CAPP CUSTOMIZATION ON THE BASE OF OBJECT-ORIENTED APPROACH

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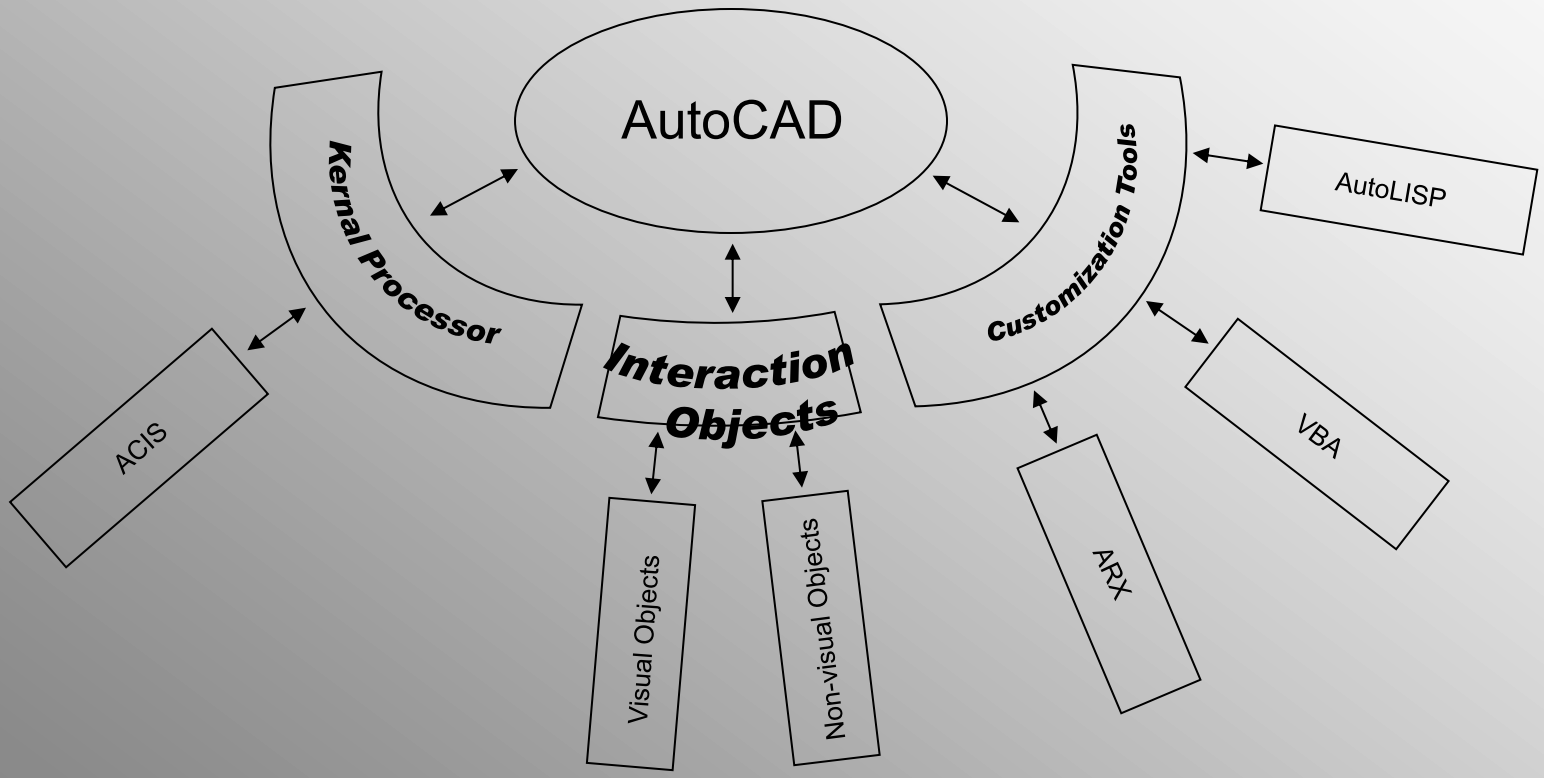
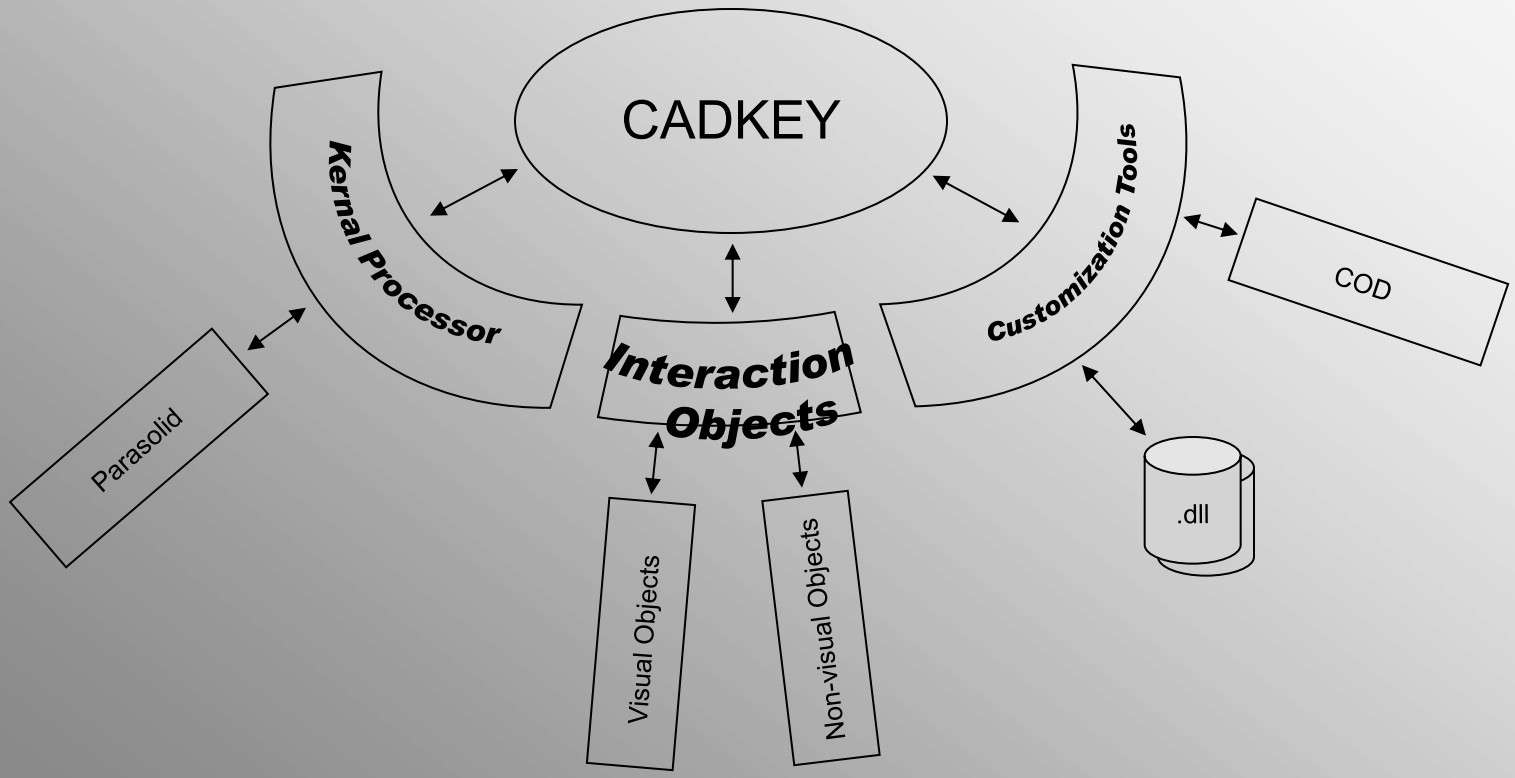
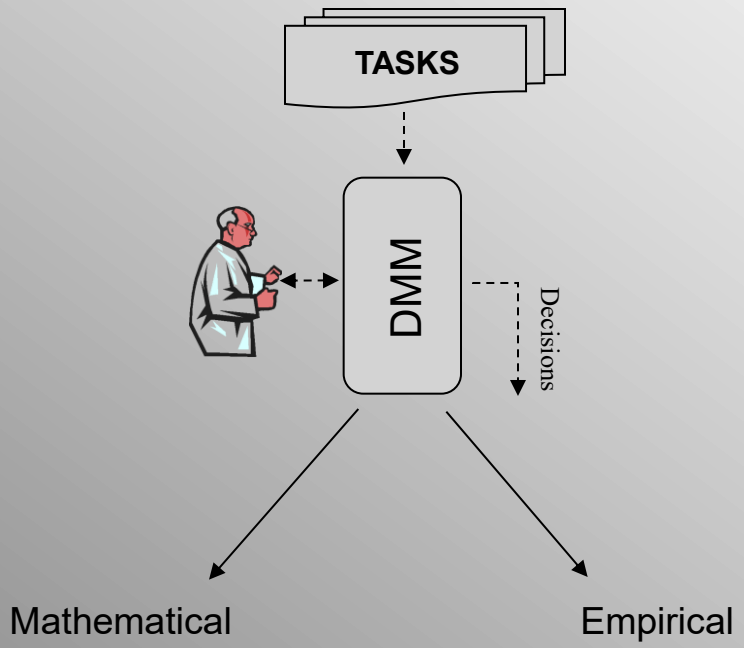
Customization Engine from AutoDESK



