2021
CNCCookbook

CAM Survey Results

Bob Warfield

Every year, CNCCookbook surveys readers on their CAM Software. The results provide an invaluable guide to CAM for the CNC World..

CNC Cookbook®
Be a Better CNC'er

Overview

Every year CNCCookbook surveys readers on their CAM Software. The results are a unique and invaluable guide to CAM for the CNC World.

This year we received over 300 responses.

Product Managers at a variety of CADCAM companies, large and small, tell me they find the results very valuable in their own planning. There's really no other source of information quite like these surveys, so I wanted to get these initial results out as soon as I could.

We've done these CAM surveys in 2010, 2012, 2014, 2015, 2016, 2017, 2018, 2020 and now 2021, so there is historical data to compare against when looking for trends. Note that the 2021 results are actually 2020, we just felt it would look funny to publish 2020 in 2021, especially given we conducted the survey at the beginning of 2021.

As in the past, we divide the market into 3 segments:

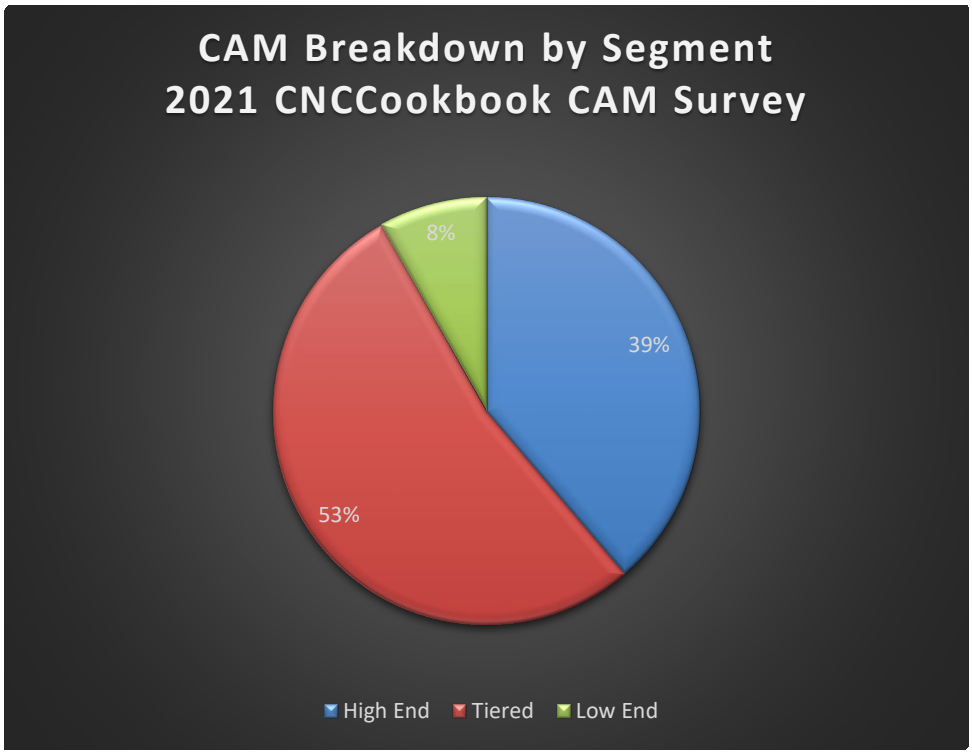
High-End: More expensive packages with more functionality.

Tiered: Modular packages available in a range of configurations that span from the Low-End to the High-End.

Low-End: These are inexpensive packages often used by Hobbyists, but as we'll see, at least one package has come up-market to the Professional World.

Let's start by taking a look by category at market share.

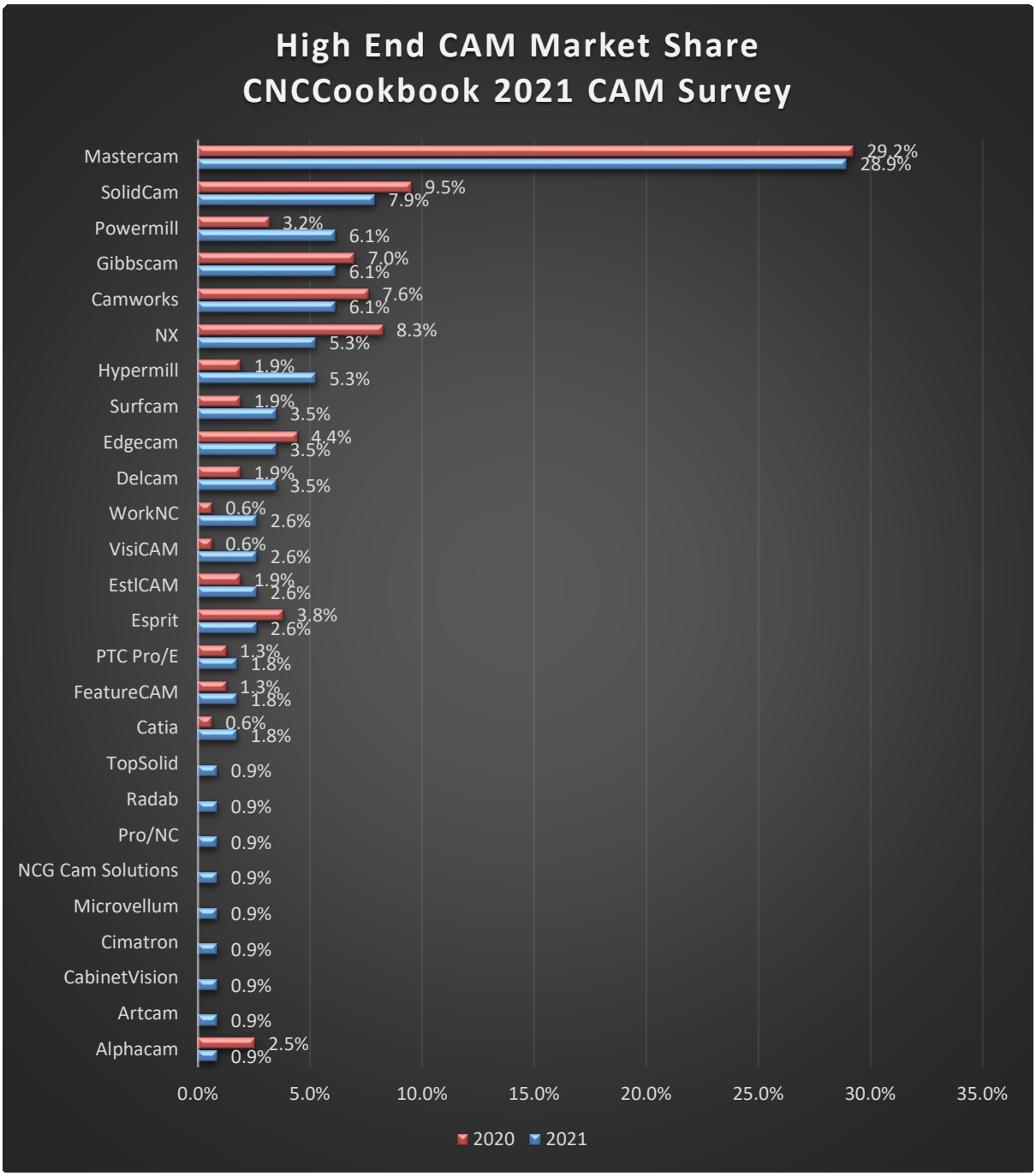
CAM Segments



This year, High End CAM was 39% of our responses, Tier-priced CAM is at 53%, and the Low End is at 8%. These numbers are basically unchanged from last year's results.

