Title	Author	Year	Input	Purpose	Medial	Domain	Approach	Advantages	Limitations
A Transformation For Extracting New Descriptors Of Shape. In Models For The Perception Of Speech And Visual Form	Harry Blum	1967	Curves	DimRedn	MAT		Fire propagation; rolling ball algorithm.	Foundation paper of MAT. MAT is definitive and invertible	Branches in MAT
A Novel Type of Skeleton for Polygons	Oswin Aichholzer ; Franz Aurenhammer ; David Alberts ; Bernd Gartner	1991	Curves	DimRedn	Skel		Origin of Straight Skeleton; based on thinning. Composed of pieces of angular bisectors which partition the interior	Branches	Works only on polygons
Using Features To Support Finite Element Idealization	Padmanabh Dabke ; Vallury Prabhakar ; Sheri Sheppard	1994	Features	DimRedn DeFeat FeatRec		Gen	Global Idealization (DESIDE-X) for defeaturing. Element Idealization (ADVANTAGE) looks at Analysis features (Geom + Loads + Constraints).	Initial use of features for CAD-CAE migration	Very basic shape/feature recognition
Feature Analysis using Line Sweep thinning algorithm	Fu Chang; Ya Ching Lu; Theo Pavlidis	1995	Curves	DimRedn	Skel		Uses Sweepline algo to determine edge pairs; calculates midlines empirically; considers many intersection types like T; X etc.		
Dimensional Reduction Of Analysis Models	Donaghy R. J. ; Mrcune W. ; Bridgett S. J. ; Armstrong C. G.	1996	Brep	Thinness DimRedn	MAT	Gen	Error Estimation		
Midsurface Abstraction From 3D Solid Models: General Theory And Applications	Mohesen Rezayat	1996	Brep	DimRedn BiDir	MA	Gen	Face pairing by ray casting Midsurface patch creation Extend and trim	Foundation paper of MA No branches of MAT	Face pairing is complicated
Mid-Surface Of Profile-Based Freeform For Mold Design	A Fischer; A Smolin; G Elber	1999	Features	DimRedn	Param	InjM	Midcurve is generated for forming sample points at mid of the parent curves.	By converting 3D problem to 2D complexity is reduced	Not generic at all. No details of midsegment calculations.
Morphological Analysis For Product Design	M. Belaziz; A. Bouras; J.M. Brun	2000	Brep	DeFeat FeatReco	PreDef	Gen	Works on final shape and decomposes body to form sub-shapes/features. Interactive feature editor to simplify model and also to decide Idealization for each feature.	Feature-based tool. The mixed-dimensional model is obtained by idealizing each feature.	Does not state explicitly about midsurfaces.
Skeletonization of Ribbon-Like Shapes Based on Regularity and Singularity Analyses	Ju Jia Zou ; Hong Yan	2001	Curves	DimRedn	MAT	Gen	Decomposes 2D image/shape into triangles (Constrained Delauney Triangles); classifies triangles then shows how to connect at junctions like T X Star V Y K etc	Skeletons is without branches. More generic and not predefined junction rules	Does not detail out skeleton generation. Works only on skeleton lines
Feature-based CAD-CAE integration model for injection moulded product design	Y M Deng ; G A Britton ; Y C Lam ; S B Tor ; Y S Ma	2002	Brep	DeFeat FeatReco		Gen	Manually selects to assign features Talks more about how CAD info can be used in CAE. Proposes common feature semantics	Good Injection moulding features classification	No info on Midsurface
Generating The Mid-Surface Of A Solid Using 2D Mat Of Its Faces	Ramanathan Gurumoorthy	2004	Curves	DimRedn	MAT	Gen	Modified MAT method (called 'midcurves') tries to remove erroneous branches	Branches free MAT	

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A Cad-Integrated System For Automated Idealization Of Cad-Models For Finite Element Analysis	Rol; Stolt	2005	Features	DeFeat DimRedn	PreDef	Gen	Features for idealization. Sub-parts can have ready Midsurface directly from company's database. Mentions ignoring fillets as Global idealization;	Even though compute power has increased with idealization more iterations at early stage.	2.5D Midsurface creation. Limitation: thk is not assigned
A Knowledge Based Manufacturing Advisor For Cad	Helen L Lockett; Phd Thesis	2005	Brep	FeatReco		InjM	A mid-surface quality factor (MQF) has been defined as the percentage of points on the solid-model that are within a specified threshold distance to any point on the midsurface	Two metrics that have been developed to evaluate the feature recognition results: firstly a measure of the mid-	I-DEAS mid-surface gives best results for parts that have a thin and relatively uniform wall thickness.
