsBE
KS D 5521	특수 알루미늄 청동 봉	ABRF ABRE ABRD	A-Aluminium B-Bronze, R-Rod F-Forging E-Extruded D-Drawing	JIS H 3441	ABBD ABBE ABBF
KS D 5522	이음매 없는 인탈산 동관	DCuP DCuPS	D-Deoxidized Cu-Copper, P-Pipe S-Special	JIS H 3603	DCuT
KS D 5523	인탈산 동판	DCuS	D-Deoxidized Cu-Copper S-Sheet	JIS H 3104	DCuP
KS D 5524	네이벌 황동 봉	NBsBE NBsBD	N-Naval, Bs-Brass B-Bar, E-Extrusion D-Drawing	JIS H 3424	NBsBD NBsBE
KS D 5525	이음매 없는 단동 관	RBsPxS	R-Red, Bs-Brass P-Pipe, S-Special	JIS H 3641	RBsT
KS D 5526	백동 판	NCuS	N-Nickel, Cu-Copper S-Sheet	JIS H 3251	GNP
KS D 5527	이음매 없는 제지 롤 황동 관	BsPp	Bs-Brass, P-Paper	JIS H 3634	BsPPp

KS D 5528	네이벌 황동 관	NBS	N-Naval, Bs-Brass S-Sheet	JIS H 3203	NBS
KS D 5529	황동봉	BsBD BsBE	Bs-Brass, B-Bar D-Drawing E-Extrusion	JIS H 3426	BsBD BsBE
KS D 5530	동 부스바	CuBB	Cu-Copper, B-Bus B-Bar	JIS H 3361	CuBB
KS D 5531	뇌관용 동조	CuTD	Cu-Copper, T-Tape D-Detonator	JIS H 3302	CURD
KS D 5532	베릴륨·동 합금 판 및 조	BeCuS BeCuT	Be-Beryllium Cu-Copper S-Sheet, T-Tape	JIS H 3801	BeCuP BeCuR
KS D 5533	베릴륨·동 합금 봉	BeCuB	Be-Beryllium Cu-Copper, B-Bar	JIS H 3802	BeCuB
KS D 5534	베릴륨·동합금선	BeCuW	Be-Beryllium Cu-Copper, W-Wire	JIS H 3803	BeCuW
KS D 5535	단동선	RBsW	R-Red, Bs-Brass W-Wire	JIS H 3551	RBsW
KS D 5536	특수 알루미늄 청동 관	ABS	A-Al, B-Bronze S-Sheet	JIS H 3208	ABP
KS D 5537	이음매 없는 복수기용 황동 관	BsPF	Bs-Brass, P-Pipe F-(복수기)	JIS H 3632	BsBT
KS D 5538	이음매 없는 복수기용 청동 관	SiBP	Si-Silicon, B-Bronze P-Pipe	JIS H 3651	SIBT
KS D 5539	이음매 없는 니켈동 합금 관	NCuP	N-Nickel, Cu-Copper P-Pipe	JIS H 3661	NCuT
KS D 5540	조명 및 전자기기용 몰리브덴 선	VMW	V-Vacuum M-Molybdenum W-Wire	JIS H 4481	VMW
KS D 5544	조명 및 전자기기용 텅스텐 봉	VWB	V-Vacuum W-Tungsten, B-Bar	JIS H 4462	VWB
KS D 5545	황동 용접 관	BsPW	Bs-Brass, P-Pipe W-Welding	JIS H 3671	BsTW

KS D 5551	함연 황동선	PbBsW	Pb-Lead, Bs-Brass W-Wire	JIS H -	-
KS D 5552	함연 황동판	PbBsS	Pb-Lead, Bs-Brass S-Sheet	JIS H 3202	PbBsP
KS D 5553	타프피치 동선	CuW	Cu-Copper, W-Wire	JIS H 3504	TCuW
KS D 5554	황동선	BsW	Bs-Brass, W-Wire	JIS H 3521	BsW
KS D 5555	양백선	NSW	N-Nickel, S-Silver W-Wire	JIS H 3721	NSW
KS D 5561	무산소 동판	OFCuS	O-Oxygen, F-Free Cu-Copper, S-Sheet	JIS H 3111	OFCuP
KS D 5562	무산소 동조	OFCuT	O-Oxygen, F-Free Cu-Copper, T-Tape	JIS H 3311	OFCuR
KS D 5563	전자관용 무산소 동봉	EoFCuB	E-Electron O-Oxygen, F-Free Cu-Copper, B-Bar	JIS H 3403	EoFCuB
KS D 5564	무산소 형동	B-OFCu C-OFCu	B-Billet, C-Cake O-Oxygen, F-Free Cu-Copper	JIS H 2125	B-OFCu C-OFCu
KS D 5565	인탈산 형동	B-DCu C-DCu	B-Billet, C-Cake D-Deoxidized Cu-Copper	JIS H 2124	B-DCu C-DCu
KS D 5566	이음매 없는 무산소 동판	OFCuP	O-Oxygen, F-Free Cu-Copper, P-Plate	JIS H 3611	OFCuT
KS D 5568	무산소 동봉	OFCuB	O-Oxygen, F-Free Cu-Copper, B-Bar	JIS H 3411	OFCuB
KS D 5569	니플용 황동선	PbBsW	Pb-Lead, Bs-Brass W-Wire	JIS H 3523	PbBsW