Whereas last year's numbers reflected some loss of share of the High End to Fusion 360, this year's numbers show that trend has stopped, at least for now.

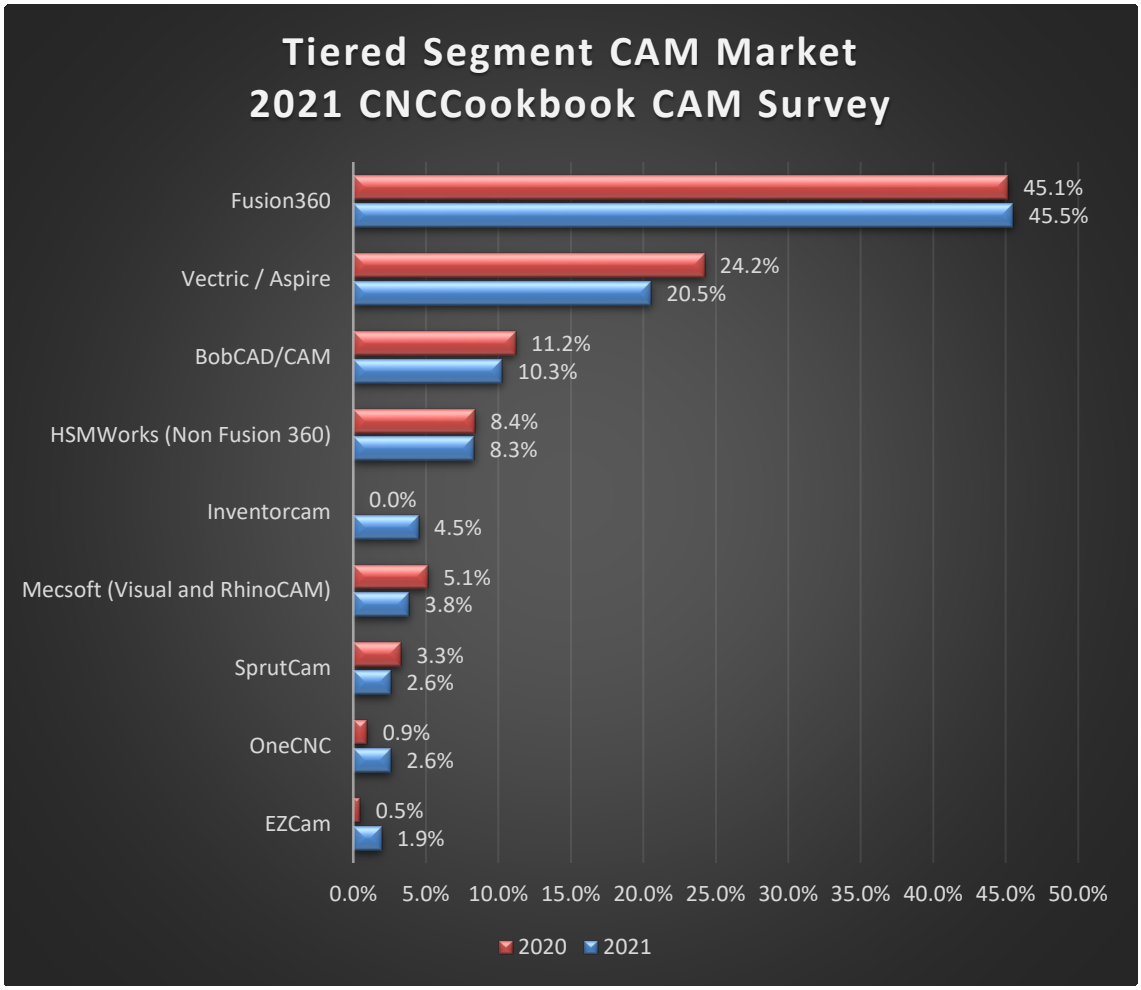
CAM Market Share by Segment: High End



This year, High End CAM market share is still led by Mastercam, which has an overall (not just high end share) share of 28.9%. Last year they had 29.2% share, so they've contracted a bit.

In second place we have SolidCam at 7.9%, down from last year's 9.5%. And in third place, PowerMill has risen from 3.2% to 6.1%.