Automatic Preparation Of Cad-Generated Solid Geometry For Fe Meshing	Rol; Stolt; S Sunnersjo	2005	Features	DeFeat DimRedn	PreDef	Gen	Updatable Parameterized model is used to idealize CAD model. Proposes Idealize as model is created. Advantages (1. idealization could be accessed at all the time at any stages for FEA; 2.	Talks about 2 sketch based features; PAD and POCKET; which sketches containing only lines and arcs. Details	Limitations on types of features; sketch geometries. Sketches need to be in
Design And Analysis Integration Model Based On Idealization Of Cad Geometry	M. Hamdi; N. Aifaoui; A. Benamara	2005	Features	DeFeat DimRedn	PreDef	Gen	Needs features to remove small details based on predefined rule (say; not at BCs). Talks about very basic primitive idealization of parallelepipeds; cylinder and wedge. Nothing about interactions.		
A Sectioning Method For Constructing The Mid-Surface Of Thin Walled Die-Cast And Injection Moulded Parts	Rol; Stolt	2006	Curves	DimRedn		InjM Cast	Part is sectioned in Draft direction. Midsegments are calculated of each profile and then such midsegements are joined together.		
Reusing Cad Models For Die-Casting Products For Fea	Rol; Stolt	2006	Features	DeFeat DimRedn	PreDef	Cast	Author has shown how to use construction history tree of the solid CAD model to automatically identify these standardized features and to insert surfaces of the correct shape; size	States gap: "all surfaces need to be trimmed against each other to form a complete connected	Compares midsurface implementations by Hypermesh and Ansys. If surfaces are non-parallel
Automated Complex Mixed-Dimensional Model Creation	T T Robinson ; Cecil Armstrong	2007	Brep	Thinness DimRedn	MAT	Gen			
Dimension Reduction Of Solid Models By Mid-Surface Generation	Dong-Pyoung Sheen; Tae-Geun Son; Cheolhi Ryu; Sang Hun Lee; Kunwoo Lee	2007	Features	DimRedn	MA	Gen	Uses feature information of simplification and MA approach for dimension reduction. Wary about 'parent-child' relations, Co-planar; T and L type joining.	features from Tree and their usage in model simplification. Primitive extend-and-trim.	Cannot understand how its better than Rezayat's/I-Deas Midsurface.
Graph-Based Midsurface Extraction For Finite Element Analysis	Hanmin Lee Et Al	2007	Brep	DimRedn	MA	Gen	Almost like Rezayat's approach. Nothing feature based.		
Idealization Of Cad Geometry Using Design And Analysis Integration Features Models	M. Hamdi ; N. Aifaoui ; A. Benamara	2007	Features	DeFeat DimRedn	PreDef	Gen	FBD or FR Elimination of details Reduction of Dimensions Validation of Topology	Feature based; pre-cooked midsurfaces for parallelepiped; cylinder and Wedge	No feature interactions
Cad-Model Parsing For Automated Design And Design Evaluation	Rol; Stolt	2008	Brep	DeFeat DimRedn	PreDef	Cast	FR as well as feature based midsurface and then design evaluation. Utilized pre-cooked (KBE based; like feature based) midsurfaces also.	Feature based. Die casting feature taxonomy.	Specific to Powder Metallurgy features and that too not the secondary features

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Recent Advances In Cad/Cae Technologies For Thin-Walled Structures Design And Analysis	Cecil Armstrong ; T T Robinson ; Hengan Ou	2008	Brep	Thinness DimRedn	MAT	Gen	Mixed Dimension is best for results. Using MAT for pair detection. No use of features.		