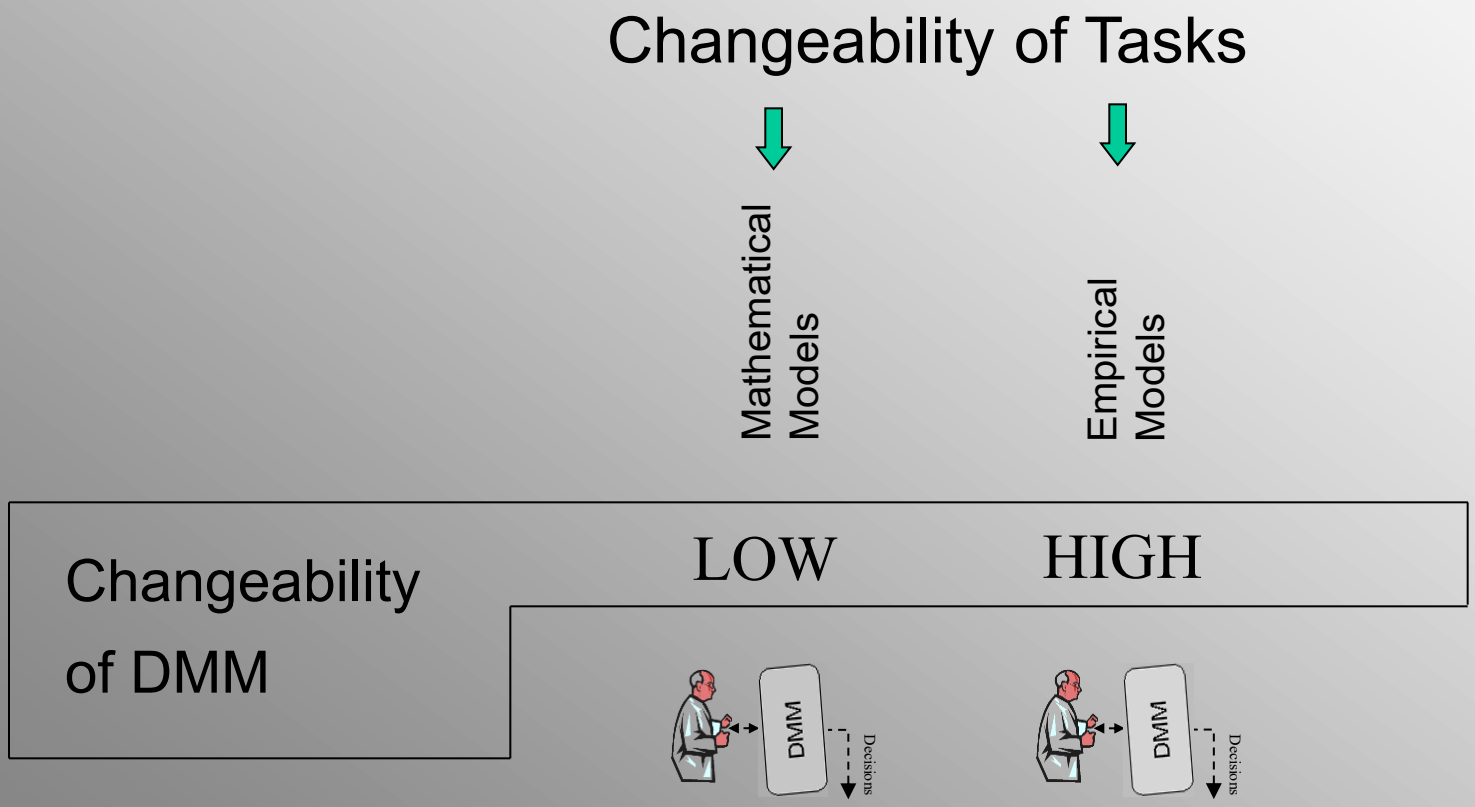
Customization Possibilities of CADKEY



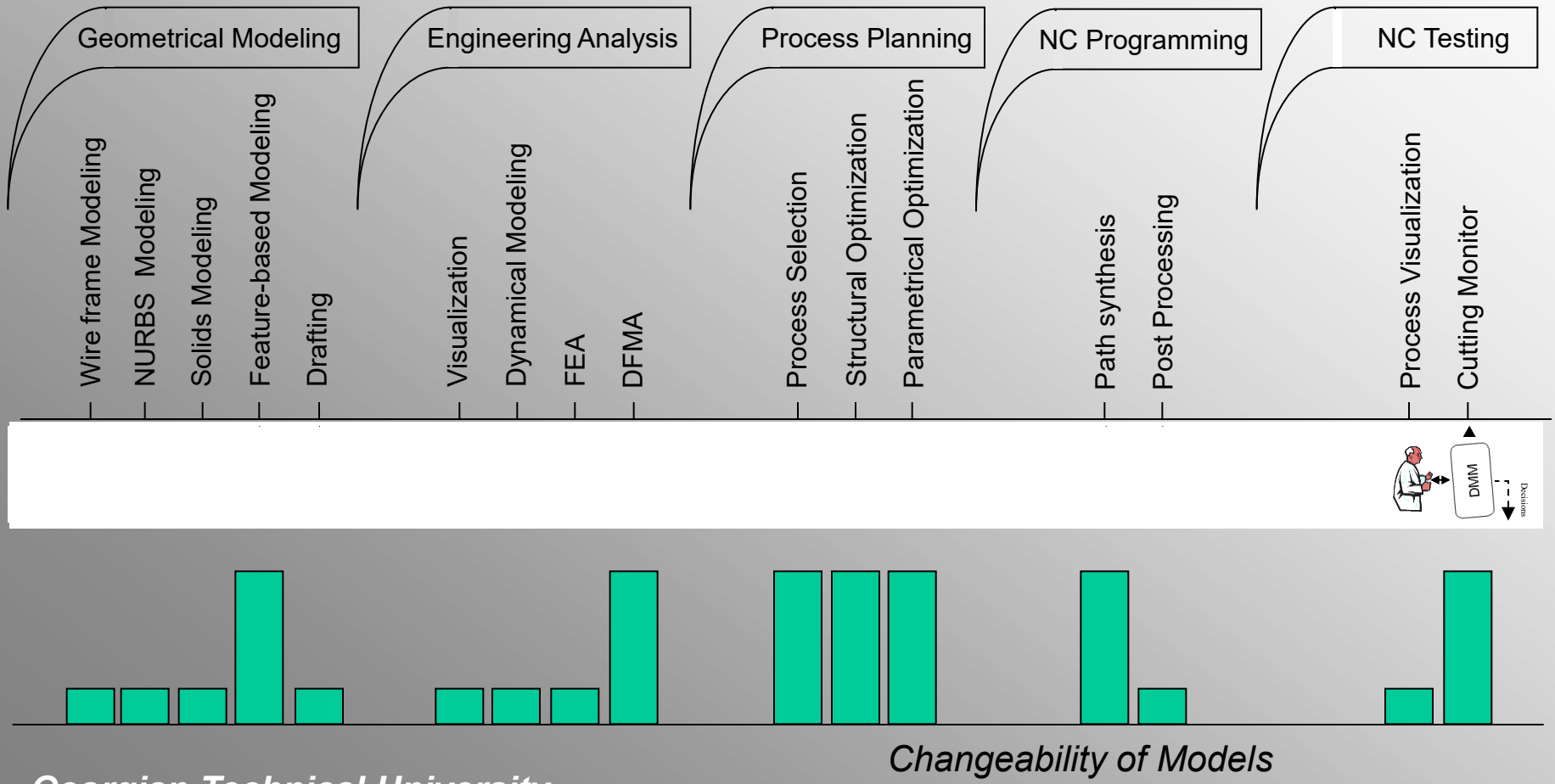
Consideration of Decision Making Models (DMM)