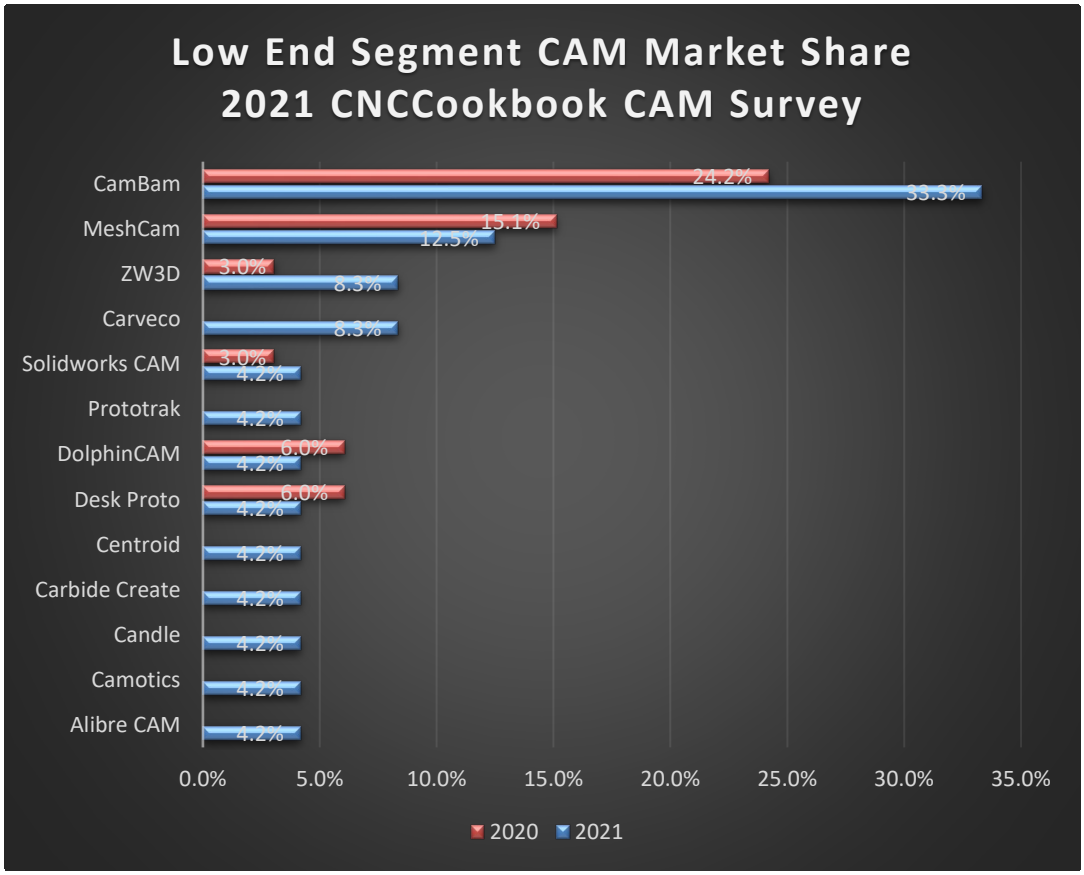
CAM Market Share: Tiered Segment



In this category, Fusion360 leads, with 45% overall market share

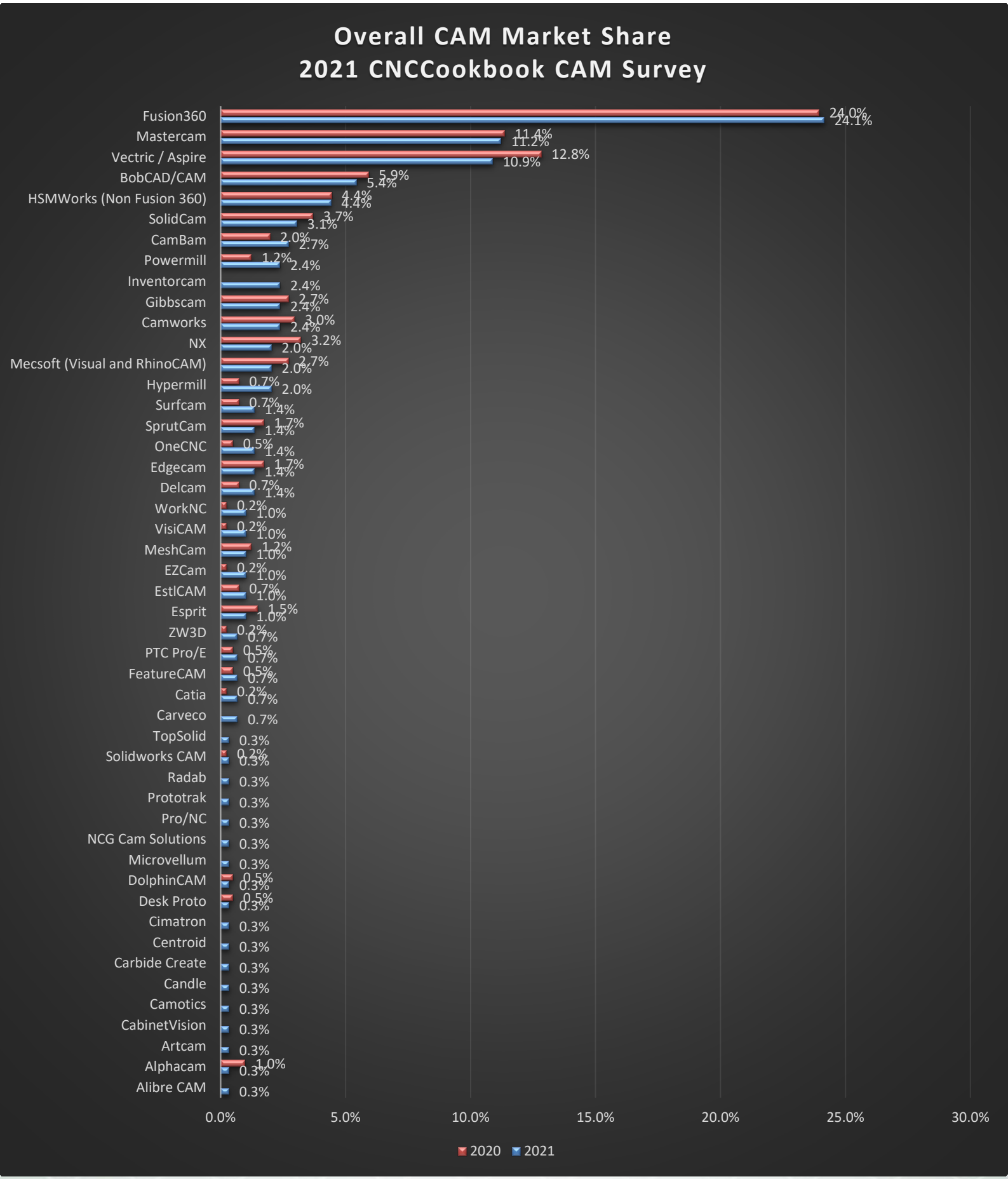
Vectric / Aspire showed the biggest change in going from 24.2% down to 20.5% this year. Most of the others didn't change all that much.

CAM Market Share: Low End



CamBam remains #1 and even grabbed share to rise from 24% to 33%. MeshCam lost a little share, moving from 15% to 12%.

