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AUTOMATIC CODE GENERATION IN GROUP TECHNOLOGY

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ABSTRACT
In this paper, we present a new method of part grouping based on actual demand of the user requirements or needs. A new algorithm is used to classify the parts into different groups using dynamic method. Here we try to match non parametric values and exactly identify the difference from old parts with new orders. Finally codes can be generated based on the manufacturer requirements

INTRODUCTION
Intuitively, if two products are similar, it is possible to reuse information about one product to derive corresponding information about the other one. There are many possible applications where reuse of information can be of significant value. Representative examples include part-family formation, redesign suggestion generation, supplier selection, cost estimation, tooling design, machine selection, stock selection, and design reuse.

LITERATURE REVIEW
An extensive literature survey has unearthed that very few articles published which aim at the methodology for the coding and classification of parts into part families, based on design and manufacturing attributes. The primary reason is the fact that there is no method accepted universally for the coding and classification of parts. It varies from one industry and manufacturer to another. Thus the design and manufacturing attributes that work for a particular company may not be suitable for another industry. Despite these difficulties, some investigators have attempted to address the coding and classification problem. Some of the notable work in this area is given by the following researcher.

- Hsu-Pin Wang and Heng Chang developed an automated classification and coding based on extracted surface features in a CAD database.
- The methodology was aimed at eliminating the human interpretation, which is required during the coding process.
- An algorithm was developed for automatically extracting surface features of the symmetrical rotational parts. AUTOCAD was used as the CAD system and KK3 was used as the target coding and classification system.
- The limitation of this system was the inability to include manufacturing details in the code. The methodology was focused on the similarity in the area of design features.
- Another notable effort in this area was performed by Pavey *et al. , by establishing an automated interface* between CAD and process planning.
- The form features of a part were used for interfacing CAD with CAM, for the machined parts. The manufacturing attributes were not addressed.
- Billo *et al. developed the integration of a group* technology classification and coding system with an engineering database where the part was coded.

PROBLEM DEFINITION
To identify the sensitivity of optimum solution,when a problem parameters changes by a small amount by considering the minimum weight design of a machine component of structure subject to constrain on the induce stress. After solving the problem, we may like to find the effect of changing the material. This means that we would like to know the change in the optimal dimension & the minimum weight of the component or structure due to change in the value of permissible stress. We use finite difference method to solve the sensitivity derivatives of changing parameters.

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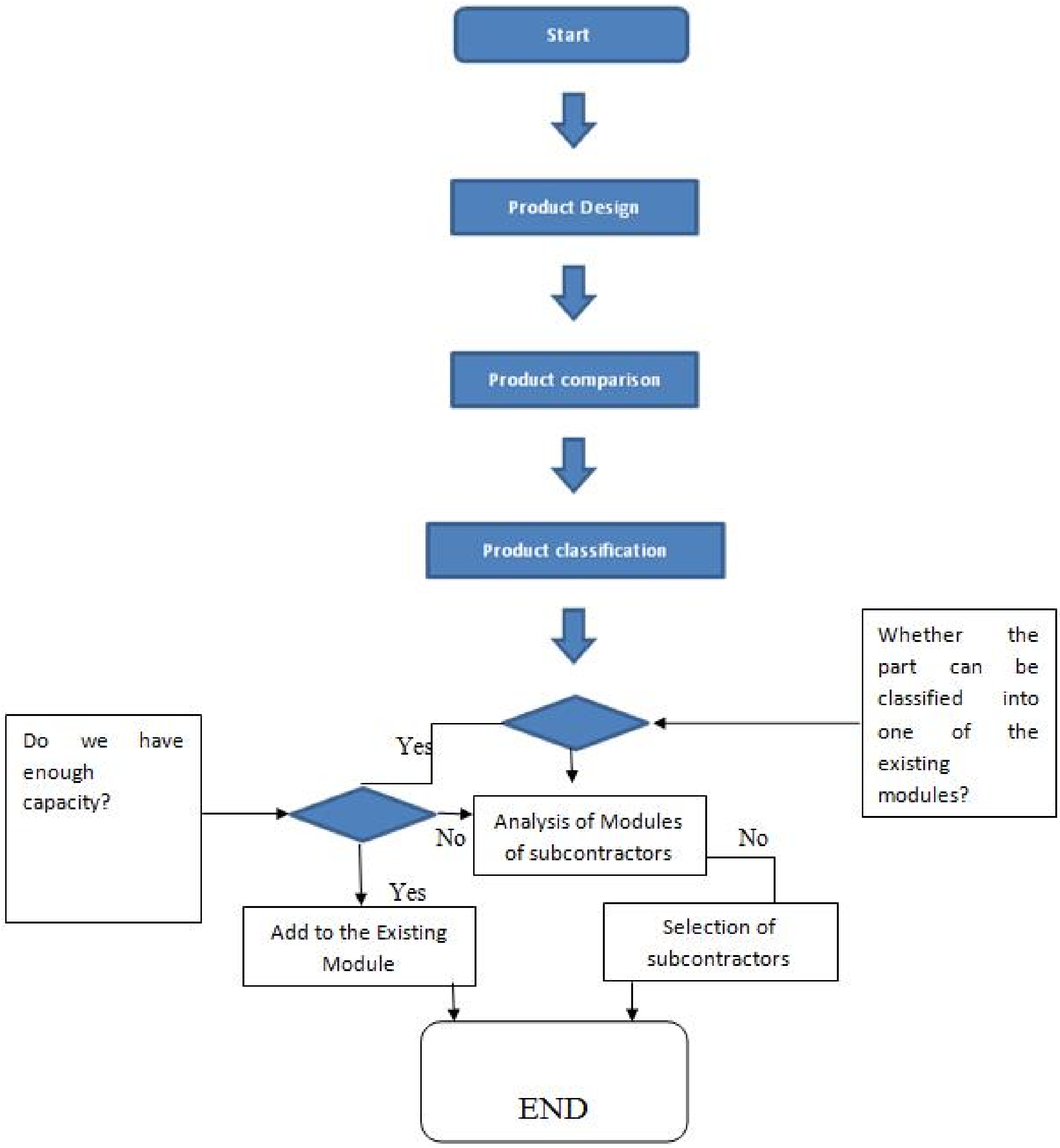
PROPOSED METHOD