Consideration of Changeability

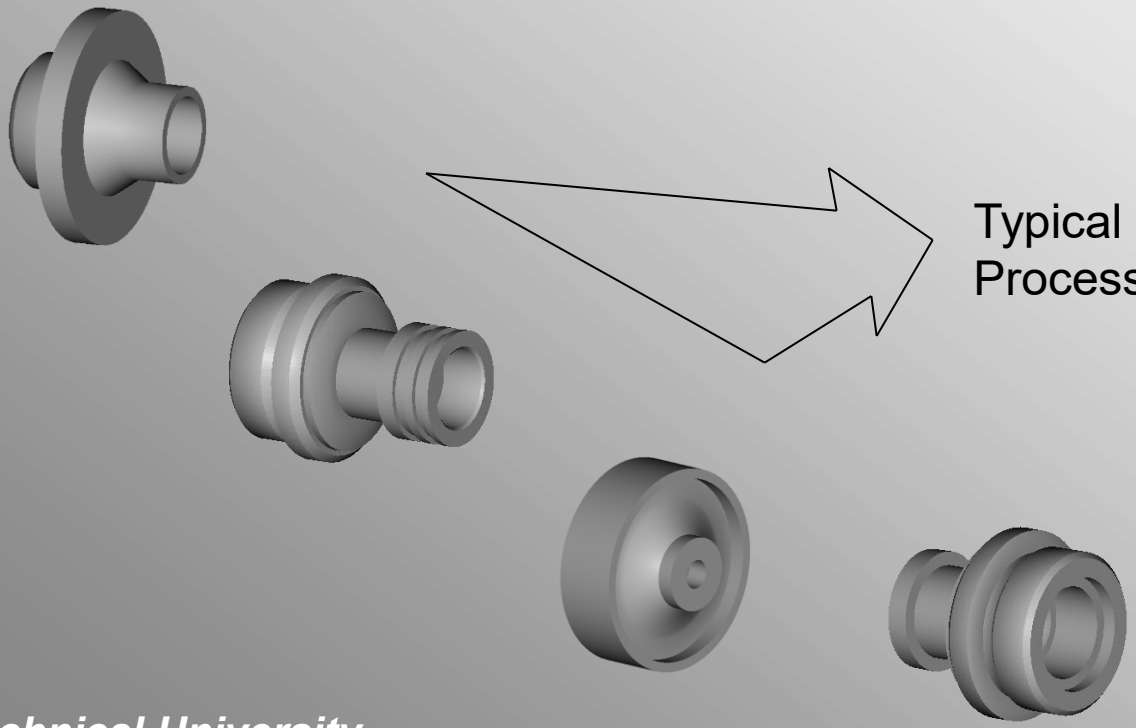


Consideration of Engineering Design Process



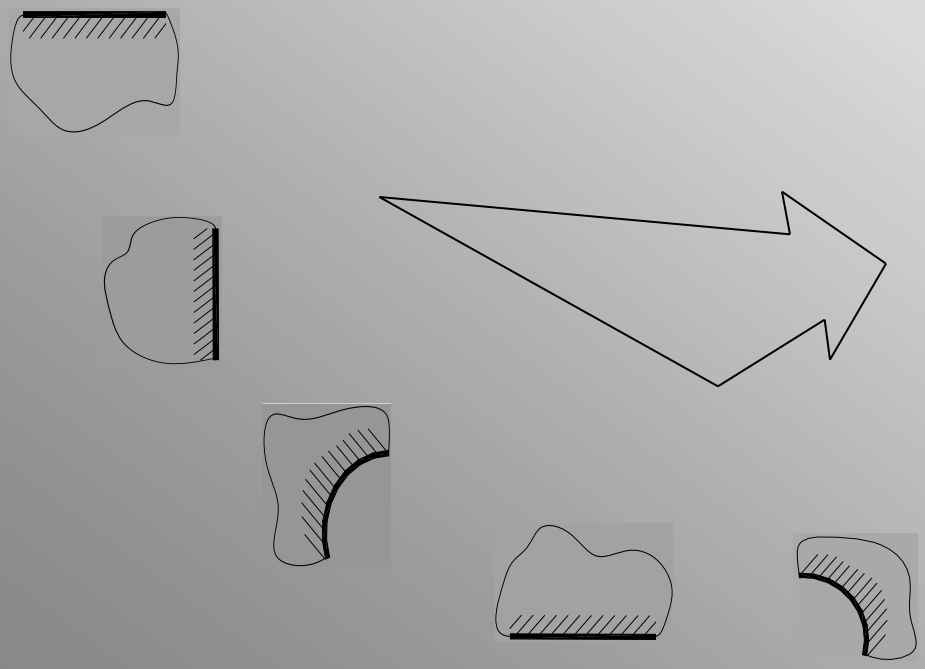
Implementation of Group Technology

I. Introduction of Part Families (Approach is coming from Mitrofanov and Sokolovski from the end of 1950)



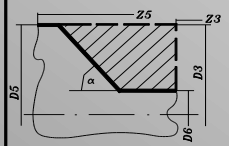
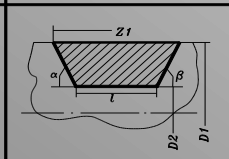
Implementation of Group Technology