Overall CAM Market Share



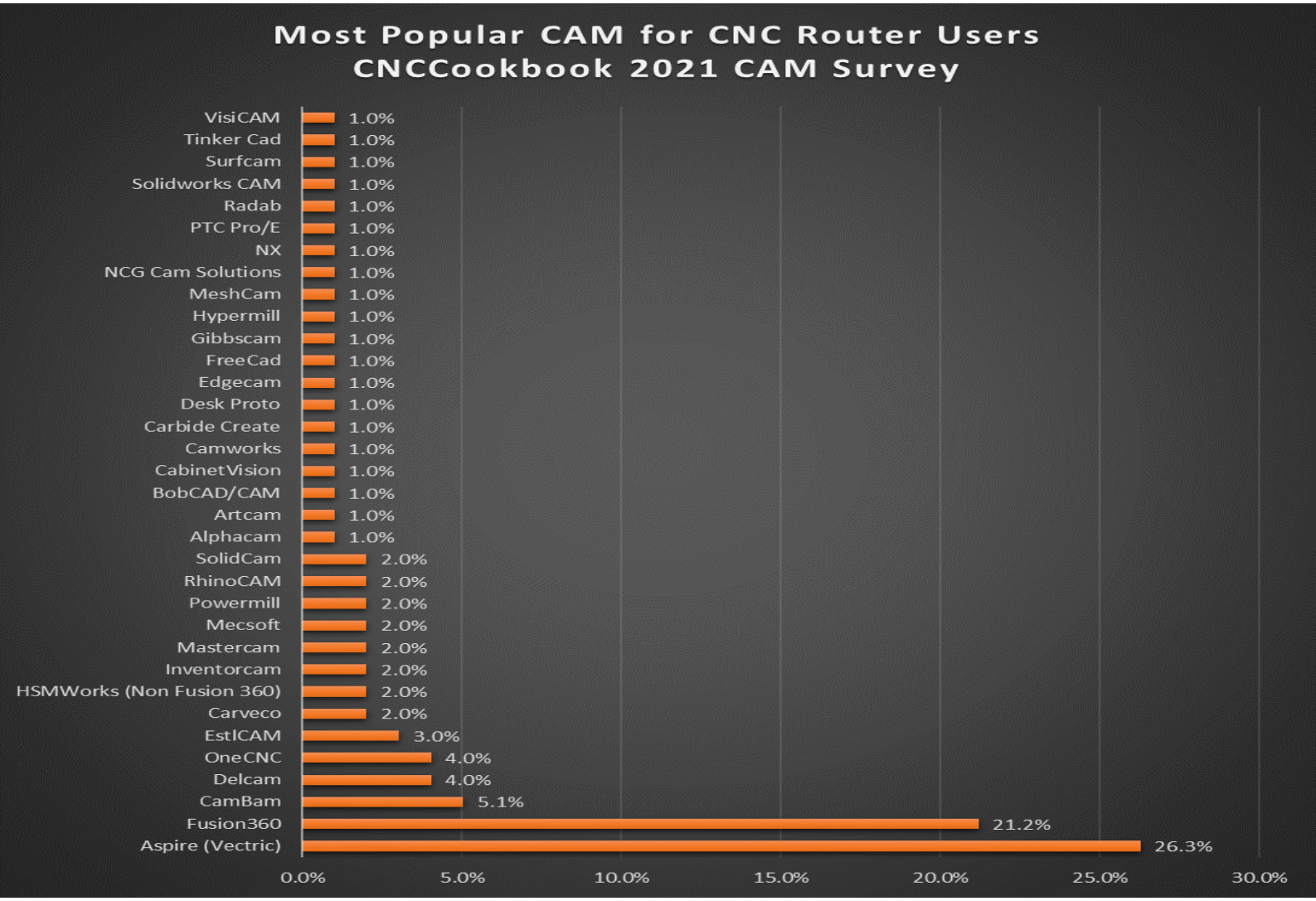
Overall Share Analysis

Looking at overall share for 2021, we can see just how much Fusion360, Aspire/Vectric, and Mastercam dominate the CAM world. Here are the highlights:

- While still at the top, Fusion360 hasn't grown overall share by much and neither has MasterCam.
- Aspire/Vectric is down slightly from 12.8% to 10.9%.
- HSMWorks is flat, Solidcam is down slightly.
- CamBam is up a pretty good tick from 2.0% to 2.7%. This may reflect interest in packages that are simpler to use than F360 at a time when F360 prices are rising from free.
- Powermill, a former customer satisfaction winner in these surveys, is solidly up from 1.2 to 2.4%.

In general, there's been a fair amount of fluctuation in share, but it's hard to say exactly what's driving it.

CAM Market Share: CNC Routers



Here the market shares for CNC Router users.

CNC Routers are often used quite differently than CNC Mills. In particular, they do a lot more artistic work such as signs and corporate logos. It's not surprising, therefore, that the Aspire / Vectric software dominates this segment.

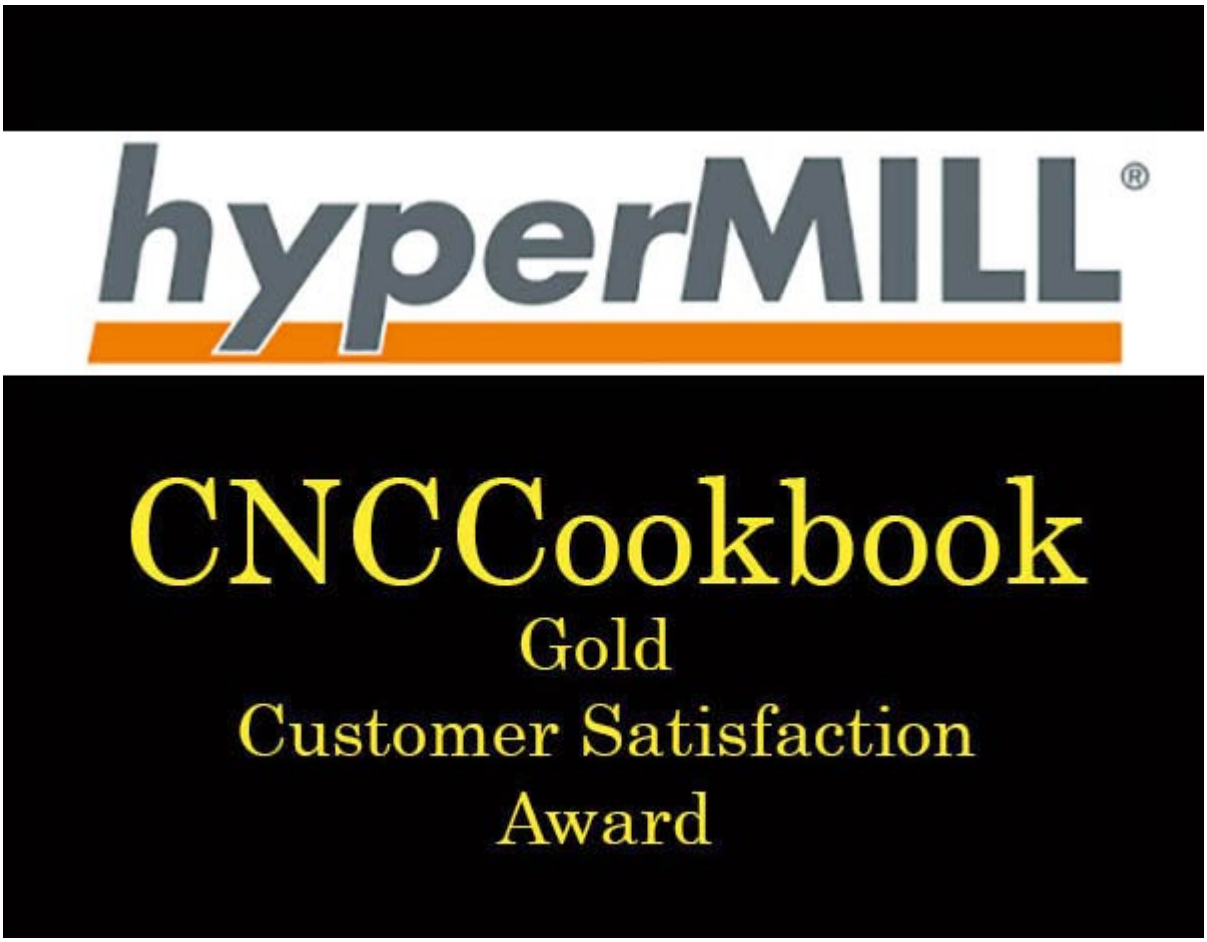
Compared to last year's survey, there is a lot more variety. That likely reflects CNCCookbook gaining a lot more CNC Router users in our readership. The leaders on this chart are relatively unchanged except that Type3 dropped off.

Customer Satisfaction Awards

Which packages did customers love the most? There's a lot more detail in the eBook (see below), but here are the winners.