A new approach consists of applying methods, which enable the dynamic grouping of the engineering parts in the individual groups according to selected criterions (e.g.cost, precision, equipment, level of automation, etc.) Based on that automated process planning can done as per the machining parameters.



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Large part families can be grouped as follows

obeležje / polje	OSNOVNE GRUPE ČINILACA	NAČIN DOBIJANJA ČINILACA	OSNOVNA PODELA	ODNOS OSNOVNIH DIMENZIJA	OSNOVNA DIMENZIJA	OBLIK OSNOVNE SPOLJAŠNJE POVRŠINE	OBLIK OSNOVNE UNUTRAŠNJE POVRŠINE	POSEBNE SPOLJAŠNJE POVRŠINE	POSEBNE UNUTRAŠNJE POVRŠINE	VRSTA MATERIJALA	OBLIK POLUFABRIKATA	VRSTA TERMIČKE OBRADE	KVALITET POVRŠINA	POVRŠINSKA ZAŠTITA
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
0			OBRTNI, SIMETRIČNI, BEZ OZUBLJENJA	L/D<0,1	D<6	Glatke	Bez	Bez	Bez	Čelici sa negarantovanim sastavom	Šipke okrugle	Bez termičke obrade	N12 50 mm	Bez zaštite
1	PREDMETI RADA			0,1<L/D<0,5	6<D<10	Stepenaste sa jedne strane	Središna gnezda	Glodane površine	Aksijalne rupe ili otvori bez podele	Čelici ugljenični	Šipke profilne	Kaljenje i opuštanje	N11 25 mm	Bojenje osnovnom bojom
2				0,5<L/D<1	10<D<16	Stepenaste sa obe strane	Glatke ili stepenaste sa jedne strane	Utiskivane površine	Aksijalne rupe ili otvori sa podelom	Čelici legirani	Cevi	Cementacija	N10 12,5 mm	Lakiranje
3				1<L/D<2	16<D<25	1 + konus	Stepenaste sa obe strane	Nareckane površine	Radijalne rupe ili otvori	Čelici za automate	Profili I,T,L,U	Indukciono kaljenje	N9 6,3 mm	Niklovanje
4		DELOVI IZRAĐENI REZANJEM		2<L/D<5	25<D<50	2 + konus	1 + konus	Navoj valjan	Kombinacije 1, 2 i 3	Laki metali	Limovi, trake, ploče	Žarenje	N8 3,15 mm	Hromiranje
5				5<L/D<10	50>D>100	1,2,3,4 + profilne površine	2 + konus	Ozubljenja valjano	Kose rupe ili otvori	Obojeni metali	Odlivci	Normalizacija	N7 1,6 mm	Cinkovanje
6				L/D>10	100<D<150	0,1,3 + navoj	1,2,3,4 ili 5 + navoj	1 + 2	Rupe ili otvori sa navojem	Plastični materijali	Otkovci i otpresci	Nitriranje	N6 0,8 mm	Bruniranje
7					D>150	2,4,5 + navoj	1-6 + uzdužni žlebovi	3 + 4	Poligonalni otvori	Bakelit	Zavareni pripremci	Alitriranje	N5 0,4 mm	Eloksiranje
8						0-6 + puž, brušen	Rupe ili otvori sa odnosom l/d > 5	3 + 5		Tekstolit	Sklopovi		N4 0,2 mm	Zaulijvanje
9						0-6 + puž, valjan				Ostali materijali	Ostalo		N3 0,1 mm	5 + 2

DESIGN CONSIDERATION

The design of gear for a particular application is tedious problem because of so many factors such as difference in size,type,power,pinion speed,velocity,stress & material.The main parameters to be decide for a gear are gear ratio,pinion speed & power based on that Centre distance, module, face width, gear diameter can be calculated automatically. The number of teeth etc may vary according to the customer demand. These are derived using various formulae's and also using tables.