II. Introduction of Simple Shapes (Approach is coming from Tsvetkov from the earlier 1970)



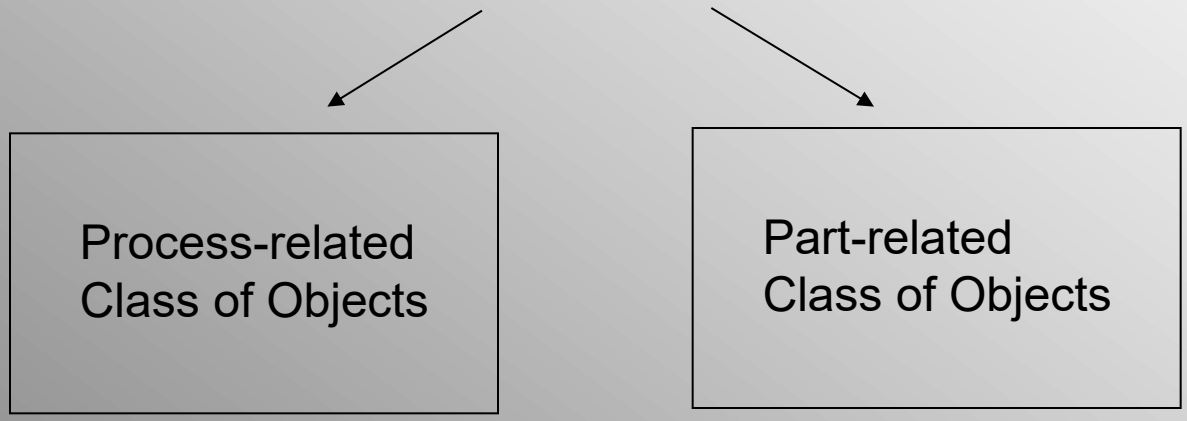
Implementation of Group Technology

III. Introduction of Features (Resent approach)

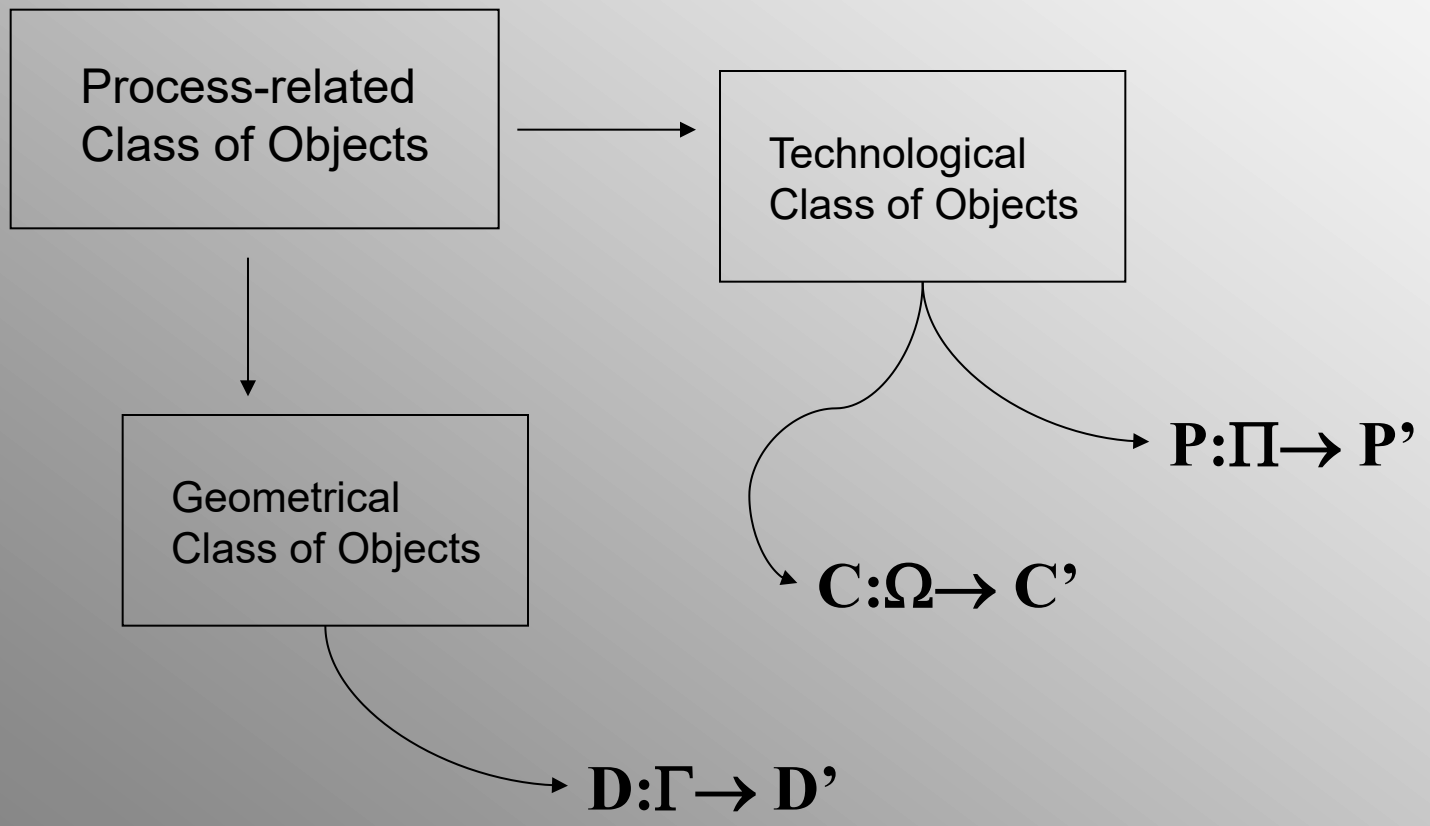
Construction	Tool Pass			NC Macros	CAC	
	Tool	Scheme	M.Condit.		Method	Parmt.
			[PV] [SN] [PT] [ST]	N... R01... R02... R03... R04... R05... R06... R07... R08... R09... R10... R11... L71	Entry: L93 Marpos Real-time: Promec	D3; HB P_z; P_x; N
			[PV] [SN] [PT] [ST]	N... R01... R02... R03... R04... R05... R06... R07... R08... R09... R10... R11... L72	Entry: L93 Marpos Real-time: Promec	D3; HB P_z; P_y; N
			[PV] [ST] [SV]	N... R01... R02... R03... R04... R05... R06... R07... R08... R09... R10... R11... R12... R13... L73	Entry: L93 Marpos Real-time: Promec	D3; HB P_z; P_y
	①  ② 		[PT] [ST]	N... R01... R02... R03... R04... R05... R06... R07... R08... R09... R10... R11... L81	Entry: Real-time: Promec	HB P_y
	①  ②  ③  ④ 		[PN] [MT] [SV]	N... R01... R02... R03... R04... R05... R06... R07... R08... R09... R10... R11... R12... L82	Entry: Real-time: Promec	HB P_z; P_y; M