Similarity Measures For Mid-Surface Quality Evaluation	Helen L Lockett; Marin Guenov	2008	Brep	FeatReco	MA	Gen	Uses Midsurface for feature recognition		
Solid Deflation Approach To Transform Solid Into Mid-Surface	Dong-Pyoung Sheen Et Al	2008	Features	DeFeat DimRedn	Thin	Gen	solid converted into a zero-thickness model by deflating the air. A mid-surface is extracted from it. Model is simplified by the removal of any detailed features.	Has feature based model simplification as well as dimension reduction	finding Face pairs which is difficult. academic parts only. No stitching
A Survey Of Cad Model Simplification Techniques For Physics-Based Simulation Applications	Thakur; Atul ; Banerjee; Ashis Gopal ; Gupta; Saty;Ra K.	2009	Curves Mesh Brep Features Voxel	DeFeat DimRedn	MAT MA	Gen	List various approaches for Model Simplification (Surface based; Volumetric; feature based etc)	Good classification of approaches	
Feature-Based Non-Manifold Modelling System To Integrate Design And Analysis Of Injection Moulding Products	Sang Hun Lee	2009	Features	DeFeat	MAT PreDef	Gen	Master model caches all LODs and LOAs. Uses Non-manifold modeller. Feature based details removal. cellular topology. Each primitive features includes abstractions.		
Integration Of Design And Analysis Models	Matt Sypkens Smit; W F Bronsvoort	2009	Features	ReMesh BiDir		Gen	Hints at per-feature abstraction. Based on multiple views/representations. Analysis view needs to be parametric feature based.	Feature based CAD CAE Integration mainly for meshing optimization	No details about Midsurface creation
Representation And Automated Generation Of Analysis Feature Model For Finite Element Analysis	Weijuan Cao ; Haipang Wu ; Yuqin Jiang ; Yusheng Liu ; Shuming Gao	2009	Mesh Brep	Thinness DimRedn FeatReco	MA	Gen	from analysis feature idealized geometry is extracted. Finds Face pairs - thin portions; mapping between the face pair and the mid-surface is established		No details about Midsurface creation
Dimensional Reduction And Design Optimization Of Gas Turbine Engine Casings For Tip Clearance Studies	Felix Stanley	2010	Curves	DimRedn	MAT	Cast	Uses MAT curves for 2D profile (got from Suresh Krishnan's code; but it also has branches) and then revolves it. Mostly deals with Axisymmetric shapes.		MAT has branches and removing them is not trivial
Determining the Skeleton of a Simple Polygon in (Almost) Linear Time	Robert Edwards	2010	Curves	DimRedn	Skel		For convex polygons the method begins by creating a double-linked list of rays that are bisectors of each angle. For each ray; distances are determined from a ray's origin (a corner of	Almost linear time execution	Gaps at the ends
Transformation Of A Thin-Walled Solid Model Into A Surface Model Via Solid Deflation	Dong-Pyoung Sheen; Tae-Geun Son; Dae-Kwang Myung; Cheolhi Ryu; Sang Hun Lee; Kunwoo Lee; Tae	2010	Features	DimRedn	MA	Gen	Wants to avoid trimming-extension needed in MAT approach as well as patch-joining needed in MA approach. Face pair detection and medial surface is put in		
Medial Axis Extraction and Thickness Measurement of Formed Sheet Metal Parts	Nataša Petrovi?	2010	Mesh	Thinness	MAT	SheetM	Thickness measurement of scanned sheet metal point cloud.		

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A Medial Axis Based Thinning Strategy for Character Images	Soumen Bag; Gaurav Harit	2011	Voxel	DimRedn	MAT		e proposed a medial axis based thinning strategy used for performing skeletonization of printed and handwritten character images. In this method; we have used shape characteristics of		Tries to detect close midsegments by distance and not by topology
An Approach To Automated Conversion From Design Feature Model To Analysis Feature Model	Weijuan Cao ; Xiaoshen Chen ; Shuming Gao	2011	Features	Thinness DimRedn FeatReco	PreDef	Gen	Automatic conversion of design features into analysis (solid/shell) features. Remnant (what's left in final model) of additive features are decomposed into Swept and Non-swept parts.	Feature based (although not truly). Uses sketch info to create midsurface	Hard to find remnant portions; extract sweep sketch etc.