Tied for first place with very close scores are PowerMill and HyperMill:

Congratulations to the PowerMill team! This marks the second time PowerMill took the gold as they also had it in 2016.



Congratulations to the HyperMill team!

Silver Awards

Congratulations to the Mastercam team!

Customer Satisfaction Award Winners over the Years

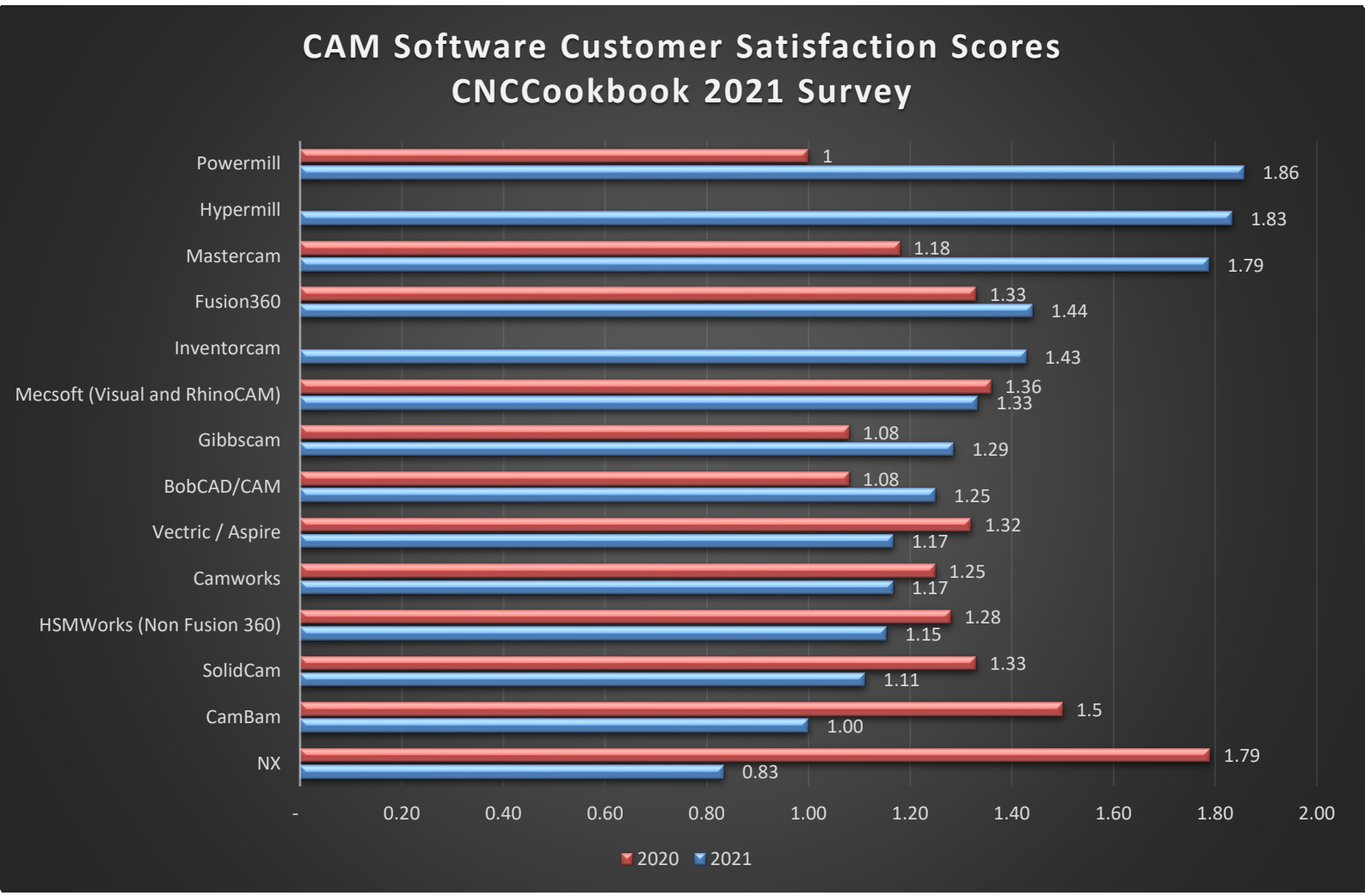
We think the customer satisfaction awards are a big deal as they represent actual user's evaluation of the software. After all, who would know more than actual users who live with a package day after day and use it to do their work?

Here is the roster of Customer Satisfaction Award winners over the years:

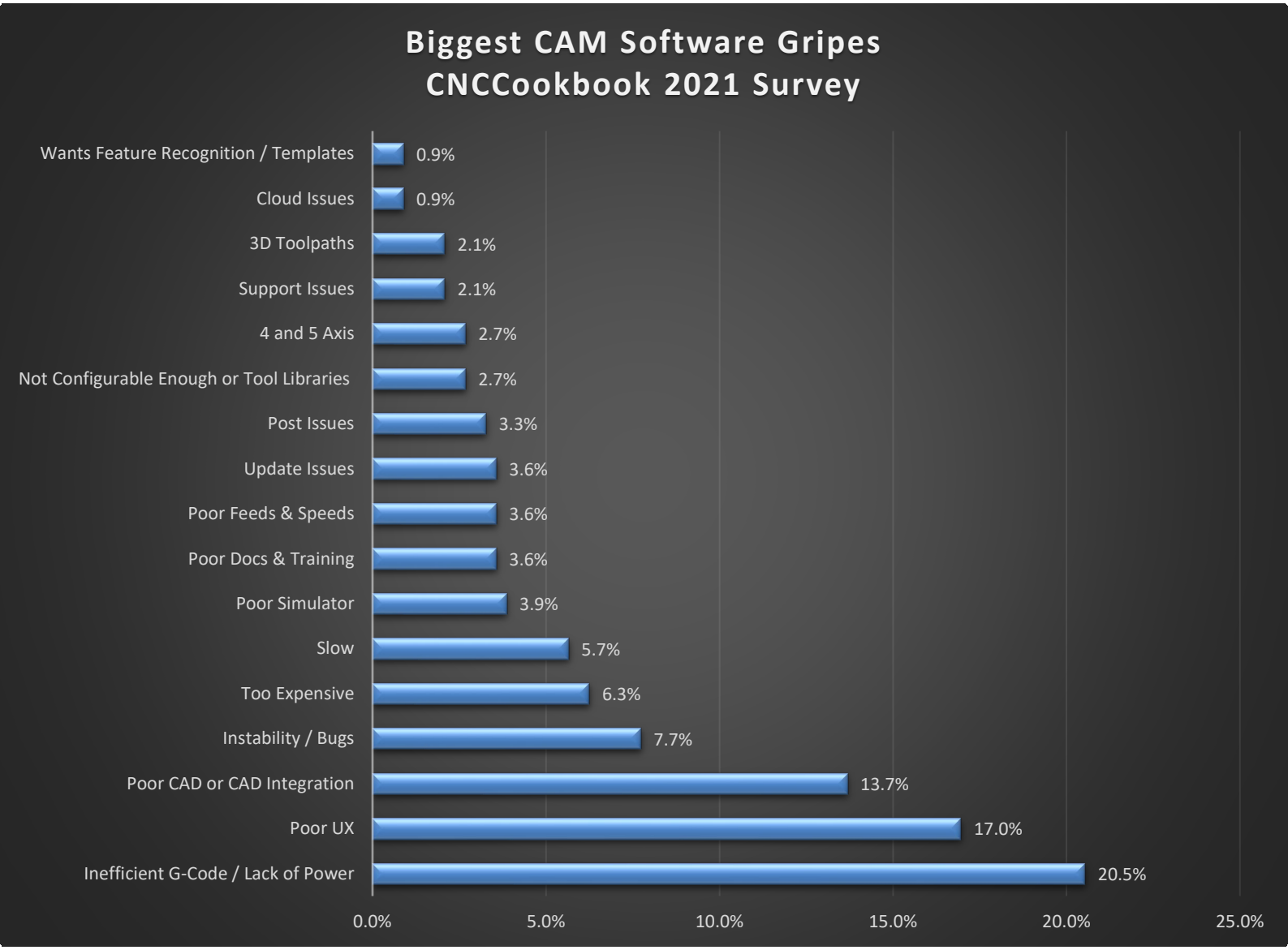
PowerMill 2021 & 2016
SprutCAM 2020 & 2016
SolidCAM 2018 & 2017
HyperMill 2021
Mastercam 2021
Siemens NX 2020
Gibbscam 2018
CamBam 2018
Surfcam 2017