Customization Methodology

Two Classes of Objects according to Features-based approach of Group Technology were separated:

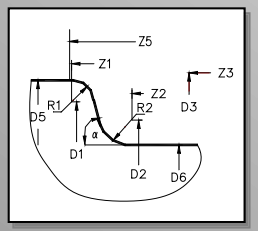


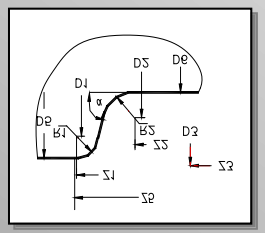
Description of Object Classes

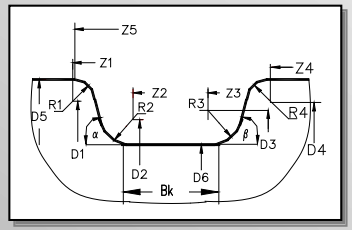


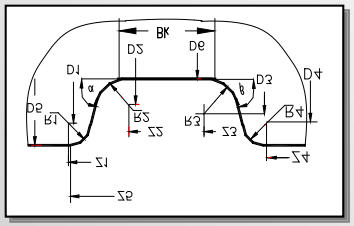
Geometrical Class of Objects

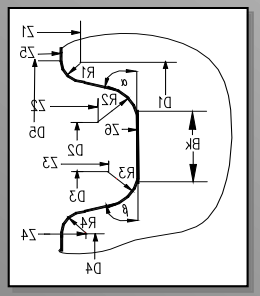
10 Geometrical Sub-Classes of objects were built after consideration of turning parts