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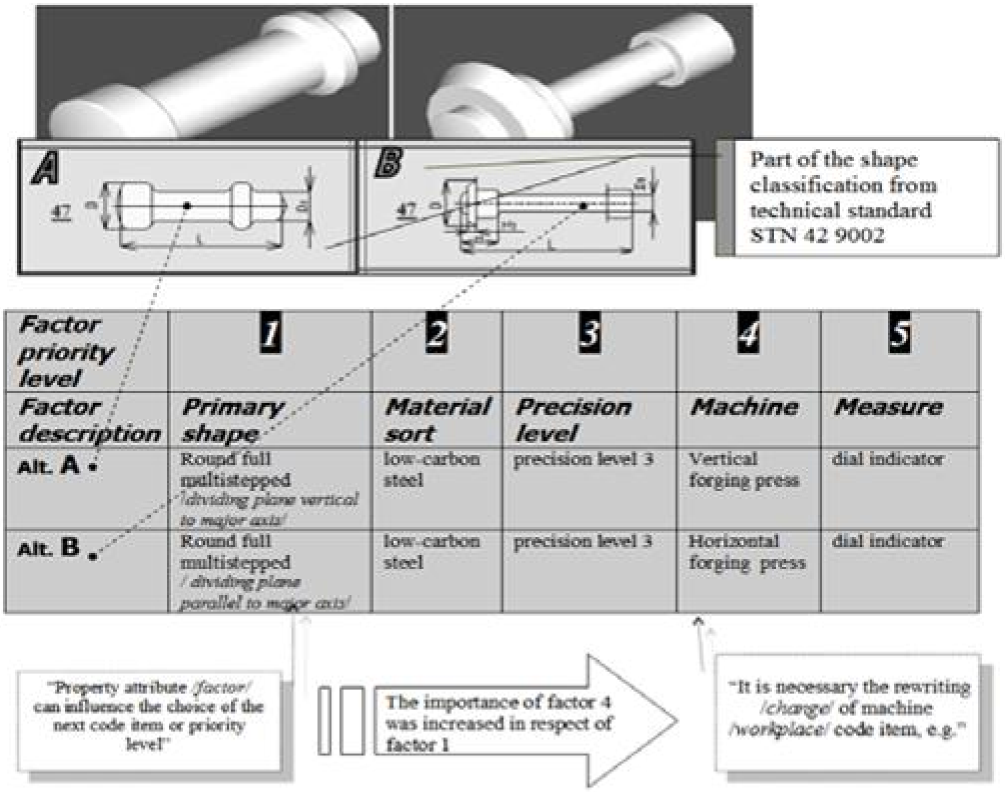
GT code compare old and new part



After deriving the new product structures, product manager starts with searches of some similar product Structures in data base. When similar product is found, comparison is started. Product manager compares two structures to identify changes or differences between the two product structures in order to make further work easier. Now product manager can:

1. Identify component changes between assemblies.
2. Test for consistency between multiple views of the same item.
3. Find differences between differently configured structures.

The given example shows two product structures of mechanical roller. Product manager uses all mentioned mode levels to compare two product structures and find the differences. In the left window we can see product structure parts (components) of the old product, and in the right window the product structure of new model of roller can be seen.

CONCLUSION

A classification system, that more precisely reflects flexible demand, is needed. Dynamic classification has been used to categorize product properties according actual demand. During past years, the classification systems in CAPP systems have utilized static classification. The static classification system does not reflect important changes in the factory.

The disadvantages of the current CAPP systems based on GT lie in their static classification systems, which are not suitable for flexible change of GT representatives. There is no support to apply it in these systems. A new approach consists of applying methods, which enable the dynamic grouping of the engineering parts in the individual groups according to selected criterions (e.g.cost, precision, equipment, level of automation, etc.).
The dynamic classification system includes a flexible classification system that generates a detailed and comprehensive knowledge catalogues based on the actual criterions used in the input.The building of a dynamic classification system utilized in GT CAPP is a time demanding and a very labour intensive task. The task requires theoretical elaboration, the working out of a serious methodology of process planning and the use of an advanced programming technique. It seems that the dynamic classification method is very effective and flexible method for part grouping in casting and forging process planning.

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