Satisfaction Scores

Here's the big chart of all customer satisfaction scores. Note that we only include packages below that had at least 5 responses.



CAM Software Gripes



What are the biggest gripes users have with their CAM Software? You can see them laid out above.

Number one this year (up from 14% last year) is lack of power. Whether this is lack of a particular type of toolpath or inability to control the paths enough, this is all about an inability to make the g-code do what the user wants.

Poor UX (i.e. usability, user interface, hard to learn, hard to use) was second, and about the same as last year. CAM is hard to learn and use, it seems.

Third was the builtin CAD or the CAD integration. The actual percentage of complaints is higher, almost 14% vs about 12% last year.

Fourth was instability, though at 8%'ish was lower than the 12% reported last year.

CAM Software Gripes (Cont'd)

Configurability is an interesting one. Shops want CAM to capture their best practices without having to configure them manually over and over again.

Poor feeds and speeds also came up repeatedly, as it has in prior years. In general, CAM Feeds and Speeds are mediocre at best. Get a stand alone Feeds and Speeds calculator like G-Wizard and you'll do a lot better. In fact, I'll make a standing offer to all CAM companies—we'd love to work with you to integrate our world-class feeds and speeds engine with your software.

CAM Software Gripes: Part 2

This year, I am changing the format of how we will report the specific gripes for the top CAM packages. Instead of a chart, I am just going to list the gripes that are over 10% of respondents for a package.

BobCAD/CAM

- 12%: Inefficient G-Code / Lack of Power
- 24%: Instability / Bugs
- 18%: Poor CAD or CAD Integration
- 18%: Support Issues

CamBam

- 20%: Inefficient G-Code / Lack of Power
- 20%: Instability / Bugs
- 20%: Poor CAD or CAD Integration

Camworks

- 18%: Inefficient G-Code / Lack of Power
- 18%: Instability / Bugs
- 18%: Poor CAD or CAD Integration
- 18%: Poor Docs & Training

Fusion 360

- 26%: Poor UX
- 15%: Inefficient G-Code / Lack of Power
- 11%: Slow

Gibbscam

- 44%: Poor CAD or CAD Integration
- 11%: Not configurable enough
- 11%: Post Issues
- 11%: Poor Feeds & Speeds
- 11%: Slow

CAM Software Gripes: Part 2 (cont'd)

HSMWorks (Non Fusion 360)

- 19%: Inefficient G-Code / Lack of Power
- 19%: Poor CAD or CAD Integration
- 14%: Update Issues
- 10%: Poor UX
- 10%: Too Expensive
- 10%: Poor Feeds & Speeds

Hypermill

- 29%: Too Expensive
- 29%: Poor Feeds & Speeds
- 14%: Poor UX
- 14%: Poor CAD or CAD Integration
- 14%: Poor Simulation

Inventorcam

- 29%: Poor UX
- 14%: Inefficient G-Code / Lack of Power
- 14%: Poor CAD or CAD Integration
- 14%: Too Expensive
- 14%: Poor Docs and Training
- 14%: Poor Simulation

Mastercam

- **21%: Poor CAD or CAD Integration**
- **21%: Too Expensive**
- **15%: Poor UX**

Mecsoft (Visual and RhinoCAM)

- 73%: Inefficient G-Code / Lack of Power

CAM Software Gripes: Part 2 (cont'd)

Siemens NX

- 44%: Poor UX
- 22%: Inefficient G-Code / Lack of Power
- 22%: Poor CAD or CAD Integration
- 11%: Poor Docs & Training

Powermill

- 22%: Poor CAD or CAD Integration
- 20%: Poor UX
- 11%: Inefficient G-Code / Lack of Power
- 11%: Post Issues