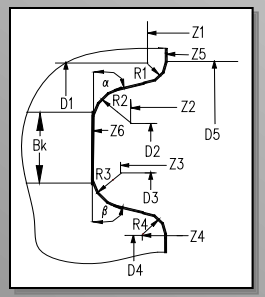


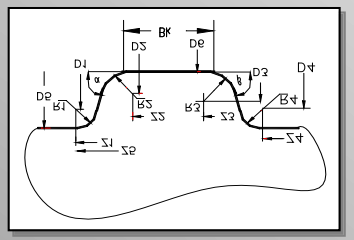


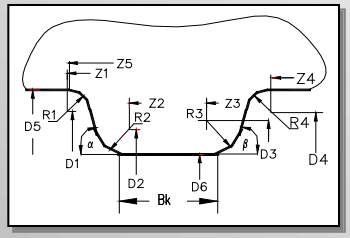


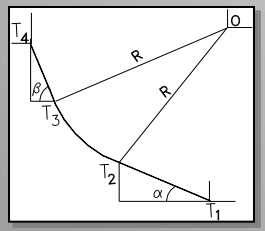


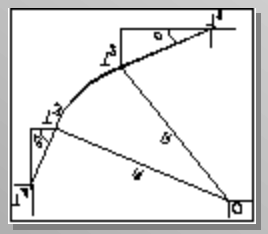










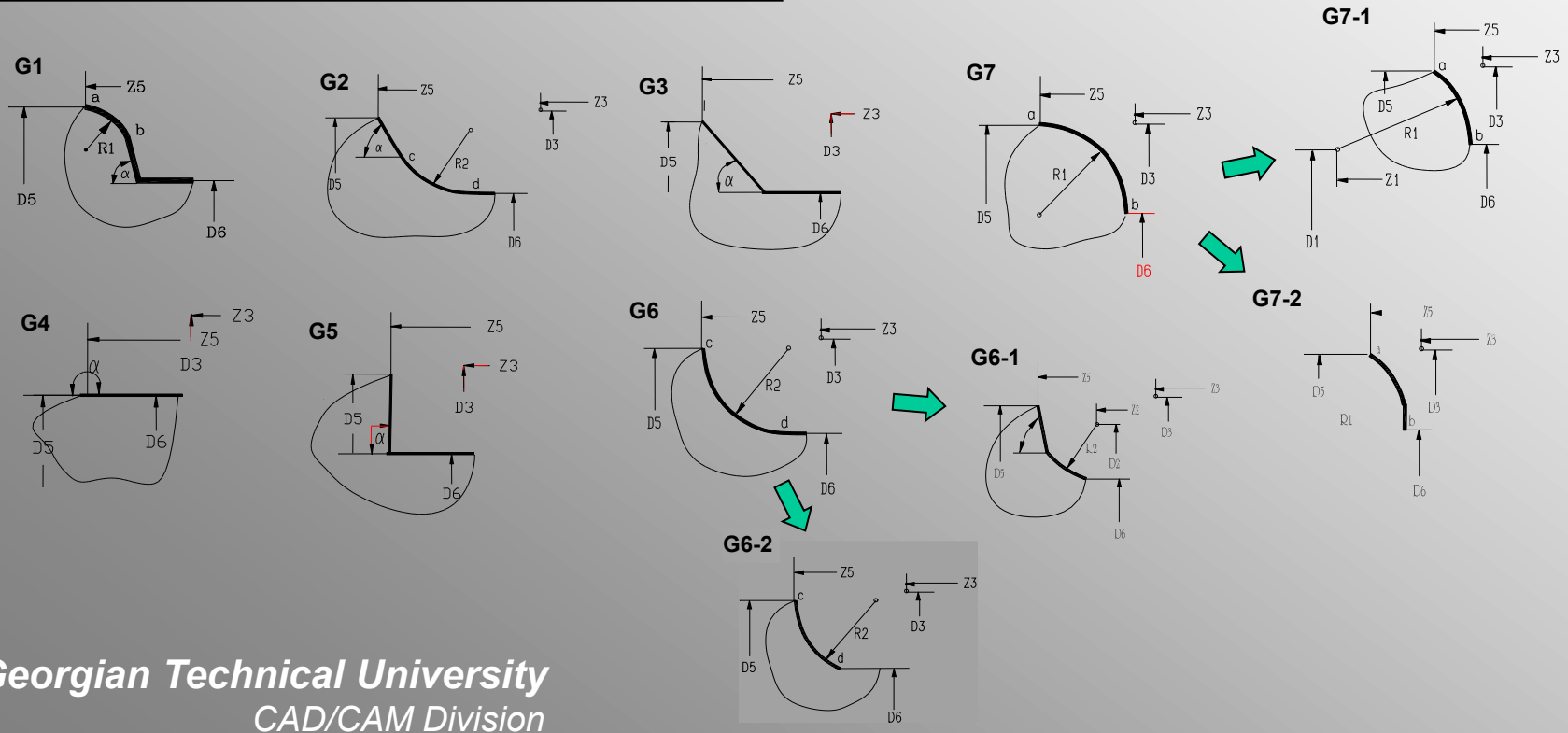


Decomposition of Objects

Decomposition Criteria:

Structure
Topology
Parameterization

Semi-Open Cylindrical Sub-Class



Technological Class of Objects

3 Classes of tool movement objects and 5 optimization objects were built:

M1 – 4 point closed cycle movement

M2 – 3 point closed cycle movement

M3 – equidistant movement

Optimization objects:

[PV] – by restrictions of *P=Const* and *V=Const*

[ST] – by restrictions of *S=Const* and *T=Const*

[SN] – by restrictions of *S=Const* and *N=Const*

[MN] – by restrictions of *M=Const* and *N=Const*

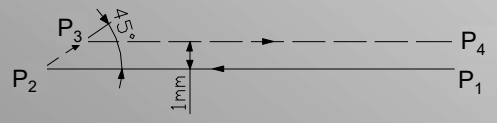
[MT] – by restrictions of *M=Const* and *T=Const*

Decomposition of Objects

Decomposition Criteria:

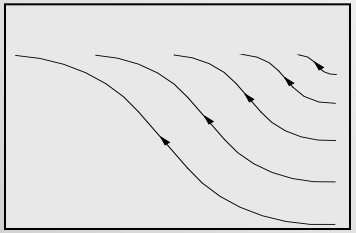
Structure
Topology

M1-1 ‘Feedrate-Fast-Fast’

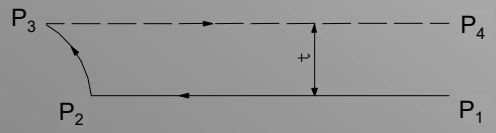


M2 ‘Feedrate-Fast-Fast’

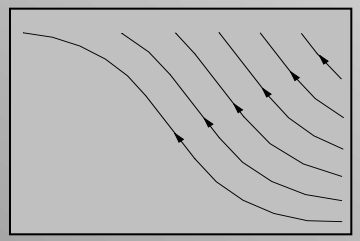
M3-1 ‘equidistant with scaling’



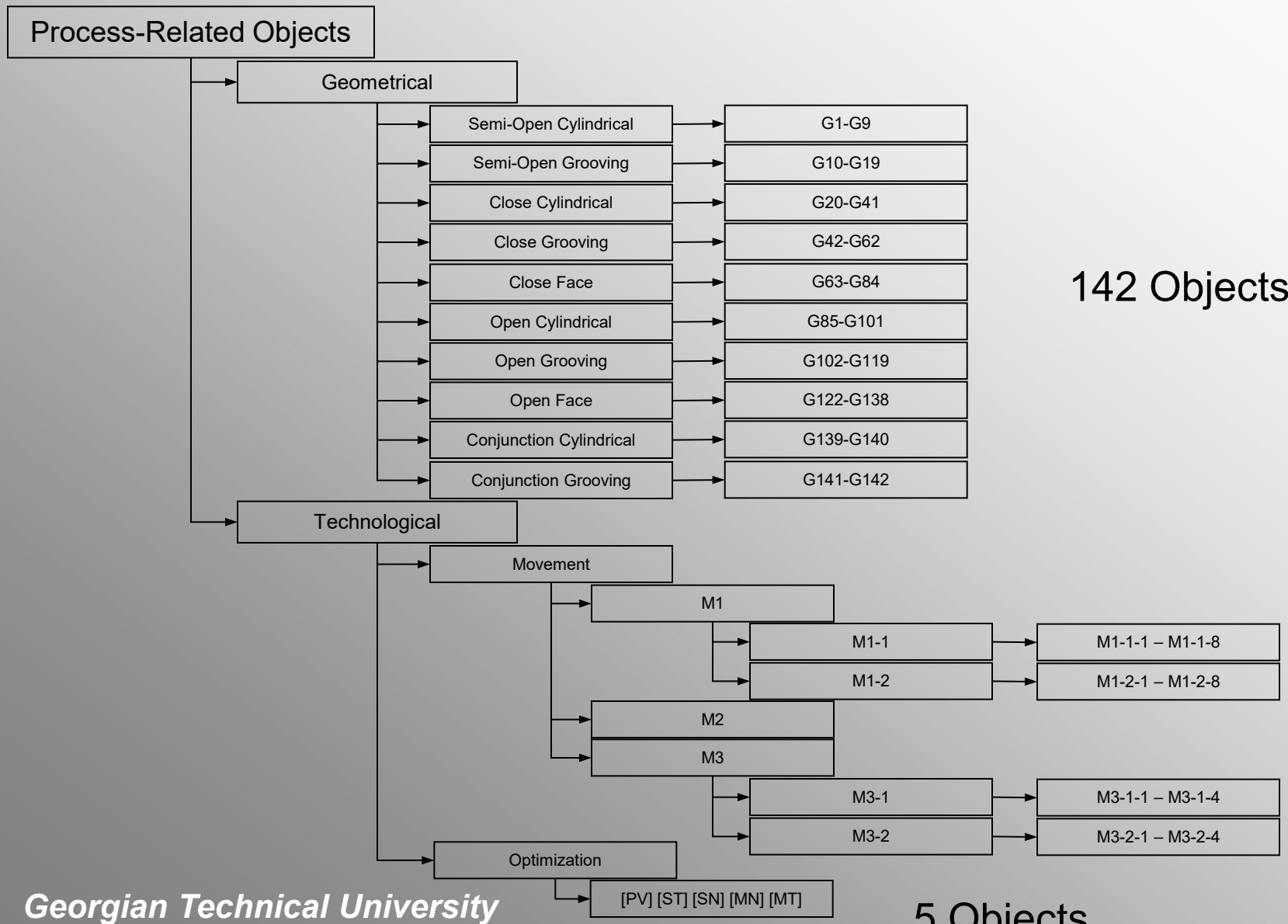
M1-2 ‘Feedrate-Feedrate-Fast’