Efficient Remeshing And Analysis Views For Integration Of Design And Analysis	Matthijs Sypkens Smit	2011	Features	Thinness DimRedn ReMesh	PreDef	Gen	Talks about multiple feature-based views of a master-design feature view. Concurrent update of other views; say Manufacturing; Analysis would be done as part is getting built in Design. Clearly	Talks about One-Side-Not-OK. Per feature abstraction. Has stated mapping	Clearly states limitation that much of research is yet to be done; use of symmetry; various
Cad Model Simplification Using A Removing Details And Merging Faces Technique For A Fem Simulation	Hamdi Mounir ; Aifaoui Nizar ; Benamara Abdelmajid	2012	Brep	DeFeat		Gen	Read STEP file Identify and suppress small features based on criteria Heal the model	Good summary of literature survey Good criteria for defeaturing	
Using Direct CAD Features and Parametric Data to Accelerate CAE Analysis	Shan Nageswaran	2012	Features	DeFeat DimRedn		Gen	Utilizing CAD like features to define mesh quality parameters and then later mesh these features accordingly.	feature based CAE modeling and CAE parametric changes.	
Development Of A Cad Model Simplification Framework For Finite Element Analysis	Brian Henry Russ	2012	Features	DeFeat		Gen	suppression rules by use of a statistical induction learning technique .	Automatic identification of non-critical features; accidental suppression of critical child features;	
Integration design and analysis of excavator boom based on CAD/CAE	Aimin Ji ; Kun Zhu ; Xinlei Huang ; Xu Yin	2013	Features	DeFeat	MA	Gen	Feature based model simplification.	Defeaturing parameters are collected upfront	No details on how midsurfaces are connected
Abstraction of mid-surfaces from solid models of thin-walled parts: A divide-and-conquer approach	Yoonhwan Woo	2013	Brep	DimRedn FeatReco	PreDef MA	Gen	decomposition on Brep into maximal (no concave edges) volumes which are simpler; get individual midsurfaces; then compose/extend/trim	Detailed study of face pairing; invalidity etc	No details on how midsurfaces are connected
Extraction of generative processes from B-Rep shapes and application to idealization transformations	Flavien Boussuge ; Jean-Claude L´Eon ; St´Efanie Hahmann ; Lionel Fine	2013	Brep	DimRedn FeatReco	MAT	Gen	Given Brep tries to build construction history. Mainly Feature Recognition of Extrudes. Then uses such features to idealize.	Modeller Independent States few types of interactions between midsurfaces	Too basic recognition. No details of various cases of midsurface connections
Idealized Models for FEA Derived from Generative Modelling Processes based on Extrusion Primitives	Flavien Boussuge ; Jean-Claude L´Eon ; St´Efanie Hahmann ; Lionel Fine	2013	Brep	DeFeat DimRedn FeatReco	MAT Decomp	Gen	decomposes brep into extrusion primitives and uses its graph for idealization. Tests if individual primitives are idealizable; using MAT. Interfaces for proper connections	Modeller Independent States few types of interactions between midsurfaces	Too basic recognition. No details of various cases of midsurface connections
Poly Decomp Algorithm (mnbayazit.com/406/bayazit)	Mark Bayazit	2013	Curves	ReMesh	Decomp	Gen	Polygon Decomposition algorithm.	Simple implementation. Ready code which works on vertex list; no line data structures	Not all basic cases are working. Needs improvement in Ray hitting

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Feature-based simplification of boundary representation models using sequential ieterative volume decomposition	Kim; Byung Chul ; Mun; Duhwan	2014	Brep	DeFeat FeatReco		Gen	Trries to build CSG model out of Brep using 4 types of Decomposition methods (fillets; wrap; split and cellular). Once tree is available; irrelevant features are suppressed to form LoDs	Works on Brep instead of expexting feature tree. Creates a feature tree like structure.	Too basic. Wont scale at all Claims that features are not accecible via APIs; which is wrong.