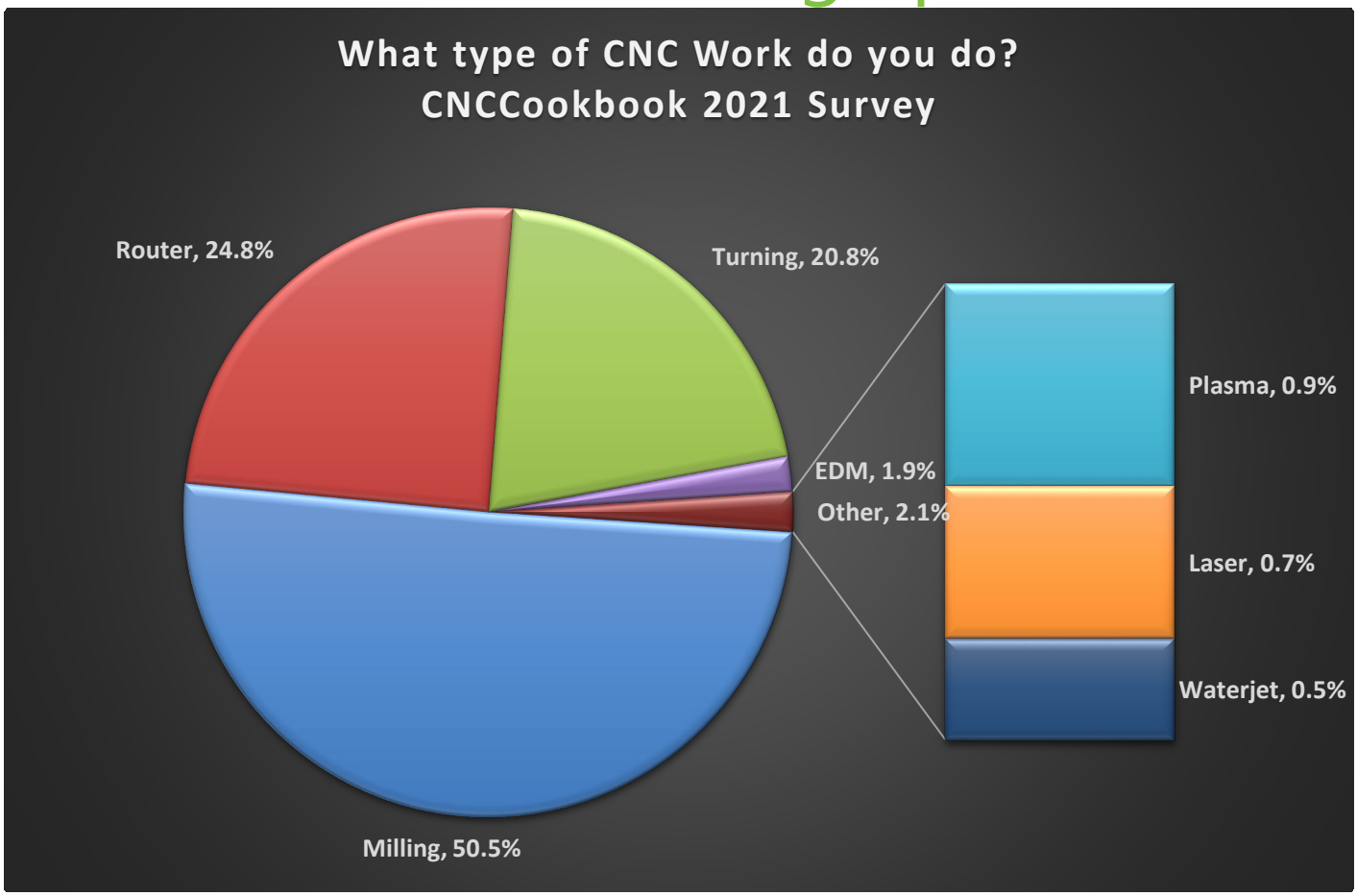
SolidCam

- 33%: Inefficient G-Code / Lack of Power
- 22%: Instability / Bugs
- 22%: Slow
- 11%: Poor CAD or CAD Integration
- 11%: Poor Simulation

Vectric/Aspire

- 30%: Inefficient G-Code / Lack of Power
- 13%: Poor UX
- 10%: Too Expensive
- 10%: Slow
- 10%: 4 and 5 Axis

CAM Demographics



In terms of the type of CNC Work respondents are doing, the majority is CNC Milling, followed by Router and Turning work. There's a smattering of other activities that probably would've been larger had they been actual choices on the survey rather than write-ins.

Are you evaluating new CAM Software currently?

This year, 20.61% of respondents are considering new CAM Software to replace the package they currently use. That's way up from last year's 17.81% of respondents.

Most were probably hunkered down and not looking to spend on anything unless absolutely required during the Pandemic Year..

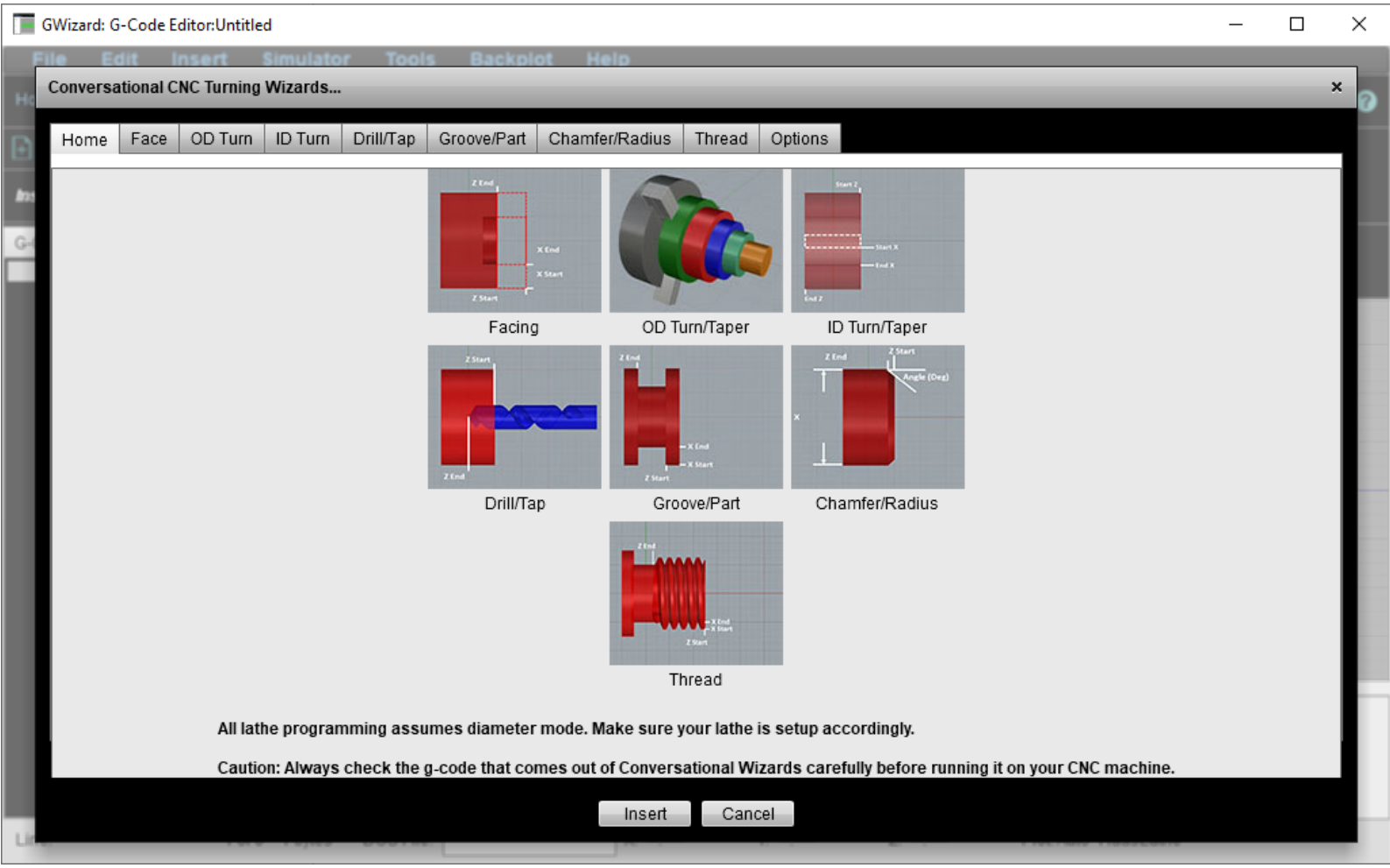
Have you ever used Conversational Programming instead of CAM to save time?

45% of respondents have used Conversational Programming to save time over CAM. That score is down from last year's 45% result.