KS D 5570	날업롤용 이음매 없는 동관	CuPN	Cu-Copper, P-Pipe N-Textile Printing	JIS H 3602	CuTN
KS D 5581	전자관용 무산소 동선	EOFCu-W	E-Electron O-Oxygen, F-Free Cu-Copper, W-Wire	JIS H 3510	Cxxxx-W
KS D 5582	전자관용 무산소 동관 및 조	EOFCuS-T	E-Electron O-Oxygen, F-Free Cu-Copper, S-Sheet T-Strip	JIS H 3510	CxxxxP-R
KS D 5583	전자관용 니켈 관 및 조	VNiS-T	V-Vacuum Ni-Nickel, S-Sheet T-Tube	JIS H 4501	VNiP
KS D 5584	전자관용 음극용 니켈 관 및 조	VNiS-T	V-Vacuum C-Cathode, Ni-Nickel S-Sheet, T-Tube	JIS H 3502	VNiP
KS D 5585	전자관용 니켈용 및 선	VNiB	V-Vacuum Ni-Nickel, B-Bar	JIS H 4511	VNiW
KS D 5586	전자관용 이음매 없는 니켈 관	VNiT	V-Vacuum C-Cathode Ni-Nickel, T-Tube	JIS H 4522	VNiT
KS D 5604	티탄 봉	TiB	Ti-Titanium, B-Bar	JIS H 4650	TB
KS D 6000	티탄 판 및 조	TiP-R	Ti-Titanium P-Plate, R-Strip	JIS H 4600	TP TR
KS D 6601	황동 주물	BsC	Bs-Brass, C-Casting	JIS H 5101	YBsC
KS D 6002	청동 주물	BrC	Br-Bronze, C-Casting	JIS H 5111	BC
KS D 6003	화이트 메탈	WM	W-White, M-Metal	JIS H 5401	WJ
KS D 6004	베어링용 동연 합금주물	KM	K-Kelment, M-Metal	JIS H 5403	KJ
KS D 6005	아연합금 다이캐스팅	ZnDC	Zn-Zinc, D-Die C-Casting	JIS H 5301	ZDC

KS D 6006	알루미늄 합금 다이캐스팅	AIDC	Al-Aluminum, D-Die C-Casting	JIS H 5302	ADC
KS D 6007	고강도 황동 주물	HBsC	H-High, Bs-Brass C-Casting	JIS H 5102	HBsC
KS D 6008	알루미늄 합금 주물	ACxA	Al-Aluminum C-Casting, A-Alloy	JIS H 5202	AC
KS D 6010	인청동 주물	PBrC	P-Phosphor B-Bronze C-Casting	JIS H 5113	PBC
KS D 6011	연인청동 주물	PbBrC	Pb-Lead Br-Bronze, C-Casting	JIS H 5115	LBC
KS D 6012	베어링용 알루미늄 합금 주물	AM	A-Aluminium, M-Metal	JIS H 5402	AJ
KS D 6013	초경 합금	SGD	S-Special, G-General D-Drawing	JIS H 5501	SGD
KS D 6014	실진 청동 주물	SzBrC	Sz-Siluzin, Br-Bronze C-Casting	JIS H 5112	BzBC
KS D 6016	마그네슘 합금 주물	MgC	Mg-Magnesium C-Casting	JIS H 5203	MC
KS D 6701	알루미늄 및 알루미늄 합금 판 및 조	Axxx S,R,C	A-Aluminium S-Sheet R-Ribbon, C-Clad	JIS H 4000	Axxx P,R,E PC
KS D 6702	연관	PbP	Pb-Lead, P-Pipe	JIS H 4311	PbT
KS D 6703	수도용 연관	PbPW	Pb-Lead, P-Pipe W-Water	JIS H 4312	PbTW
KS D 6705	알루미늄 박	AIF	Al-Aluminum F-Foli	JIS H 4191	AIH
KS D 6706	고순도 알루미늄 박	AIFS	A-Aluminium F-Foli, S-Special	JIS H 4192	AOH
KS D 6707	양백판 및 조	NSPx NSTx	N-Nickel, S-Sheet P-Plate, T-Tape	JIS H 3701	NSP NSR
KS D 6708	양백봉	NSB	N-Nickel, S-Silver B-Bar	JIS H 3711	NSB