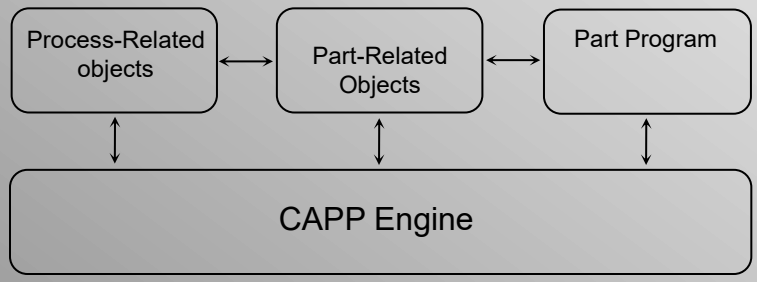
M3-2 ‘equidistant without scaling’



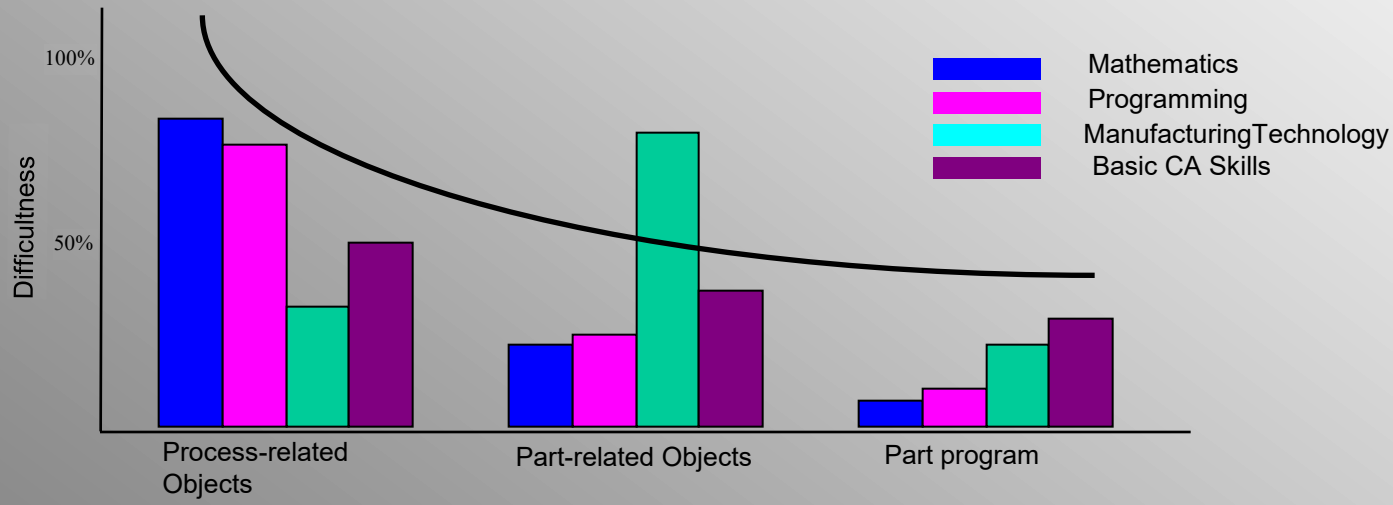
Finale Distribution of Objects



Advantage of Methodology



Description	Skills	Background	Customization
Process-related Objects	High	Mathematics Programming	Manufacturing Process Type
Part-Related Objects	Med	Manufacturing Technology	Family of part
Part Program	Low	Operator	Part



Conclusions

a) Separation of *two* main Classes of Objects brings the advantage of the suggested methodology of customization. While it brings possibility to separate the Process-related Objects, most difficult part of customer software related with geometrical transformations and carries out its development process only once during system general customization.

b) Part-related Objects development process is carried out each time when process formalization for group technology is necessary and it requires users with a strong knowledge of manufacturing technology only, without any strong background in mathematics and programming.

c) Development of object system for turning at Georgian Technical University, showed that the corresponding tasks were well formalized and a language with pure programming ability can be implemented.

d) Suggested approach can be adopted on other types of machining operations without any considerable changes