Conversational Programming is a time saving and simpler alternative to CADCAM for certain jobs. I like to think of it as making it super easy to do all the sorts of things manual machinists do just by filling out a quick wizard.

Conversational Programming can be delivered as a stand-alone software package like our G-Wizard Editor or it can be built right into your CNC Control. It can make it a breeze to make simple parts or to add simple features to other parts.

Here's G-Wizard Editor's list of Conversational Turning Wizards to give an idea:



Is your CAM Software integrated within your CAD Software?

65.1% of respondents said their CAM is integrated with their CAD. That score is down from last year's result of 68%.

Several folks wrote into the "Other" category that their CAM software was "associative" with their CAD program. What that means is even though they don't run together in the same window, making changes to CAD are automatically reflected in CAM.

That associative linkage delivers 90% of the value of a true integration.

Do you modify your CAM-generated g-code by hand?

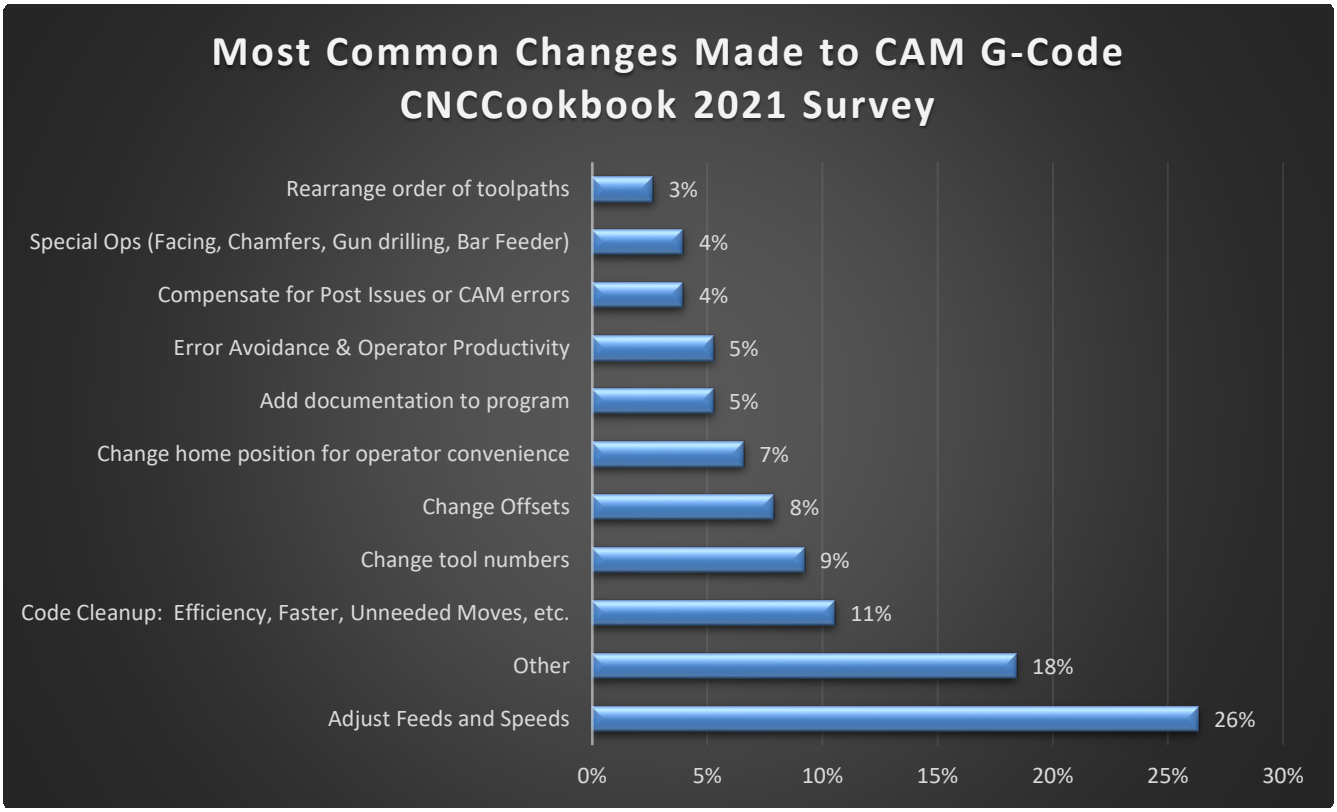
Results:

- Frequently: 12.2%, down from 14% last year
- Sometimes: 54.7% (up from 52% last year)
- Never: 33% (down from 34%)

Being able to modify your CAM's g-code can be a powerful tool. If your shop lacks this capability, you're missing out on a lot of opportunity to improve automation and profitability.

To get an idea what's possible, check out **37 things your CAM won't do for you that g-code programming can.** It will show you what's possible with a little g-code programming added to CAM.

Our respondents use this capability to do the following kinds of things:



As you can see, by far the most common change made to CAM-generated g-code is feeds and speeds. Not surprising considering how poor CAM-generated Feeds and Speeds are rated in this survey..

Other activities include modifying the tool numbers (so you can load your tool changer differently), general code cleanup, work offset-related changes, changing where the table stops at various points in the program, and adding documentation so programs are more readable.

Here's the list of one-offs from the "Other" category:

Change cut depths
Convert toolpath y-coordinates to a-coordinates
Delete some parts from a run
Enable through spindle coolant
Loop, Sub Program, main Program Organization
M00, M01
Macros
Modify 4th axis position
Modify Tool Change position
Q parameters
Remove Tool Length Compensation
Scale or Rotate Work
Spindle Direction
Tool pickup and put away

How do you test or proof your CAM-generated programs?

Proofing programs to avoid crashes and other errors is critical before you run them on a machine. Here's how the survey respondents go about testing their programs:

- 17.92% Cut "air" on the machine (up from 13.41% last year)
- 62% run the code through the CAM simulator (down from 63.06% last year)
- 9.68% use a stand alone simulator (up from 8.71% last year)

The remainder use some combination of the three.

Note that trusting the CAM Simulator is down. Most people do trust them. What can be more sexy than watching that simulation? It's full 3D and you'd swear it has to be accurate.

The issue is the way CAM program simulators work. If your CAM program includes a true CNC g-code simulator, then yes, it can be used to help test g-code programs.

The thing is, most CAM programs don't. They just plot the same geometry information that was used to create the g-code output by the postprocessor. This allows for subtle bugs to creep in that are not detectable in the CAM backplot.

For example, bugs in the post cannot be detected this way because the post is downstream of that geometry info. In other words, you aren't really performing an independent test on the g-code. Relying on this type of simulator is fraught with peril.

Because of that, a lot of experienced machinists insist on a separate simulated backplot as a sanity check for their g-code before they'll run it. It doesn't cost very much or take very long to have this peace of mind, so it's something you should consider.

Proving programs is just one of the reasons folks rely on our G-Wizard Editor software. We wrote an article that details the sorts of problems a simulator like G-Wizard can eliminate from your programs:

5 Ways G-Code Simulators Crush CNC Errors