KS D 6709	스프링용 양백판 및 조	NSSS NSST	N-Nickel Silver S-Sheet, S-Spring T-Tape	JIS H 3702	NSSP NSSR
KS D 6713	알루미늄 및 알루미늄 합금 용접 관	Axxxx TW	A-Aluminium T-Tube, W-Welded	JIS H 4090	Axxxx- TE TDTES TDS
KS D 6755	알루미늄 선	AIW	Al-Aluminum W-Wire	JIS H 4040	AxBES AxBDS AxW
KS D 6756	알루미늄 리벳재	AIV	Al-Aluminum V-Rivet	JIS H 4120	AxBR
KS D 6757	알루미늄 및 알루미늄 합금 리벳재	Axxxx	Al-Aluminum	JIS H 4120	AxBR
KS D 6759	내식 알루미늄 합금 압출형재	AlxE	Al-Aluminum E-Extruded	JIS H 4100	Axxxx- S,SS
KS D 6760	이음매 없는 알루미늄 관	AlxP	Al-Aluminum P-Pipe	JIS H 4080	Axxxx- TE TDTES TDS
KS D 6761	이음매 없는 알루미늄 및 알루미늄 합금 관	Axxxx-PE,P D	A-Aluminium P-Pipe, E-Extruded D-Drawing	JIS H 4080	Axxxx- TE TDTES TDS
KS D 6762	알루미늄 도체 및 알루미늄 합금도체	AELS	A-Aluminium E-Electric C-Conductor S-Shape	JIS H 4180	Axxxx- PB SBSBC SBS CTB TBS
KS D 6763	알루미늄 및 알루미늄 합금 봉 및 선	Axxxx- BE BDBES BDS	A-Al, B-Bar E-Extrusion D-Drawing S-Special	JIS H 4040	Axxxx- BL BDBES BD
KS D 6770	알루미늄 및 알루미늄 합금 단조품	Axxx- FD, FH	Al-Aluminium F-Forging D-Die, H-Hand	JIS H 4140	Axxxx- FD, FH
KS D 7002	PC강선 및 PC강연선	SWPC	S-Steel, W-Wire P-Prestressed	JIS H 3536	SWPR SWPD
KS D 7009	PC경강선	SWHD SWHR	S-Steel, W-Wire H-Hard D-Deformed R-Round	JIS H 3538	SWCR SWCD

KS D 8302	철강소지상의 니켈 및 크롬도금	SN	S-Steel, N-Nickel	JIS H 8612	FNM FGM
KS D 8303	동 및 동합금 소지상의 니켈 및 크롬 도금	BN	B-Brass or B-Bronze N-Nickel	JIS H 8613	BNM BGM
KS D 8304	전기아연 도금	ZP ZPC	Z-Zinc, P-Plating C-Chromate	JIS H 8610	ZM ZMC
KS D 8305	아연 및 아연합금 소지상의 니켈 및 크롬도금	ZN ZNC	Z-Zinc, N-Nickel C-Chromium	JIS H 8614	-
KS D 8308	용융 아연 도금	ZHD	Z-Zinc, N-Nickel D-Dipped	JIS H 8641	HDZ
KS D 8309	용융 알루미늄 도금	AD	Al-Aluminium D-Dipped	JIS H 8642	HDZ
KS D 8320	알루미늄 용사	AS ASP ASS ASD	Al-Aluminium S-Spray, P-Primer S-Sealing D-Diffusion	JIS H 8301	AS ASP ASS ASD
KS D 8322	아연 용사	ZnS	Zn-Zinc, S-Spray	JIS H 8300	ZS ZSP
KS D 8324	자용 합금 용사	MSFNi	M-Metallizing F-Fuse, S-Spray, Ni-Nickel	JIS H 8303	MSFNi
KS D 8326	강재의 용사	MCS	M-Metallizing C-Carbon, S-Steel	JIS H 8302	MCS
KS D 8330	전기 주석 도금	MFSn MCuSn	M-도금, F-Ferrous Cu-Copper	JIS H 8619	MFSn
KS D 9005	포장용 대강	SSP	S-Steel, S-Strip P-Packing	JIS H 3141	SPCC SPCD SPCE
KS C 2503	전자 연결봉	SUYB	S-Steel, U-Use Y-Yoke, B-Bar	JIS C 2503	SUYB
KS C 2504	전자 연결판	SUYP	S-Steel, U-Use Y-Yoke, P-Plate	JIS C 2504	SUYP
KS C 2505	영구자석용 재료	McSu	M-Magnet C-Casting	JIS C 2502	ME MC MP MF

제 3 장 결 론

“원자력기기장치개발지원”과제를 효율적이고 안정적으로 수행하면서 생산성과 품질향상을 위하여 CNC lathe (model ; Hi-ECO21HS), High performance turning M/C(CUTEX-160)machining center (model ; ECOMIL-43V), CNC milling machine (model ; HISUPER-2N) 및 KANDAN-2 (각 1대씩)등의 CNC 공작기계를 운영하면서 생산된 CNC 프로그램과 도면을 요약 정리하여 기술보고서로 발간하므로써 과제 참여원은 물론 타 과제에서도 관심 있는 연구원들이 이를 참고로 CNC 공작기계의 기본 자료로 활용하며 보다 발전된 연구기기 부품의 설계 자료로 활용할 수 있을 것으로 기대한다.

또한 이와 같은 “CNC 공작기계의 프로그램 설계보고서”가 매년 발간되면 의뢰자(고객)는 물론 CNC 프로그램 설계자가 유사한 제품에 대한 프로그램 설계시 참고자료로 활용할 수 있으며 생산성 및 정밀성이 향상된 프로그램으로 발전시킬 수 있는 설계기술 향상에도 좋은 자료가 될 것이다.

특히, 하나로 운영, ITER mock-up 개발, 이용 및 관련 연구 등에 필요한 기기와 부품 등의 품질보증 문제가 계속 대두되면서 장치개발팀에서도 보다 신뢰성 있는 지원업무를 수행하고자 2006년 9월 ISO-9001 획득하였으며, 이를 토대로 하여 고객만족을 위한 공작지원 체제를 강화 할 예정이다.

참 고 문 헌

- (1) KS 와 JIS 금속재료 비교표, Powerindex.net



서 지 정 보 양 식

수행기관보고서번호	위탁기관 보고서번호	표준보고서번호	INIS주제 코드
KAERI/TR - 3868/2009			
제목/부제	CNC 공작기계의 프로그램 설계 보고서(IV)		
연구책임자 및 과제명 (AR,TR 등의 경우 주저자)	염 기 언(장치개발팀)		
연구자 및 과제명	장치개발팀; 이인배, 염정현,		
출판지	대전	발행기관	한국원자력연구원
페이지	148 P.	도표	있음(※), 없음()
참고사항	발행년	크기	2009 27 Cm
공개여부	공개(※), 비공개()	보고서종류	기술 보고서
비밀여부	대외비(), ____급비밀	연구위탁기관	계약번호
초록(15-20줄 내외)	<p>산업기술의 발전과 더불어 공작기계분야에서도 고속·고능률 가공을 위한 CNC 공작기계는 꾸준히 발전하면서 활용범위는 광범위하게 확대되어 가고 있다. 연구기기 제작 및 보수과제를 보다 효율적이고 안정적으로 수행하기 위해서는 생산설계 및 가공기술의 지속적인 기술개발이 병행되어야 하며 특히, 인력부족에 따른 어려움을 해소하고 생산성 및 품질향상을 위하여 CNC 공작기계의 활용이 매우 중요하다. 이와 관련하여 과제 수행 중에 생산된 CNC 공작기계의 프로그램과 도면을 기술보고서로 발간하므로써 전문성이 요구되는 프로그램 교육자료로 활용하며 다기능, 고정밀화 되어 가는 원자력연구기기 및 부품의 제작업무에 효율적으로 활용할 수 있다.</p>		
주제명 워드(10단어 내외)	CNC공작기계, 원자력기기장치, 제작 및 보수, 프로그램, 가공기술		

BIBLIOGRAPHIC INFORMATION SHEET					
Performing Org. Report No.	Sponsoring Org. Report No.	Standard Report No.		INIS Subject Code	
KAERI/TR-3868/2009					
Title/Subtitle					
Program design report of the CNC machine tool(IV)					
Project Manager and Department (or Main Author)		Ki Un Youm(Laboratory Equipment Development Team)			
Researcher and Department					
Laboratory Equipment Development Team ; I.B. LEE, J.H. YOUM					
Publication Place	Daejeon	Publisher	KAERI	Publication Date	2009
Page	148 P.	Ill. & Tab.	Yes(*), No()	Size	27 Cm
Note					
Open	Open(*), Class()		Report Type	Technical Report	
Classified	Restricted(),_Class Document				
Sponsoring Org.			Contract No.		
Abstract(15-20 Lines)					
<p>The application of CNC machine tool being widely expanded according to variety of machine work method and rapid promotion of machine tool, cutting tool, for high speed efficient machine work.</p> <p>In oder to conduct of the project of manufacture and maintenance of laboratory equipment, production design and machine work technology are continually developed, especially the application of CNC machine tool is very important for the improvement of productivity, quality and clearing up a manpower shortage.</p> <p>We publish technical report which it includes CNC machine tool program and drawing, it contributes to the systematic development of CNC program design and machine work technology.</p>					
Subject Keywords(About 10 words)					
CNC machine tool, nuclear laboratory equipment, manufacture, maintenance, program, machine work technology.					